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The Fourth Australian Atlas of Healthcare Variation

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Foreword

In Australia, we are fortunate to have one of the best healthcare systems in the world. The response to the COVID-19 pandemic has highlighted the dedication and expertise of our health workers, along with leadership and cooperation among our institutions and governing bodies.

Although the pandemic has dominated the health news and placed extra demands on the system, the longstanding challenges we face in health have not gone away. It is more important than ever to be strategic about our approach to the issues raised in this *Fourth Australian Atlas of Healthcare Variation*.

We must focus our resources on those with clinical need, and investigate variation to identify and minimise low-value care. Where we see high rates of preventable hospitalisations, clearly we must do better. In many cases, such as heart failure and chronic obstructive pulmonary disease, there is good evidence about what works to improve the care for people with these conditions. It is time to implement evidence-based care.

I thank our partner in producing this Atlas, the Australian Institute of Health and Welfare. I also thank the many individuals and institutions that have provided invaluable feedback on the data and commentaries: state, territory and Commonwealth health departments; policy makers; clinicians; clinical colleges and societies; and consumer representative organisations.

The healthcare variation data in the Atlas series help us to see patterns that we can't see from our localised perspectives and alerts us to problem areas. Please make use of the wealth of information in this Atlas to improve healthcare delivery.

Professor Villis Marshall AC
Chair

Australian Commission on Safety and Quality in Health Care

28 April 2021

Overview

The *Australian Atlas of Healthcare Variation* series explores the extent to which use of health care in Australia varies depending on where people live, how their care is funded and their level of socioeconomic disadvantage. Where possible, it looks at how use of health care by Aboriginal and Torres Strait Islander people compares with use by other Australians; how health care use in urban regions compares to rural and remote regions of Australia; and how health care use for private hospital procedures compares to health care use for public hospital procedures. It uses maps and graphs of variations in care, derived from information routinely gathered by the health system, to show how use of health care differs according to these factors.

The aim is to prompt further investigation into whether the observed variation reflects a response to differences in people's healthcare needs or in the informed choices they make about their treatment options. Variation for these reasons is desirable and a hallmark of a sophisticated healthcare system. But when variation in the use of health services is due to other factors – such as the provision of patient care that is not supported by evidence, uncertainty about the intervention's place in therapy, or differences in access to care or in appropriateness of care – it is unwarranted variation and represents an opportunity for the health system to improve.

Overview

Improvements to the health system involve increasing awareness of, and access to, treatment options that produce better outcomes for consumers, and reducing the use of investigations or treatments with little or uncertain benefit. They can take many forms, from policy reform through to a person-centred system that includes patients in shared decision making. Where improvements are imperative and/or there are obvious groups or sectors of the health system to lead them, the Commission makes recommendations.

In this Atlas

This *Fourth Australian Atlas of Healthcare Variation* (the Atlas) examines variation in 17 healthcare items according to where consumers live, and it tracks changes over time for nine of these items. Some items were selected for re-examination in this Atlas because there have been interventions that would be expected to affect the rates or patterns of use. In other cases, we have re-examined items that were shown to have less than optimal use in the first analysis, but little has been done to improve patient outcomes.

The interpretation of data in this Atlas, and discussions of what can be done to improve care, have benefited from thorough consultation by the Australian Commission on Safety and Quality in Health Care (the Commission). Clinicians, policy makers, medicines use experts, researchers and consumer representative organisations have helped us identify the likely drivers of variation and the changes that are needed to prevent unwarranted variation. The Commission is grateful for these insights.

This Atlas has been produced in partnership with the Australian Institute of Health and Welfare (AIHW), who have contributed enormous expertise in their analysis and understanding of the data and data sources. Commonwealth, state and territory health departments have also been pivotal partners in providing data, and in working with the Commission to interpret findings and find potential avenues for improvements in healthcare delivery.

What has the Atlas series taught us?

Where we see variation, it must be investigated and explained. Does it reflect differences in consumer needs or preferences, or is it unwarranted? The Atlas data assists us to identify potentially unwarranted variation and reveals signs that suggest healthcare delivery is not optimal:

1. High rates of healthcare interventions that have a risk of harm and uncertain or no benefit, suggesting a need for decisive action
2. High rates of admission for potentially preventable conditions or complications of chronic illness that may be due to a lack of integrated care and variable implementation of evidence-based care
3. Low rates of investigation or treatment in groups with the highest burden of disease, indicating that barriers to appropriate access should be investigated and dealt with
4. Markedly higher rates of interventions, or repeat interventions, in some areas, without an obvious reason, raising concern about the degree of benefit gained, potential harms, and opportunity costs to the health system.

What can we do?

Education and training are important, but not sufficient for reducing unwarranted variation in healthcare delivery. The implementation of shared decision making as routine practice to ensure informed consent, system and regulatory changes, and appropriate distribution of resources, are needed if we are to achieve meaningful change.

The current remuneration system for healthcare providers in Australia rewards quantity rather than quality. We need different and complementary payment approaches that better recognise and support high-quality care. And to underpin such change, we need to improve how we measure appropriateness of care; for example, with greater use of clinical quality registries.

What is appropriate care?

Appropriate care means offering patients care that optimises benefits and minimises harms, and is based on the best available evidence. At a health system level, it also needs to take into account whether the people with the greatest clinical need are getting care.

A lack of evidence contributes to variation in use of some health interventions, such as spinal fusion. Increasing the evidence base must be a priority in these situations by, for example, mandating contributions to a clinical quality registry.

The commentaries in this Atlas present a variety of specific strategies for reducing unwarranted variation in the patient care items examined, as shown in the examples below.

Cease payment for non–medically indicated early planned births

This fourth Atlas includes a report on gestational age at planned caesarean section or induction of labour without a medical or obstetric indication. This follows a report in the third Atlas about gestational age at planned caesarean section without a medical or obstetric indication. Short-term adverse effects from planned caesarean section before 39 weeks' gestation are well-established, and more recent research has suggested concerning long-term developmental effects for children born before 39 weeks, such as poorer educational outcomes.[1-6] For this reason, the Commission examined the topic in the third Atlas and again in this Atlas, despite data limitations that must be considered when interpreting the findings.

As reported in Chapter 1, in the seven reporting states and territories, 43–56% of the planned caesarean sections performed at less than 39 weeks' gestation, did not have a documented obstetric or medical indication. Despite the likely overestimation in these figures because of data limitations (see 'Important notes about the data…' on page 49), these high estimated rates are a call to action.

Given that the short-term adverse effects from planned caesarean section before 39 weeks' gestation are well-established, and despite multiple clinical policy responses the practice continues, a financial lever is needed in Australia to prevent unnecessary harm from early planned births. This should include ceasing MBS benefits and private insurance payments, as well as changes to state, territory and hospital admission policies, to prevent non–medically indicated planned births before 39 weeks and improve neonatal outcomes.

Integrated care to reduce potentially preventable hospitalisations

Potentially preventable hospitalisations include hospitalisations that may have been prevented by provision of disease-based, evidenced-based practice with appropriate intervention earlier in the disease. More than 330,000 potentially preventable hospitalisations in Australia in 2017–18 were due to the five conditions examined in Chapter 2: chronic obstructive pulmonary disease (COPD), kidney infections and urinary tract infections, heart failure, cellulitis, and diabetes complications.[7] Substantial variation was observed between the highest and lowest local area rates for each condition: from about 18 times as high for COPD to about six times as high for heart failure.

The high hospitalisation rates and substantial variation reported in this chapter show that recommended care is not always provided for people with chronic conditions. Despite major efforts to coordinate care for people with chronic diseases, fragmented care remains the major contributor to suboptimal outcomes for many patients.

Overview

A fundamental shift of healthcare investment to a better integrated primary care system must be made to improve health outcomes. Critically, health systems also need to become better at applying evidence-based interventions to reduce the progression of chronic disease and improve consumers' quality of life.

Trials of integrated care models have shown that people with advanced chronic diseases are routinely receiving suboptimal care. For example, potentially preventable hospitalisations were reduced by 37% among people with chronic disease who were enrolled in or who had attended the rapid access and stabilisation service in an integrated care model in Western Sydney.[8] The model focuses on people with type 2 diabetes, COPD, and coronary artery disease or congestive heart failure. The Western Sydney Primary Health Network and Western Sydney Local Health District shared governance of the project. However, the separate funding of hospital and general practice care means only partial integration of care can be achieved.[8] A single funding system for the health district, incorporating community, primary and hospital care, may achieve the best outcomes for people with chronic conditions.[8]

The Commission is working with the Independent Hospital Pricing Authority to design funding models for reducing potentially preventable hospitalisations, consistent with the long-term health reforms set out in the National Health Reform Agreement Addendum 2020–25.[9] These reforms will be evidence based and will prioritise consumer outcomes. This work will build on the activities set out in the 2017 Bilateral Agreements on Coordinated Care between the Commonwealth and states and territories.

Audit and review to improve use of spinal fusion

Most people with chronic low back pain related to degenerative disorders do not have nerve-related symptoms. The role of spinal fusion in these circumstances is very limited and controversial.[10] The *Fourth Australian Atlas of Healthcare Variation* found marked differences in rates of lumbar spinal fusion.

In 2015–2018, the rate of hospitalisation for lumbar spinal fusion was 12.4 times as high in the area with the highest rate compared with the area with the lowest rate, raising concern that the procedure is being used outside the guidelines in the areas with higher rates. The substantial variation in rates of lumbar spinal fusion, a procedure recommended in few circumstances, suggests an urgent need for peer review of clinical variation at a local level, as well as high-quality evidence about who may benefit from this surgery and the degree of benefit.

Patients offered spinal fusion surgery for low back pain should be fully informed of the potential benefits and risks for them. They must be given clear information about the likely outcomes, the gaps in evidence and other treatment outcomes so they can give fully informed consent for the procedure.

Health services should include clinical audit as a credentialing requirement for surgeons who perform lumbar spinal surgery. Priority should be given to improving access to services that provide multidisciplinary review and non-surgical treatments for chronic low back pain.

Reducing supply-driven gastroscopy

Chapter 5 examines rates of repeat colonoscopy and repeat gastroscopy within a shorter time frame than recommended in most situations. Rates were higher in major cities compared with remote areas, and in areas of socioeconomic advantage. Given the few good reasons for performing these repeated procedures, and the lack of correlation with prevalence of disease, the findings suggests overuse of the procedures in these areas.

Access to clinicians may influence the likelihood of people seeking care and affect the rates of repeat colonoscopy and repeat gastroscopy. Open access units that do not require consultant assessment of the appropriateness of requests, as well as greater remuneration for providing a service rather than a consultation, may also lead to variation and over-servicing in some areas.

Where supplier-induced demand is found to be a contributor to unwarranted variation, regulatory approaches are needed. For example, limiting provider numbers in some cases could improve appropriateness of care. Relevant clinical craft groups should also provide leadership about best practice to reduce over-servicing.

Informed consent

In all health care, consumers should be informed of the benefits and risks to them, and of appropriate alternatives. This is crucial when the intervention involves uncertain or little benefit. Ensuring women and their partners are informed of the benefits and risks is a powerful strategy for reducing harm from early planned birth without a medical or obstetric indication.

Giving young adults with gastroesophageal reflux symptoms information about the natural course of the disease, and how lifestyle modifications can help, will reduce inappropriate referral for gastroscopy (see Chapter 5). Improved consumer awareness of the appropriate timing of proton pump inhibitor dosing will also improve the effectiveness of treatment and reduce the need for higher doses or long-term use. Tools such as the AIHW cancer summary data tool[11] can support data-driven discussions with consumers on the rates of cancer in various age groups. Discussing the very low rate of gastroesophageal cancer in younger adults may reduce inappropriate requests for gastroscopy and repeat gastroscopy in this group (see Chapter 5).

Supporting self-management

Consultations for procedures such as colonoscopy are an opportunity to arm the consumer with strategies to reduce their subsequent risk – for example, by reducing the lifestyle-related risk factors for bowel cancer. At a population level, the frequency of bowel cancer could be significantly reduced with successful modification of the key population-attributable risks – that is, addressing diet (21.8%), physical inactivity (16.5%), excess weight (12.5%), smoking (7.4%) and alcohol use (5.5%).[12]

In chronic illness, self-management has a major bearing on the prevention of complications. It is the patients themselves who need to take their diabetes medications every day, quit smoking or do the exercises to manage their back pain. Educating people with chronic illness about self-management, and supporting them to be active and effective partners in their health care, has the potential to greatly improve health outcomes.

Overview

Improving equity in health care

A concerning pattern of inequity has emerged from all four Atlases. For example, the much higher rates of otitis media in Aboriginal and Torres Strait Islander children than in other Australian children are not matched by appropriately higher rates of myringotomy (see Chapter 3).

Conversely, where the patterns in the Atlas do follow known differences in the burden of disease, they highlight the need to improve prevention of chronic disease by addressing risk factors, and the need to improve prevention of serious complications in people who have developed disease. People living in areas of socioeconomic disadvantage have higher rates of chronic conditions such as diabetes, heart disease and chronic COPD.[13] The Atlas series has made many recommendations for improving health care for under-served groups with specific conditions, but models of care and prevention need to better target health inequities in a systematic way.

A lack of community-based health services and long distances to travel contribute to the high hospitalisation rates for patients from remote and some regional areas. Anecdotally, a greater availability of beds in some small rural hospitals may also lead to a lower threshold for admitting patients. Services must be redesigned to increase the availability of health care close to home for people living in non-metropolitan areas.

Socioeconomic disadvantage may contribute to hospitalisations through a variety of mediators, such as greater disease severity, multiple comorbidities and poor health literacy.[14] Long-term strategies are needed to address the social determinants of health. Complex social determinants also underlie the disparities in health between Aboriginal and Torres Strait Islander people and other Australians.[15,16] To reduce health inequities, improvements in social factors are required – for example, in education, employment and living conditions.[15]

Misalignment of mainstream health services with Aboriginal and Torres Strait Islander culture is a barrier to accessing health care.[17] Increasing access to culturally safe health care will involve continuing to develop partnerships with the Aboriginal Community Controlled Health Service sector, increasing the Aboriginal and Torres Strait Islander health workforce, and improving cultural awareness and competency of mainstream health services.

Following evidence-based practice

For many of the conditions discussed in this Atlas, we have evidence of what works to improve outcomes for consumers, and we have evidence-based best practice spelt out in guidelines. Despite having this information available, the implementation is lacking – this constitutes inappropriate care.

For example, results of a recent Australian study found only 13% of heart failure patients received excellent care according to guidelines.[18] Another Australian study also showed shortfalls in rates of prescribing recommended medicines for patients admitted to hospital for heart failure.[19] Pulmonary rehabilitation is another example – it can reduce COPD-related hospitalisations by 36–56%[20,21] and is recommended by guidelines.[22] However, estimates of the use of pulmonary rehabilitation have ranged from less than 5% to 10% of people in Australia with COPD.[23] In each example, multiple factors contribute to the problem, and multi-pronged approaches are needed to support best practice.

More effective prevention strategies

The need for many of the interventions analysed in the Atlas could be reduced by better prevention. For example, addressing lifestyle-related risk factors such as obesity and smoking could prevent a considerable proportion of chronic diseases and bowel cancers.[13] A substantial reduction in risk factors could deliver significant benefits in terms of reduced burden of disease, as well as reduced expenditure on investigations and treatment for these diseases. Reducing unnecessary healthcare interventions has several further benefits, including reducing the associated carbon emissions, which will in turn benefit health at a societal level.

Conclusion

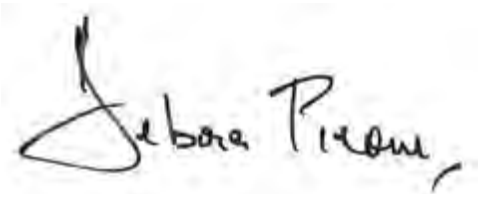
The Atlas series has highlighted many challenges and inequities in health care. It has also suggested reasons for variation, as well as realistic and specific recommendations for change. And it has shown how analysis and presentation of routinely collected data can promote action by organisations and clinical groups to investigate and improve appropriateness of care and the value Australians receive from their healthcare system. Many case studies in the Atlas show how innovative solutions, such as integrated care for people with chronic conditions, can improve health outcomes. Implementing successful interventions on a larger scale requires effective diffusion mechanisms, as well as funding reform.[24]

The maps and commentary in the four *Australian Atlases of Healthcare Variation* reveal many opportunities to deliver better health care in this country, by investigating and addressing both underuse and overuse of services, and by implementing targeted strategies to prevent chronic disease. Providing education and training is important, but not enough. We must make major system changes at all levels to achieve real progress.

Conjoint Professor Anne Duggan

Clinical Director

28 April 2021



Adjunct Professor Debora Picone AO

Chief Executive Officer

28 April 2021

Why measure variation in healthcare use?

Getting the best outcomes for patients and reducing harm is the goal of the Atlas. Where we see substantial variation in use of a particular treatment, it is an alarm bell that should make us stop and investigate whether appropriate care is being delivered.

Variation in itself is not necessarily bad, and it can be good if it reflects health services responding to differences in patient preferences or underlying needs. When a difference in the use of health services does not reflect these factors, it is unwanted variation and represents an opportunity for the health system to improve.

Rates of an intervention that are substantially higher or lower in some areas can highlight:

- Clinical practice that is not supported by evidence-based guidelines
- Inequity of access to evidence-based care, and the need to deliver services more fairly
- Uncertainty about the intervention's place in therapy, and the need for better data on its benefits and harms
- Gaps in evidence accessible to clinicians, and the need for clinical care standards
- Inadequate system supports for appropriate care, and the need for changes in training or financial incentives.

Looking at how healthcare use varies between people living in different areas, between people with and without socioeconomic disadvantage, and between Aboriginal and Torres Strait Islander people and other Australians can show who in our community is missing out. Fundamental changes to address the underlying determinants of ill health, as well as better service delivery for those with existing disease, are needed where these inequities are found.

Overview

Responses to the Atlas series

The overall goal of the Atlas series is to improve the appropriateness of care. At a local level, the data can be used to make judgements and drive improvement in health care. At a national level, the Commission publishes recommendations for action using levers across the entire health system to effect change. Some of the most powerful levers recommended in the Atlas series have been aligning payments for health care with best-practice guidelines, developing clinical care standards, and incorporating the examination of healthcare variation into the National Safety and Quality Health Service Standards.

The Atlas series has prompted action across the health system to address variation in healthcare. Case studies highlighting responses to the Atlas reports on knee arthroscopy and psychotropic medicines are shown below. More example initiatives are described in the third Atlas, Chapter 6.

Case study: knee arthroscopy

Knee arthroscopy is a surgical procedure for examining the inside of the knee joint and, if necessary, repairing it. Arthroscopic procedures are not effective for treating knee osteoarthritis.[25] In older patients with knee pain caused by osteoarthritis or degenerative meniscal changes, arthroscopic procedures provide only minor pain relief, which is offset by an increased risk of harm.[26] In 2015, the first Atlas reported that there were more than 33,000 hospitalisations for knee arthroscopy in people aged 55 years and over in Australia in 2012–13.[28] The rate of hospitalisation was seven times higher in the area with the highest rate compared with the area with the lowest rate.[28]

The Commission released the Osteoarthritis of the Knee Clinical Care Standard in light of the variation reported in the first Atlas and referred the findings to the MBS Review Taskforce, which subsequently recommended removal of funding for knee arthroscopy for degenerative changes.[28] The rate of knee arthroscopy in people over 55 years of age in Australia fell by 40% from 2015 to 2019.[29] Many drivers are likely to have contributed to this reduction, in addition to the Atlas.

Case study: state response to high rates of psychotropic medicine use

The first Atlas showed that several areas of Tasmania were among the highest users in Australia of anxiety and depression medicines.[27] Differences in rates of anxiety and depression in the population did not account for these high rates. Primary Health Tasmania undertook a comprehensive needs assessment to gain a deeper understanding of the Atlas findings, and to see how optimal treatment of anxiety and depression could best be supported.

Primary Health Tasmania, together with the Tasmanian Health Service and the Department of Health and Human Services, took a multi-pronged approach to improving the quality of clinical care. Quality improvement initiatives included auditing practice data, conversations with clinicians in target areas, providing peer support to improve practice, developing deprescribing resources and training clinicians in their use, and developing Tasmanian Health Pathways for mental health. The team assessed the availability of mental health services in different areas of Tasmania, and improved access where gaps were found. The team improved access to face-to-face social work and psychology supports, promoted consumer self-management tools for depression and anxiety, and increased the use of GP Mental Health Treatment Plans.

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Key findings and recommendations

When variation in healthcare use reflects differences in the clinical needs or preferences of the people receiving care, it is warranted and means that the healthcare system is appropriately responding to population need. But some of the patterns of care in this Atlas, and the high rates of use of some treatments, suggest that greater attention needs to be paid to matching health care to people's needs to ensure appropriate care.

This Fourth Australian Atlas of Healthcare Variation shows that there is an opportunity to improve healthcare delivery to ensure that the best care is available to everybody, regardless of where they live. The Atlas also shows that we need to do better with data availability so that we can gain a comprehensive picture of the patterns of healthcare use in Australia and improve the value obtained from our healthcare system. This section presents the key findings from the Atlas, and the Australian Commission on Safety and Quality in Health Care (the Commission)'s recommendations for action. The Commission consulted widely, but is solely responsible for making the recommendations; as such, the recommendations may not reflect the views of all contributors to the Atlas.

Key findings and recommendations

1. Early planned births

Planned birth by caesarean section or induction (a medical treatment to start labour) is an important intervention in maternity care. However, the timing of birth should be carefully considered to ensure the best outcome for the mother and her baby.

When planning for birth by caesarean section or induction of labour, waiting until at least 39 weeks gestation results in better short- and long-term outcomes for the baby, unless there are medical or obstetric reasons for earlier birth. Short-term risks, such as respiratory problems and admission to neonatal intensive care, are higher for babies born at early term (by caesarean section or induction of labour) rather than full term.[1-4] There is also some evidence of longer-term risks in children born before 39 weeks gestation (either vaginally or by caesarean section) compared with those born at full term, such as cognitive deficits and a higher risk of attention deficit hyperactivity disorder (ADHD).[5]

Despite a number of data limitations (see page 49), the estimates presented in this chapter suggest that the percentage of caesarean sections performed before 39 weeks without a medical or obstetric indication may be substantial, and action is needed to reduce these rates.

Strategies to reduce rates of early planned birth without a medical or obstetric indication before 39 weeks gestation include:

- Changing policies of state and territory governments, hospitals and insurers to stop booking of early planned births without a medical or obstetric indication
- Giving parents information about the risks and benefits of early planned birth, and support for shared decision making
- Giving clinicians information about the risks and benefits of early planned birth
- Collecting data on the reason for early planned birth.

Gestational age	Range of state and territory rates* for caesarean sections without a medical or obstetric indication, as a percentage of all caesarean sections at these gestational ages, 2017
<37 weeks	13.3–19.3%
<38 weeks	24.8–32.7%
<39 weeks	42.8–56.1%

* Excludes Northern Territory

Gestational age	Range of state and territory rates* for induction of labour without a medical or obstetric indication, as a percentage of all inductions at this gestational age
<39 weeks	0.2–6.0%

* Excludes New South Wales and the Northern Territory

Recommendations

1a. It is recommended that pregnancies continue until at least 39 weeks gestation unless there is a medical or obstetric reason justifying earlier intervention.

1b. Health service organisations with maternity services, and clinicians, to implement systems to obtain informed patient consent that includes the provision of comparative information for prospective parents on the short- and long-term risks of early planned birth without a medical or obstetric indication.

1c. Health service organisations with maternity services to establish policies to cease booking planned births without a medical or obstetric indication before 39 weeks from July 2022 and to review adherence to these policies.

1d. Medicare Benefits Schedule payment for planned births before 39 weeks without a medical or obstetric indication to cease from July 2022.

1e. Health service organisations with maternity services, and clinicians, to ensure that care is consistent with The Whole Nine Months[6] campaign.

1f. The Australian Institute of Health and Welfare (AIHW) to prioritise the development of the indicator on early caesarean section without a medical or obstetric indication in the National Core Maternity Indicators, including the need for a data element on the reason for early birth.

1g. All state and territory health departments to ensure consistent, routine collection and reporting of data on gestational age for planned births without a medical or obstetric indication to improve the quality of data collections. This should include reporting of gestational age in days to allow more in-depth understanding of the distribution of births occurring before 39 weeks.

1h. Health service organisations with maternity services to:

i. Report early planned births without a medical or obstetric indication as part of mandatory reporting of National Core Maternity Indicators

ii. Conduct audits of records documenting the communication of information to prospective parents about the risks of early planned births without a medical or obstetric indication, and provide the results back to clinicians to act upon, in line with Action 1.28 of the National Safety and Quality Health Service Standards

iii. Incorporate individual clinicians audit data as part of re-credentialing processes

iv. Report on agreed key performance indicators, trends and adverse events on early planned births without a medical or obstetric indication to the governing body.

1i. Short- and long-term risks arising from early planned birth without a medical or obstetric indication are avoidable. The Commission to include early caesarean section without a medical or obstetric indication in the national list of hospital-acquired complications.

Key findings and recommendations

2. Chronic disease and infection: potentially preventable hospitalisations

Potentially preventable hospitalisations are an indicator in the National Healthcare Agreement, and include hospitalisations that may have been prevented by appropriate management earlier in the disease. The rate of potentially preventable hospitalisations in a local area is likely to reflect sociodemographic factors as well as the quality of early disease management.[7]

More than 330,000 potentially preventable hospitalisations in Australia in 2017–18 were due to the five conditions examined in this chapter: chronic obstructive pulmonary disease (COPD), kidney infections and urinary tract infections (UTIs), heart failure, cellulitis, and diabetes complications.[8] After standardising to remove age and sex differences between populations, substantial variation was observed between local areas (Statistical Area Level 3 – SA3) in the rates of hospitalisation for each condition. Variation was greatest for COPD (the highest rate was about 18 times higher than the lowest), cellulitis (about 16 times) and diabetes complications (about 12 times). For all the conditions examined, hospitalisation rates were higher among Aboriginal and Torres Strait Islander people, people living in areas of socioeconomic disadvantage, and those living in remote areas.

The high hospitalisation rates and substantial variation reported in this chapter show that recommended care is not always provided for people with chronic conditions. Even with the significant funding provided through Medicare to better coordinate primary care for people with chronic diseases, fragmented health care contributes to suboptimal management.

Likely contributors to variation include a higher proportion in some areas of patients with the most complex chronic disease, for whom hospitalisation may be inevitable. Poor access to health services in the community is also related to higher rates of potentially preventable hospitalisations. Ability to access health services is determined not only by clinician supply, but also by costs, transport and sufficient health literacy to know when to seek care.

Healthcare investment must be redirected to create a better-integrated primary care system to reduce potentially preventable hospitalisations. Critically, health systems also need to become better at reducing the progression of chronic disease and improving patients' quality of life.

Data item		Range across local areas* per 100,000	Times difference	Times difference excluding top and bottom 10%	Number during 2017–18
2.1	Chronic obstructive pulmonary disease (COPD)	56 – 1,013	18.1	3.3	77,754
2.2	Heart failure	91 – 531	5.8	2.0	62,554
2.3	Diabetes complications	64 – 782	12.2	2.9	50,273
2.4	Kidney infections and urinary tract infections	141 – 893	6.3	2.3	76,854
2.5	Cellulitis	90 – 1,393	15.5	2.9	68,663

* Statistical Area Level 3

Recommendations

2a. Consistent with the commitments made under the National Health Reform Agreement and building on the activities set out in the 2017 Bilateral Agreement on Coordinated Care, Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to implement the following principles in developing chronic disease management programs consistent with the National Strategic Framework for Chronic Conditions:

i. Patients, families and carers as partners in care, where patients are activated to maximise their knowledge, skills and confidence to manage their health, aided by technology and with the support of a healthcare team

ii. A risk stratification approach that supports identification of patients with high coordination and multiple provider needs, to ensure personalisation of service provision

iii. Flexible service delivery and team-based care that supports integrated patient care across the continuum of the health system through shared information and care planning

iv. A commitment to care that is of high quality and safe, including care planning and clinical decisions that are guided by evidence-based patient healthcare pathways, appropriate to the patient's needs

v. Data collection and sharing by patients and their healthcare teams to measure patient health outcomes and improve performance.

2b. The Commission, the Independent Hospital Pricing Authority and the Administrator of the National Health Funding Pool to identify and develop alternative approaches to funding for chronic disease and infection that could be applied to the National Health Reform Agreement Pricing and Funding model so that pricing and funding are aligned with best-practice guidelines. The alternative models could include bundled payments, capitation payments or regionally coordinated service responses.

COPD

2c. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to implement appropriate care for the management of people with chronic obstructive pulmonary disease (COPD) using the *COPD-X Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease 2020*[9] as the routine model of care.

Heart failure

2d. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to implement process improvement for the effective management of people with heart failure, including:

i. Multidisciplinary care across the acute and primary care sectors

ii. A combination of strategies, including non-pharmacological approaches such as physical activity programs and fluid or dietary management, and pharmacotherapy.

Diabetes

2e. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to promote appropriate care for the management of people with diabetes aligned with:

i. *The Management of Type 2 Diabetes: A handbook for general practice* (2020)

ii. The Australian National Diabetes Strategy 2016–2020.

Key findings and recommendations

3. Ear, nose and throat surgery for children and young people

Tonsillectomy

Tonsillectomy is used to treat recurrent throat infections (tonsillitis) and obstructive sleep apnoea (OSA), but there are uncertainties about its benefits. It is one of the most common surgical procedures performed in children in Australia – at a rate higher than in New Zealand or the United Kingdom.

After standardising to remove age and sex differences between populations, the Atlas found that, in 2017–18, the rate of hospitalisation for tonsillectomy in children and young people was six times higher in the local area with the highest rate than in the area with the lowest. It also found that the rate of tonsillectomy hospitalisations increased by 3% between 2012–13 and 2017–18.

There is a need for more information to ensure evidence-based care is provided to children with recurrent tonsillitis or OSA. Further developing the Australian Society of Otolaryngology Head and Neck Surgery Ear, Nose and Throat data registry could add to the knowledge base about outcomes for specific patient groups and provide information for effective peer review of tonsillectomy.

Myringotomy

Myringotomy is another common surgical procedure performed in young children. It is used to treat otitis media, an infection of the middle ear that can cause hearing loss.

Myringotomy (with insertion of grommets) is recommended for children who have otitis media with effusion (fluid) and documented hearing loss in both ears for more than three months.

Otitis media is the key cause of hearing loss in Aboriginal and Torres Strait Islander children, who are at risk of earlier, more severe and longer-lasting middle ear disease than other children. The Atlas examined rates in Aboriginal and Torres Strait Islander children for the first time.

The Atlas found that, in 2017–18, the rate of hospitalisation for myringotomy in children and young people was about eight times higher in the local area with the highest rate than in the area with the lowest. Although the rate for Aboriginal and Torres Strait Islander children was 6% higher than the rate for other children, it was lower than would be expected if surgery rates matched the prevalence of otitis media in Aboriginal and Torres Strait Islander children.

A comprehensive approach combining prevention, early treatment and coordinated management is urgently required to reduce rates of otitis media in Aboriginal and Torres Strait Islander children.

Data item		Range across local areas* per 100,000	Times difference	Times difference excluding top and bottom 10%	Number during 2017–18
3.1	Tonsillectomy hospitalisations, 17 years and under	305 – 1,836	6.0	2.2	42,509
3.2	Myringotomy hospitalisations, 17 years and under	198 – 1,607	8.1	2.3	34,755

* Statistical Area Level 3

Recommendations

Tonsillectomy

3a. The Australian and New Zealand Society of Paediatric Otorhinolaryngology to work with relevant clinical colleges to develop clinical guidelines on tonsillectomy in children, and subsequent to this the Commission to develop a clinical care standard with safety and quality indicators.

3b. Health service organisations to:

i. Conduct audits of indications for tonsillectomy and tonsillectomy rates to monitor variation and provide the results back to clinicians to act upon in line with Action 1.28 of the National Safety and Quality Health Service (NSQHS) Standards

ii. Incorporate individual clinician's audit data as part of recredentialing processes.

Myringotomy

3c. State and territory health departments and health service organisations to set benchmarks for access to paediatric audiology services.

3d. The Australian Government Department of Health to develop and implement two national ear and hearing health performance indicators for Aboriginal and Torres Strait Islander children consistent with the recommendations of the National Aboriginal and Torres Strait Islander Hearing Health Advisory Panel:

i. Measure the proportion of Aboriginal and Torres Strait Islander children who received an annual ear and hearing health check and the proportion of these who were found to have ear and/or hearing health conditions

ii. Measure the proportion of Aboriginal and Torres Strait Islander children who received audiology services and the proportion of those diagnosed with hearing loss.

3e. The Australian Government Department of Health, as part of the Roadmap for Hearing Health, to publish data on progress against the integrated national approach to undertaking ear health checks of children aged 0–6, with the goal of every Aboriginal and Torres Strait Islander child having regular ear health checks.

3f. Health service organisations to:

i. Conduct audits of myringotomy and myringotomy rates to monitor variation and provide the results back to clinicians to act upon in line with Action 1.28 of the NSQHS Standards

ii. Incorporate individual clinician's audit data as part of recredentialing processes.

Key findings and recommendations

4. Lumbar spinal surgery

Lumbar spinal surgery refers to surgery in the lumbar spine or lower back. It is sometimes used to treat degenerative spinal disorders, which is the focus of this chapter. Two common lumbar spinal procedures are fusion and decompression. The Atlas excludes use of spinal surgery for treating infection, tumours or injury.

Degenerative spinal disorders are a diverse group of conditions that can cause chronic low back pain, leg pain and disability. Lumbar spinal surgery is generally only considered for certain degenerative spinal disorders if non-surgical options have not worked. There are limited data on patient outcomes, due in part to difficulties in conducting high-quality randomised controlled trials of these types of surgery.

Spinal fusion

Spinal fusion surgery involves joining two or more vertebrae using a bone graft. It has a role in treating a small minority of people who have degenerative spinal disorders that include nerve-related problems. Most people with chronic low back pain related to degenerative disorders do not have nerve-related symptoms. The role of spinal fusion in these circumstances is limited and controversial.

After standardising to remove age and sex differences between populations, the Atlas found that, in 2015–2018, the rate of hospitalisation for lumbar spinal fusion was about 12 times higher in the local area with the highest rate than in the area with the lowest. There was a 4% fall in the national rate of lumbar spinal fusion, and a 25% fall in the rate of lumbar spinal fusion excluding decompression, between 2012–2015 and 2015–2018.

Spinal decompression

Spinal decompression aims to increase the amount of the space in the spinal canal to relieve pressure on nerves and blood vessels. After standardising to remove age and sex differences between populations, the Atlas found that in, 2015–2018, the rate of hospitalisation for lumbar spinal decompression was about eight times higher in the local area with the highest rate than in the area with the lowest. The national rate of lumbar spinal decompression fell by 6% between 2012–2015 and 2015–2018.

Addressing variation

Priority should be given to examining and improving access to services that provide multidisciplinary review and non-surgical treatments for chronic low back pain. The Australian Spine Registry should be developed to support data collection on all patient outcomes. Surgeons should contribute data on all consenting patients, and regularly audit and review patient outcome data with their peers.

Data item		Range across local areas* per 100,000	Times difference	Times difference excluding top and bottom 10%	Number during 2015–18
4.1	Lumbar spinal fusion, 18 years and over	7 – 87	12.4	2.7	14,608
4.2	Lumbar spinal decompression excluding fusion, 18 years and over	27 – 209	7.7	2.1	43,185

* Statistical Area Level 3

Recommendations

4a. Health service organisations and Primary Health Networks to implement evidence-based pathways for the management of low back pain consistent with the care described in the Low Back Pain Clinical Care Standard (planned for publication in late 2021).

4b. Health service organisations where lumbar spinal surgery is conducted to implement evidence-based guidelines; for example, the National Institute for Health and Care Excellence guidelines: *Low Back Pain and Sciatica in Over 16s: Assessment and management*.

4c. The Royal Australasian College of Surgeons to require surgeons performing lumbar spinal surgery to participate in the Australian Spine Registry as part of mandatory continuing professional development requirements.

4d. The Commission to work with relevant specialist organisations to develop a list of key safety and quality indicators for the management of specified spinal conditions, which can be used by members for audit of their practice.

4e. Health service organisations to:

i. Develop and implement scope of clinical practice models for surgeons undertaking spinal surgery

ii. Audit spinal surgery and provide the results back to clinicians to act upon in line with Action 1.28 of the National Safety and Quality Health Service (NSQHS) Standards

iii. Incorporate individual spinal surgeons' audit data as part of re-credentialing processes

iv. Report key performance indicators, trends and adverse events in spinal surgery to their governing body, consistent with the NSQHS Standards.

4f. Primary Health Networks to implement a nationally agreed health pathway for management of low back pain, including imaging and referral indications, based on the Commission's Low Back Pain Clinical Care Standard (planned for publication in late 2021).

Key findings and recommendations

5. Gastrointestinal investigations

Gastroscopy 18-54 years

Gastroscopy is used to investigate, treat or monitor conditions of the upper part of the gastrointestinal (GI) tract. Most conditions that affect the upper GI tract and require gastroscopy are uncommon in people aged under 55 years.

After standardising to remove age and sex differences between populations, the Atlas found that, in 2018–19, the rate of Medicare Benefits Schedule (MBS)–subsidised services for gastroscopy for people aged 18–54 years was almost 11 times higher in the local area with the highest rate than in the area with the lowest. Rates were markedly higher in major cities than elsewhere. Almost two-thirds of gastroscopy services were performed on the same day as a colonoscopy for the same person.

Repeat gastroscopy, all ages

Few people who have an initial gastroscopy require another within three years. Repeat gastroscopy is used mainly to monitor conditions that can increase the risk of upper GI cancer or bleeding in high-risk groups.

The Atlas found that, in 2018–19, the rate of MBS-subsidised services for repeat gastroscopy performed within two years and 10 months of an earlier gastroscopy was almost 15 times higher in the local area with the highest rate than in the area with the lowest. Rates were markedly higher in major cities and also increased in with socioeconomic advantage.

Development and application of national guidance on the appropriate use of gastroscopy is needed. These should include guidance on when it is appropriate to repeat the procedure. Interventions to educate clinicians and consumers that the risk of upper GI cancer is low for most people, especially those aged under 55 years, are required.

Repeat colonoscopy, all ages

Repeat colonoscopy is used mainly to monitor for bowel cancer in people at increased risk of developing it. The timing of repeat colonoscopy is based on bowel cancer risk. A limited number of people who have an initial colonoscopy require another within three years.

After standardising to remove age and sex differences between populations, the Atlas found that, in 2018–19, the rate of MBS-subsidised services for repeat colonoscopy performed within two years and 10 months of an earlier colonoscopy was almost 20 times higher in the local area with the highest rate than in the area with the lowest. Rates were markedly higher in major cities and increased with socioeconomic advantage.

A concerted focus by clinicians, medical colleges and health service organisations to drive implementation of the national surveillance guidelines and the *Colonoscopy Clinical Care Standard* could reduce the frequency of inappropriate repeat colonoscopies.

Data item	Range across local areas* per 100,000	Times difference	Times difference excluding top and bottom 10%	Number during 2018–19
5.1 Gastroscopy MBS services, 18–54 years	218 – 2,348	10.8	2.9	154,338
5.2 Repeat colonoscopy MBS services, all ages	62 – 1,236	19.9	2.7	147,875
5.3 Repeat gastroscopy MBS services, all ages	61 – 908	14.9	3.1	87,933

* Statistical Area Level 3

Recommendations

5a. State and territory health departments to develop and implement evidence-based triage criteria for the prioritisation and allocation of patients to gastroscopy, colonoscopy, and gastroscopy performed with colonoscopy.

5b. Health service organisations to:

i. Audit clinicians performing endoscopy services and provide the results back to clinicians to act upon, in line with Action 1.28 of the National Safety and Quality Health Service (NSQHS) Standards

ii. Incorporate individual clinicians' audit data as part of re-credentialing processes

iii. Report key performance indicators, trends and adverse events in endoscopy to the governing body, consistent with the NSQHS Standards.

5c. The Gastroenterological Society of Australia to develop a position statement on the appropriate use and timing of gastroscopy, and of gastroscopy performed with colonoscopy, for gastroenterologists and general practitioners.

Key findings and recommendations

6. Medicines use in older people

Polypharmacy, 75 years and over

Polypharmacy is the concurrent use of multiple medicines. It is common in older people, because they are more likely to have chronic diseases that require management with medicines. Although polypharmacy may be appropriate for some older people, it can increase the risk of harm from medicines.

After standardising to remove age and sex differences between populations, the Atlas found that, in 2018–19, the rate of people aged 75 years and over dispensed five or more medicines was about six times higher in the local area with the highest rate than in the area with the lowest. Almost 40% of people aged 75 years and over were dispensed five or more medicines. Rates of polypharmacy were higher in major cities than elsewhere, and rates increased with socioeconomic disadvantage, except in remote areas.

Medication management reviews, 75 years and over

Residential Medication Management Review (RMMR) and Home Medicines Review (HMR) are two types of medicine reviews available to people living in aged care facilities or at home. The reviews aim to help people to get the maximum benefit from their medicines and prevent medicines-related harm.

After standardising to remove age and sex differences between populations, the Atlas found that, in 2018–19, the rate of people aged 75 years and over who had at least one Medicare Benefits Schedule–subsidised service for an RMMR or HMR was almost 12 times higher in the local area with the highest rate than in the area with the lowest rate. About 5.4% of people had a review. Similar to the pattern with polypharmacy, rates were higher in major cities and increased with socioeconomic disadvantage.

Interventions for identifying people at risk of harm from polypharmacy, such as frail people and those with multiple morbidities, are needed. System changes are needed to improve access to RMMR and HMR services for these at-risk groups. Initiatives to improve uptake of pharmacist recommendations may improve the effectiveness of the review services.

Proton pump inhibitor medicine dispensing, 75 years and over

Proton pump inhibitor (PPI) medicines are effective in managing gastro-oesophageal reflux disease. They are commonly used in older people, often at higher doses or long term, without reassessment of need. Older people may be especially susceptible to harms from long-term use.

After standardising to remove age and sex differences between populations, the Atlas found that, in 2018–19, the rate of dispensing of PPI medicines to people aged 75 years and over was about six times higher in the local area with the highest rate than in the area with the lowest. Almost half people aged 75 years and over had at least one prescription dispensed for a PPI medicine.

Targeted interventions that prompt clinicians to regularly review the need for PPI medicines in older people are needed.

Data item		Range across local areas* per 100,000	Times difference	Times difference excluding top and bottom 10%	Number during 2018–19
6.1	Polypharmacy, 75 years and over	11,206 – 72,059	6.4	1.4	690,516
6.2	Medication management reviews, 75 years and over	1,618 – 19,006	11.7	2.0	96,533
6.3	Proton pump inhibitor medicines dispensing, 75 years and over	131,393 – 777,098	5.9	1.4	7,114,281

* Statistical Area Level 3

Recommendations

6a. The Commission, in collaboration with the Australian Government Department of Health, the Aged Care Quality and Safety Commission, NPS MedicineWise and relevant groups, to develop nationally consistent:

i. Guidance for people taking multiple medicines

ii. Guidance about the communication of reports to medical practitioners from Residential Medication Management Reviews and Home Medicines Reviews

iii. Measures for aged care homes to compare the percentage of residents who have received Residential Medication Management Reviews and the percentage of pharmacists' recommendations, in line with the Commonwealth's development of the National Aged Care Mandatory Quality Indicator Program

iv. Guidance for the establishment, governance, composition and operation of Medication Advisory Committees within aged care homes.

6b. The Australian Government Department of Health to investigate ways of collecting patient-level data on the supply of Pharmaceutical Benefits Scheme medicines through the S100 Remote Area Aboriginal Health Services Program to gather accurate information about the use of medicines in rural and remote Aboriginal communities.

Key findings and recommendations

General recommendations

Responsibilities of governing bodies

7a. Governing bodies to prioritise review of audit data, consistent with Action 1.28 of the National Safety and Quality Health Service (NSQHS) Standards for the following topics:

i. Early birth

ii. Tonsillectomy and myringotomy

iii. Lumbar spinal surgery

iv. Gastroscopy and colonoscopy.

Diagnosis and appropriateness of care

7b. Health service organisations to promote documentation in the healthcare record of a patient's diagnosis, or provisional diagnosis, in relation to their investigation and management. This can be used to improve the appropriateness of care, and should be communicated to the patient to increase their understanding of their care.

Clinical quality and appropriateness indicators

7c. The Commission to identify priority areas for development of nationally agreed, specialty-specific clinical quality and appropriateness indicators, and work with clinical colleges, professional societies and jurisdictions to develop these.

Clinical audit

7d. Clinical colleges and professional societies to mandate clinical audit, using agreed specialty-specific indicators where these exist, as a requirement of continuing professional development.

Registries

7e. Clinical quality registries:

i. As part of their governance framework, all clinical quality registries to include sets of indicators for quality and appropriateness of care, to be used for clinical audits at a health service organisation and clinician level

ii. To provide health service organisations and clinicians with regular reports showing their data for these indicators and how their data compares with data from other services

iii. To develop and publish their indicator sets in METeOR (National Metadata Online Registry).

7f. Health service organisations to:

i. Require clinicians to participate in data collection and quality improvement activities of relevant clinical quality registries, with the aim of improving patient outcomes

ii. Ensure that data and analyses from clinical quality registries are used efficiently in clinical peer review meetings; that records are kept of these meetings, including the clinicians who have attended them and any actions that are being taken to improve care as a result of the discussions; and that the results are reported to and reviewed by the organisation's governing body as part of the clinical governance framework.

Health pathways

7g. The Australian Government Department of Health to develop guidance for Primary Health Networks about the development of nationally consistent Health Pathways, aligned with the Commission's clinical care standards.

Health workforce

7h. The Australian Government Department of Health's health workforce unit to:

i. Map the specialist medical workforce by geographical area

ii. Quantify the supply of newly trained specialists entering the workforce, by geographical area

iii. Work with clinical colleges to understand projected specialty workforces

iv. Map the current workforce by clinical specialty (including nursing, midwifery and allied health) relevant to priority clinical conditions to identify where there are areas of over and undersupply. Mapping the workforce for non-surgical management of back pain (e.g. physiotherapy, chronic pain management) should be a priority

v. Develop strategies to prevent oversupply in particular geographical areas, with the objective of building capacity in rural and remote areas (rather than fly-in-fly-out arrangements) and reducing the personal and financial cost of population exposure to low value care driven by oversupply.

Patient Reported Outcome Measures

7i. The Commission to recommend validated Patient reported outcome measures (PROMs) for:

i. Pregnancy and childbirth

ii. Low back pain.

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About the Atlas

Who has developed the Atlas?

The Australian Commission on Safety and Quality in Health Care (the Commission), in collaboration with the Australian Institute of Health and Welfare (AIHW), has led the development of the fourth Atlas. Development has involved broad consultation with:

- The Australian Government Department of Health
- State and territory health departments and agencies
- Professional colleges and specialist societies
- Clinicians
- Healthcare organisations.

An oversight and advisory structure, including a state and territory advisory group (Jurisdictional Advisory Group) and a Primary Care Expert Advisory Group, has ensured wide-ranging input into the development of the fourth Atlas. For each chapter, a Topic Expert Group of lead clinicians and academic experts from across Australia was established. The Topic Expert Groups provided advice at key stages of development, including the interpretation of the Atlas findings. Members of the advisory groups were required to sign a confidentiality agreement and declare conflicts of interest before release of the preliminary data. The AIHW conducted the data extraction and analysis, produced the maps, graphs and tables, and provided expertise in interpreting the data.

How was it developed?

The Atlas examines a selection of procedures, investigations, treatments and hospitalisations in a range of clinical areas. A large number of clinical items were nominated and considered for inclusion, but many were not suitable because of poor data quality or small numbers, which limited the capacity to analyse and present the data. The final selection of clinical items reflects the following criteria:

- High levels of current or projected use
- Significant current or projected disease burden
- Significant potential for harm
- High use of health system resources
- Interest in the topic and clinical engagement to support review and action
- Availability of suitable data
- Important to monitor changes over time and compare with previous Atlas reports

The clinical items that met these criteria were reviewed by the Jurisdictional Advisory Group, the Primary Care Expert Advisory Group, and the Commission's executive. Following confirmation of clinical items for analysis, Topic Expert Groups were established around specific clinical themes. The Topic Expert Groups were consulted on prioritisation of the clinical items for analysis and on development of the data specifications, where possible. Following analysis of the data for each clinical item, the Jurisdictional Advisory Group, the Primary Care Expert Advisory Group and the Topic Expert Groups reviewed the results.

The expert groups also provided content for, and reviewed, the clinical commentaries. Their suggestions and the Commission's reviews of the literature were used as the basis for commentary on the possible reasons for healthcare variation and strategies for addressing variation. The clinical commentaries were also reviewed by:

- AIHW
- Medicine use experts
- The National Aboriginal and Torres Strait Islander Health Standing Committee
- Relevant clinical colleges.

More than 150 clinicians, researchers, policy experts and consumer representative organisations have examined and provided input on the clinical commentaries and data visualisations.

What does the Atlas measure?

The data in the Atlas show the rates for featured procedures, investigations, treatments or hospitalisations in each geographic area. To calculate rates, the number of interventions that occurred in an area is divided by the population of that area. Rates are age and sex standardised. Rates are based on the patient's place of usual residence and not the location of the hospital, clinic or pharmacy where the service was provided.

Why are the data age standardised and sex standardised?

The data in the Atlas have been age standardised (that is, controlled for age) so that fair comparisons can be made between areas that have different age structures. Without age standardisation, it would be difficult to know whether higher rates of an intervention in an area with a large number of retirees, for example, were due only to the older age of the local population. The data are also sex standardised, so that having a larger proportion of males or females in an area does not influence the findings. The early planned births (caesarean or induction) indicators are not age standardised because of small numbers.

Age standardisation involves calculating the rate in each area as if the area had a standard proportion of older and younger people. Sex standardisation involves calculating the rate in each area as if the area had a standard proportion of males and females. The resulting age- and sex-standardised rates can then be compared for all areas, knowing that differences in age and sex structure of the population have been accounted for.

About the Atlas

Magnitude of variation

The magnitude of variation (or 'times difference') shows how large the difference is between the lowest and highest rates of each intervention, and is expressed as a ratio of the highest to the lowest rates. For example, if the lowest rate was 10 per 100,000 people and the highest rate was 20 per 100,000 people, the magnitude of variation is two-fold.

Australian rate

Rates for an intervention may appear higher or lower than the Australian rate; in most cases, the most appropriate rate is difficult to define and not necessarily the Australian rate. Depending on the intervention, a higher or lower rate may be clinically appropriate. It is difficult to conclude what proportion of the variation is unwarranted or to comment on the relative performance of health services and clinicians in one area compared with another. An Australian rate is provided to encourage investigation into the reasons for any variation seen at local, regional, or state and territory levels.

About the data

The Atlas provides information on clinical items grouped into six clinical themes, covering procedures, investigations, treatments or hospitalisations.

The introduction to each chapter provides an overview of the clinical items; international comparisons, where possible; national and state or territory initiatives to improve care; and key findings and recommendations. Specific data limitations are also outlined. Clinical commentary is presented alongside each item, outlining the context, magnitude of variation, and possible reasons for the variation.

The fourth Atlas uses data sourced from four national health datasets:

- Medicare Benefits Schedule (MBS)
- National Hospital Morbidity Database (NHMD)
- National Perinatal Data Collection (NPDC)
- Pharmaceutical Benefits Scheme (PBS).

The years of data shown for each clinical item depend on the source and the most recently available data:

- MBS items are analysed for services provided in 2018–19
- NHMD items are analysed for hospitalisations in
  - 2014–15 to 2017–18 for potentially preventable hospitalisations
  - 2012–13 to 2014–15 and 2015–16 to 2017–18 for lumbar spinal surgery items, which are analysed for three combined years because of small numbers
  - 2012–13, 2015–16 and 2017–18 for ear, nose and throat surgery items
- The NPDC item is analysed for early planned births (caesarean or induction) in 2017
- PBS items are analysed for prescriptions dispensed in 2018–19.

Data were rerun for selected hospitalisation indicators from previous Atlases to allow robust comparison of rates over time through time-series analyses. Due to changes in data specifications and updates to NHMD datasets, some fourth Atlas results may differ from those reported in previous Atlases.

For MBS and PBS items, the Medicare enrolment postcode is used as a proxy for the patient residence because it corresponds to most people's usual residence. For NHMD items, the rates are determined by the person's usual place of residence as recorded at the time of hospital admission. For the NPDC item, the rates are based on the mother's place of residence.

The Atlas presents age- and sex-standardised rates per 100,000 people for all items, except for the NPDC items, which are presented as a percentage. NPDC data are not standardised, as a result of small numbers.

Rates are age and sex standardised to the Australian population using the Australian Bureau of Statistics (ABS) Estimated Resident Populations (ERPs). The standard population is ERP at 30 June 2001. The denominator population estimates are based on ERPs, and are either at 30 June or 31 December, depending on data sources.

Population estimates as at 31 December in the relevant year were used as the denominator for indicators based on NHMD data for 2012–13 to 2017–18. For example, population estimates as at 31 December 2017 were used for 2017–18. Population estimates as at 31 December were calculated as the average of the 30 June population estimates before and after the relevant December.

Where three years of data were combined, the denominator was the sum of the population estimates as at 31 December for each year.

Population estimates as at 30 June 2018 were used as the denominator for indicators based on MBS and PBS data for 2018–19.

The geographic local areas used are ABS standard geographical regions known as the Statistical Areas Level 3 (SA3). SA3s provide a standardised regional breakdown to assist in analysing data at the local level. SA3s generally have populations between 30,000 and 130,000 people. To enable comparisons, local areas are also grouped by Primary Health Network, state and territory, and by remoteness and socioeconomic status.

Primary Health Networks connect health services across a specific geographic area so that patients, particularly those needing coordinated care, have access to a range of services.

Remoteness is calculated according to the ABS Australian Statistical Geography Standard (ASGS) 2016 using Statistical Area Level 1 (SA1) to remoteness concordance. SA1 population was concorded to SA3, and the remoteness category with the highest percentage of SA3 population was allocated to the SA3. The remote and very remote categories were combined into one, giving a total of four remoteness categories (Major Cities, Inner Regional, Outer Regional, Remote).

The socioeconomic quintiles are based on the ABS 2016 Index of Relative Socio-Economic Disadvantage at the SA1 level. The quintile with the highest number of SA1s was allocated to the SA3. Some quintiles were combined within a remoteness category to ensure sufficient numbers of SA3s for comparison purposes.

Defined daily dose (DDD) is a measurement unit of assumed average maintenance dose per day for a medicine used for its main indication in adults, created by the World Health Organization. The DDD does not necessarily correspond to the recommended or average prescribed daily dose.

Use of DDDs allows comparisons of medicine dispensing independent of price, preparation and quantity per prescription. Expressing medicine dispensing in DDDs per thousand people per day (DDDs/1,000/day) allows the aggregation of data for medicines that have different daily doses.

The data specifications for each item can be accessed on the AIHW Metadata Online Registry (METeOR) at meteor.aihw.gov.au

Data limitations

The clinical items describe variation in health service provision. It is not currently possible to conclude what proportion of the variation is unwarranted, or to comment on the relative performance of health services and clinicians in one area compared with another. The data are provided to encourage and promote further analysis and discussion about variation at local, regional, and state and territory levels.

About the Atlas

Some data have been suppressed for the following reasons:

- To protect confidentiality of a patient – for example, when the number of prescriptions and the population are very small; this could potentially lead to identifying a patient
- To protect confidentiality of a service provider or a business entity in the MBS data – for example, when the services are predominantly provided by one or two providers
- To account for low numbers of events or very small populations – these rates are more susceptible to random fluctuations
- To preserve confidentiality – data suppressed in isolation may be calculable from the presented totals unless accompanied by other data suppressions to prevent back-calculation.

Suppressed SA3 data are included for larger area analysis.

Data for Aboriginal and Torres Strait Islander people

Data according to Aboriginal and Torres Strait Islander status have been provided for NHMD and NPDC items only. Analysis was not undertaken by Aboriginal and Torres Strait Islander status for the MBS and PBS data because this information is not available.

Analyses in this report have not been adjusted to account for the under-identification of Aboriginal and Torres Strait Islander people in NHMD and NPDC datasets. Data by Aboriginal and Torres Strait Islander status should be interpreted with caution because hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated, and there is variation in the under-enumeration among states and territories.

Maps and graphs

Data for each of the items in the Atlas are displayed as maps and graphs to show variation in rates by geographic location of patient residence.

On the maps, age- and sex-standardised rates in each of the geographic areas are ranked from lowest to highest and then split into 10 categories (deciles). These are displayed with colour gradients, where darker colours represent higher rates and lighter colours represent lower rates. Separate maps show the greater capital city areas in more detail.

Standard figures are provided for NHMD, MBS and PBS items where data are available. Each figure presents a different analysis:

- Numbers and rates by local area, listing the areas with the lowest and highest rates
- Numbers and rates by state and territory
- Rates by remoteness and socioeconomic status
- Times difference and rates by local area across years (time series analysis), where applicable

NHMD items have two more standard figures where data are available:

- Rates by state and territory, by Aboriginal and Torres Strait Islander status
- Percentages and rates by state and territory, by patient funding status.

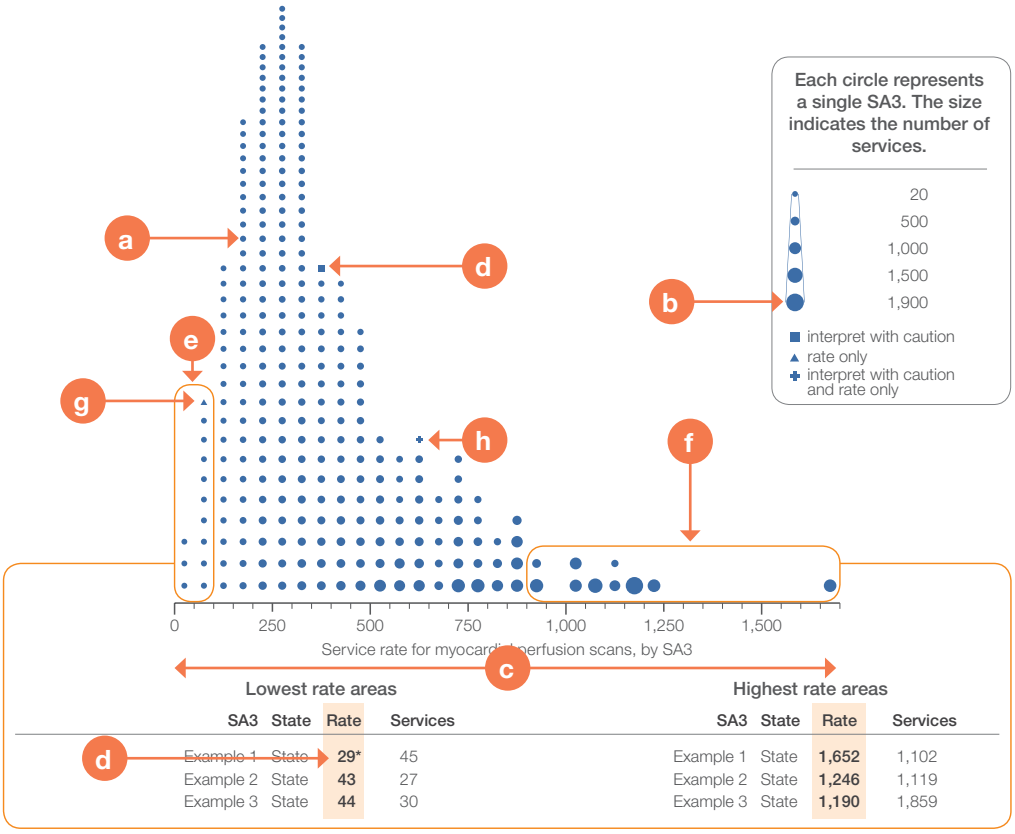
Standard figures for NPDC items are percentages by state and territory where data are available. Each figure presents a different analysis.

Further information on interpreting the figures for the print version of the fourth Atlas is provided on pages 33–36.

Additional figures are available for the online interactive Atlas at safetyandquality.gov.au/atlas

How to interpret our data visualisations

Histogram



a **What does the circle represent?**
Each circle represents an SA3. SA3s are geographical areas defined by the ABS that provide a standardised regional breakdown of Australia. SA3s generally have populations between 30,000 and 130,000 people.

b **Circle size**
The size of a circle indicates the number of events in that SA3. A large circle represents an SA3 with a greater number of events than SA3s with a smaller circle. Each histogram is accompanied by a legend to indicate scale.

c **Horizontal axis**
The horizontal axis shows the age- and sex-standardised rate. Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

d **Squares and asterisks**
Squares and asterisks indicate rates that are considered more volatile and should be interpreted with caution.

e **Lowest rates**
SA3s in the box are SA3s with the lowest age- and sex-standardised rates in Australia. The names, rates and numbers of events for these SA3s are listed in the table below the histogram.

f **Highest rates**
SA3s in the box are SA3s with the highest age- and sex-standardised rates in Australia. The names, rates and numbers of events for these SA3s are listed in the table below the histogram.

g **What does a triangle represent?**
Each triangle represents an SA3 where only the rate is published. The number of events is not published for confidentiality reasons.

h **What does a cross represent?**
Each cross represents an SA3 where the rate should be interpreted with caution, and the number of events is not published for confidentiality reasons.

About the Atlas

How to interpret our data visualisations

State and territory graphic

a **Squares and asterisks**
Squares and asterisks indicate rates that are considered more volatile and should be interpreted with caution.

b **Vertical axis**
The vertical axis shows the age- and sex-standardised rate. Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

c **What does the circle represent?**
Each circle represents an SA3. SA3s are geographical areas defined by the ABS that provide a standardised regional breakdown of Australia. SA3s generally have populations between 30,000 and 130,000 people.

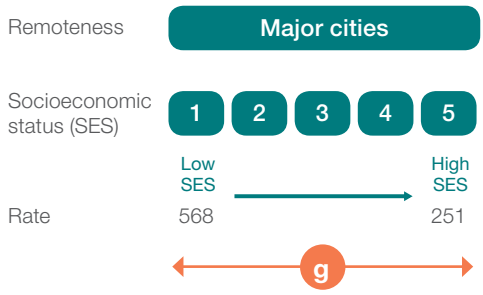
d **Australian rate line**
This line indicates the age- and sex-standardised rate for Australia.

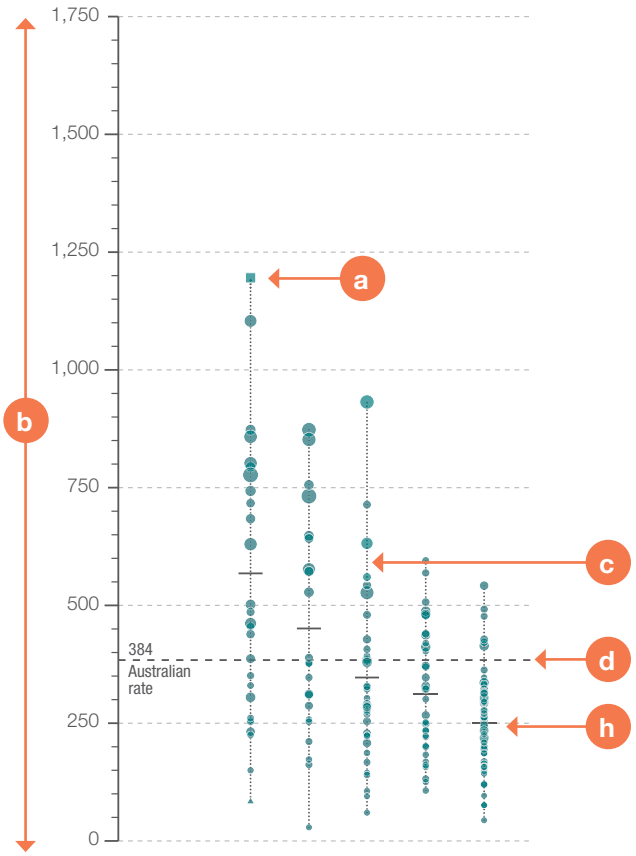
e **Circle size**
The size of a circle indicates the number of events in that SA3. A large circle represents an SA3 with a greater number of events than SA3s with a smaller circle. Each graphic is accompanied by a legend to indicate scale.

f **State and Territory rates**
This line indicates the age- and sex-standardised rate for a state or territory.

How to interpret our data visualisations

Remoteness and socioeconomic status graphic





g **Remoteness and socioeconomic status**
Each SA3 is assigned a remoteness category and a socioeconomic status (SES) category, using remoteness and SES defined by the ABS. The lowest SES category has the most overall disadvantage, and the highest SES category has the least overall disadvantage. Some SES categories are combined in remoteness categories, except in major cities, to ensure sufficient numbers of SA3s for comparison. In this example, the remoteness and SES rate is higher with greater socioeconomic disadvantage.

h **Remoteness and SES**
This line indicates the age- and sex-standardised rate for a combination of remoteness and SES.

About the Atlas

How to interpret our data visualisations

Rates across years line graph

a **Vertical axis**
The vertical axis shows the age- and sex-standardised rate. Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

b **Australian rate**
The Australian age- and sex-standardised rate.

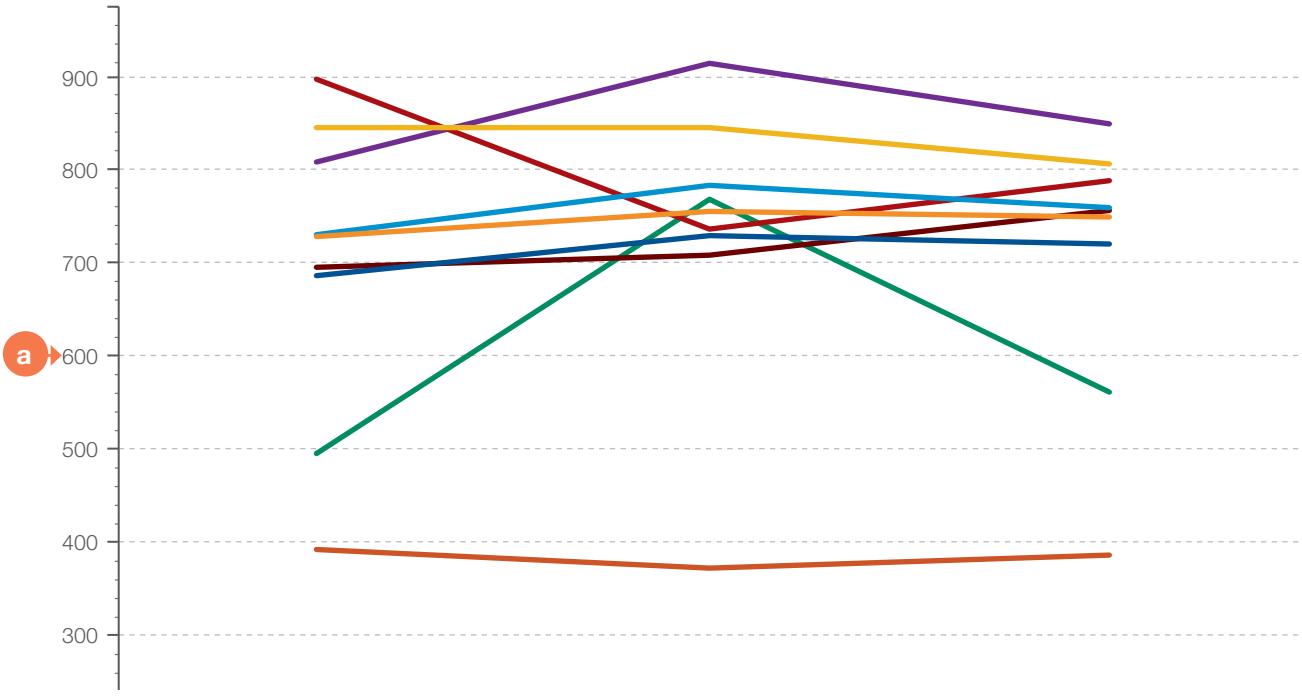
c **Highest rate**
The highest rate is the highest age- and sex-standardised rate of all SA3 rates.

d **Lowest rate**
The lowest rate is the lowest age- and sex-standardised rate of all SA3 rates.

e **Magnitude of variation**
The magnitude of variation is the times difference between the highest and lowest SA3 rates in Australia. Rates published with caution are excluded from the calculation.

f **Magnitude of variation without top and bottom 10%**
The magnitude of variation is the times difference between the highest and lowest SA3 rates after excluding the highest and lowest 10% of SA3 rates.

	2012–13	2015–16	2017–18	
Highest SA3 rate	2,414	1,753	1,836	c
Australian rate	**729**	**756**	**750**	b
Lowest SA3 rate	218	258	305	d
Magnitude of variation	11.1	6.8	6.0	e
Magnitude of variation without top & bottom 10% SA3	2.3	2.3	2.2	f



How to interpret our data visualisations

Rates across years graphic (interactive Atlas only)

This fully interactive graph is available at safetyandquality.gov.au/atlas

g **What does each diamond represent?**
Each diamond shows the rates for all SA3s in Australia for a given year.

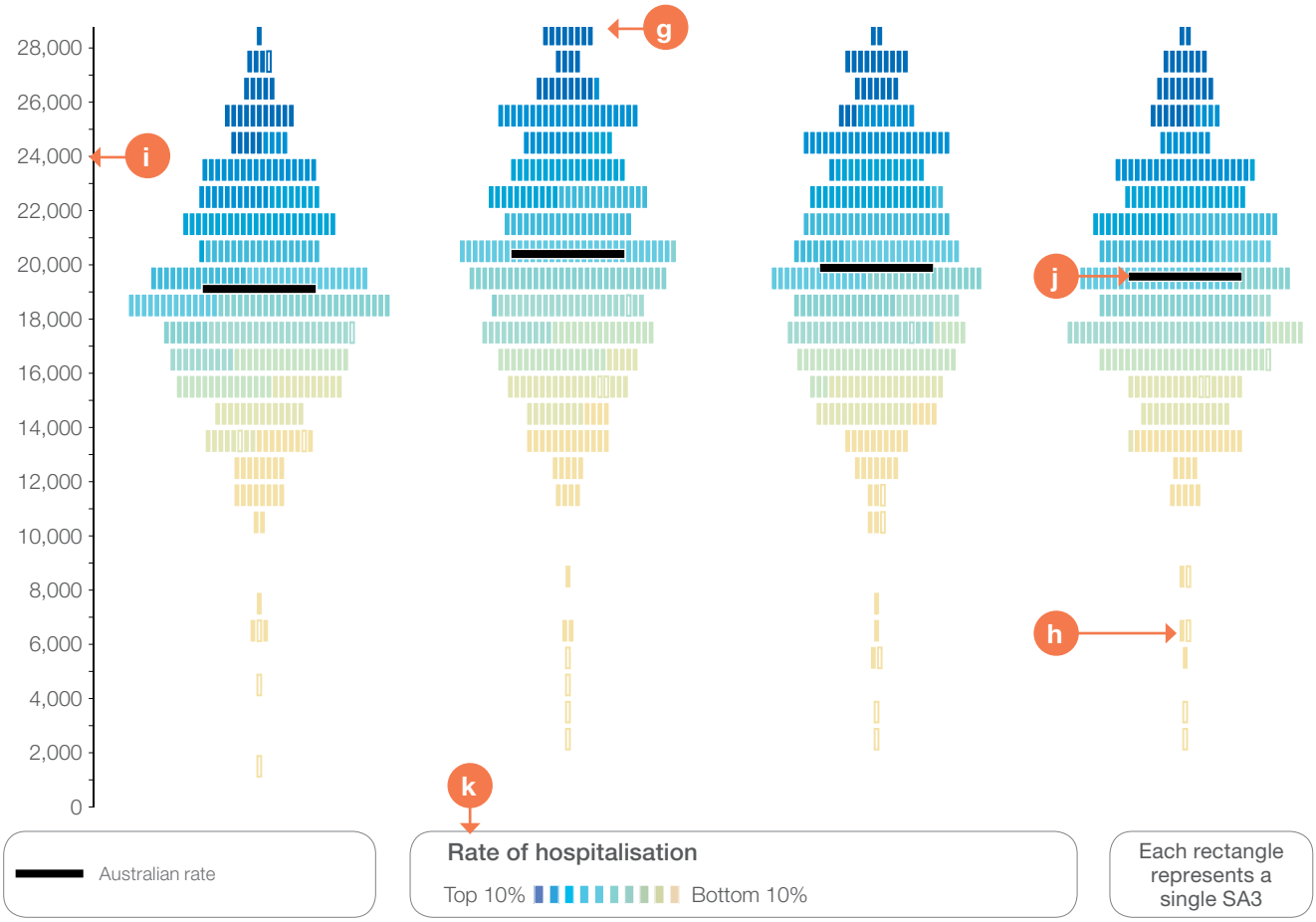
h **What does the rectangle represent?**
Each rectangle represents an SA3. SA3s are geographical areas defined by the ABS that provide a standardised regional breakdown of Australia. SA3s generally have populations between 30,000 and 130,000 people.

i **Vertical axis**
The vertical axis shows the age- and sex-standardised rate. Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

j **Australian rate**
This line indicates the Australian age- and sex-standardised rate.

k **Rate of hospitalisation**
SA3s are not presented for those suppressed due to a small number of hospitalisations and/or population in an area. Darker colour of a rectangle represents an SA3 with a higher rate, and light colour represents an SA3 with a lower rate.

Notes are displayed for SA3 rates that are considered more volatile than other published rates and needs to be interpreted with caution.



Chapter 1
Early planned births

At a glance

Planned birth by caesarean section or induction (a medical treatment to start labour) is an important intervention in maternity care. However, the timing of birth should be carefully considered to ensure the best outcome for the mother and her baby.

When planning for birth by caesarean section or induction of labour, waiting until at least 39 weeks gestation results in better short- and long-term outcomes for the baby, unless there are medical or obstetric reasons for earlier birth. Short-term risks, such as respiratory problems and the need for intensive care, are higher for babies born at early term (by caesarean section or induction of labour) than at full term. Longer-term risks in children born before 39 weeks gestation (either vaginally or by caesarean section) compared with those born at full term include cognitive deficits and a higher risk of attention deficit hyperactivity disorder.

In 2017, the ranges of state and territory rates for caesarean sections without a medical or obstetric indication, as percentages of all caesarean sections at these gestational ages, were*:

- <37 weeks, 13.3–19.3%
- <38 weeks, 24.8–32.7%
- <39 weeks, 42.8–56.1%.

Despite a number of data limitations (see page 49), the estimates presented in this chapter suggest that the percentage of caesarean sections performed before 39 weeks without a medical or obstetric indication may be substantial, and action is needed to reduce these rates.

Strategies to reduce rates of planned birth without a medical or obstetric indication before 39 weeks gestation include:

- Changing policies of state and territory governments, hospitals and insurers to block booking of early planned births without a medical or obstetric indication
- Giving parents information about the risks and benefits of early planned birth, and support for shared decision making
- Giving clinicians information about the risks and benefits of early planned birth
- Collecting data on the reasons for early planned birth.

* Excludes Northern Territory.

Recommendations

The Commission consulted widely, but is solely responsible for making the recommendations; as such, the recommendations may not reflect the views of all contributors to the Atlas.

1a. It is recommended that pregnancies continue until at least 39 weeks gestation unless there is a medical or obstetric reason justifying earlier intervention.

1b. Health service organisations with maternity services, and clinicians, to implement systems to obtain informed patient consent that includes the provision of comparative information for prospective parents on the short- and long-term risks of early planned birth without a medical or obstetric indication.

1c. Health service organisations with maternity services to establish policies to cease booking planned births without a medical or obstetric indication before 39 weeks from July 2022 and to review adherence to these policies.

1d. Medicare Benefits Schedule payment for planned births before 39 weeks without a medical or obstetric indication to cease from July 2022.

1e. Health service organisations with maternity services, and clinicians, to ensure that care is consistent with The Whole Nine Months campaign.

1f. The Australian Institute of Health and Welfare (AIHW) to prioritise the development of the indicator on early caesarean section without a medical or obstetric indication in the National Core Maternity Indicators, including the need for a data element on the reason for early birth.

1g. All state and territory health departments to ensure consistent, routine collection and reporting of data on gestational age for planned births without a medical or obstetric indication to improve the quality of data collections. This should include reporting of gestational age in days to allow more in-depth understanding of the distribution of births occurring before 39 weeks.

1h. Health service organisations with maternity services to:

i. Report early planned births without a medical or obstetric indication as part of mandatory reporting of National Core Maternity Indicators

ii. Conduct audits of records documenting the communication of information to prospective parents about the risks of early planned births without a medical or obstetric indication, and provide the results back to clinicians to act upon, in line with Action 1.28 of the National Safety and Quality Health Service Standards

iii. Incorporate individual clinicians' audit data as part of re-credentialing processes

iv. Report on agreed key performance indicators, trends and adverse events on early planned births without a medical or obstetric indication to the governing body.

1i. Short- and long-term risks arising from early planned birth without a medical or obstetric indication are avoidable. The Commission to include early caesarean section without a medical or obstetric indication in the national list of hospital-acquired complications.

1.1 Early planned births without medical or obstetric indication

Why is this important?

When planning for birth by caesarean section or induction of labour, waiting until at least 39 weeks gestation results in better short- and long-term outcomes for the baby, unless there are medical or obstetric reasons for earlier birth. Short-term risks, such as respiratory problems and the need for neonatal intensive care, are higher for babies born at early term (by caesarean section or induction of labour) than at full term.[1-4] There is some evidence of longer-term risks in children born before 39 weeks gestation (either vaginally or by caesarean section) compared with those born at full term, including cognitive deficits and a higher risk of attention deficit hyperactivity disorder (ADHD).[5]

What did we find?

In 2017, the ranges of state and territory rates for caesarean sections without a medical or obstetric indication, as a percentage of all caesarean sections at these gestational ages, were*:

- <37 weeks, 13.3–19.3%
- <38 weeks, 24.8–32.7%
- <39 weeks, 42.8–56.1%.

Rates of induction of labour without a medical or obstetric indication at gestational age of <39 weeks were also examined: in contrast to caesarean section, these percentages were very low, ranging from 0.2% to 6% in 2017 in six reporting states and territories.

What can be done?

Strategies to reduce rates of early planned birth† without medical or obstetric indication before 39 weeks gestation include:

- Revision of the Medical Benefits Schedule (MBS) to cease payments for early term planned births without a medical or obstetric indication
- State and territory governments, hospitals and insurers to cease allowing early planned births without a medical or obstetric indication
- Giving parents information about the risks (and benefits, in some cases) of early planned birth, and support for shared decision making
- Giving clinicians information about the risks and benefits of early planned birth
- Improving data collection and monitoring to highlight where progress is being made and where more work is needed
- Reporting to the public at the hospital level to improve transparency and accountability.

* Excludes Northern Territory. Note: the reason for caesarean section and the reason for early birth are not necessarily related; data on medical or obstetric reasons for early birth are not collected.
† Birth without established labour is interpreted as planned birth in this report.

Early planned births without medical or obstetric indication

Context

Planned birth by caesarean section or induction (a medical treatment to start labour) can be an important intervention in maternity care. However, the timing of birth should be carefully considered to ensure the best outcome for the mother and her baby.

Where there are certain medical or obstetric complications, such as pre-eclampsia or fetal growth restriction, early planned birth may be necessary because the risks of waiting until 39 weeks gestation outweigh the benefits.[6] But if there are no complications, waiting until at least 39 weeks is optimal for the baby because the last few weeks of pregnancy are important for the baby's development, including brain and lung maturation.[4,5]

Parents may not be aware that waiting until at least 39 weeks is best for their baby if there are no medical or obstetric reasons for earlier birth.[7] Educational campaigns on this issue have emphasised the effects of early birth on brain maturity and the need for admission to a special care nursery if the baby is born early (Figure 1.1).

Redefining 'full term'

Until recently, birth between 37 and 41 weeks gestation was considered full term, and neonatal outcomes were generally thought to be the same during this period.[8] Evidence of poorer outcomes for babies born before 39 weeks prompted a re-evaluation of this definition. From 2010, the descriptor 'early term' began to be used for 37–38 weeks gestation, and 'full term' for 39–40 weeks gestation.[8]

Risks of early-term birth

Short-term risks

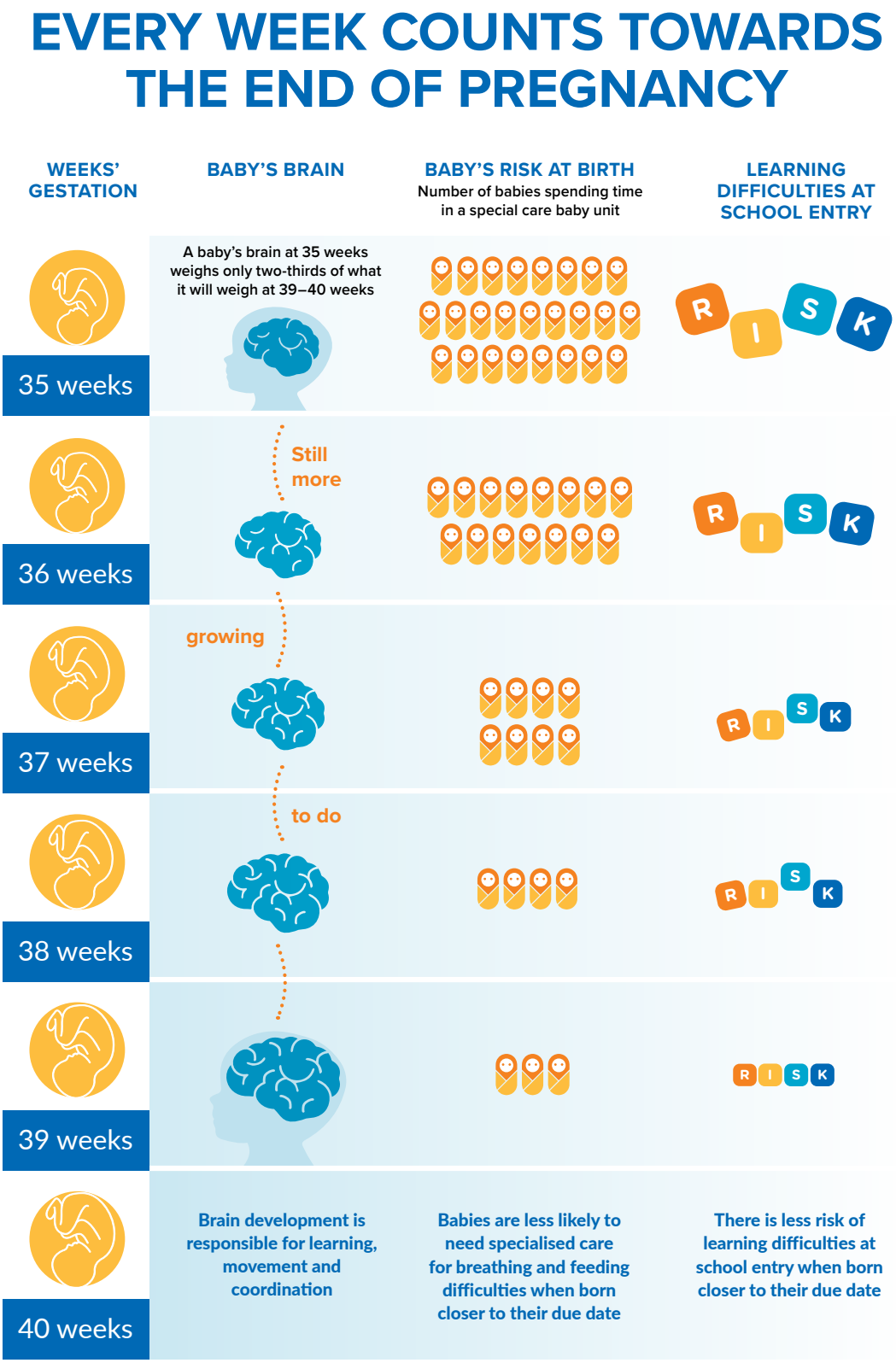
Observational studies have shown an increase in short-term risks, such as respiratory problems and the need for neonatal intensive care, for babies born at early term (37–38 weeks) rather than full term (39–41 weeks). These risks are higher following planned birth by either caesarean section or induction of labour.[1-4] Even after fetal lung maturity has been confirmed, babies born by early planned birth without a medical or obstetric indication have significantly worse respiratory outcomes, and poorer overall neonatal outcomes, than full-term babies.[9]

The risks of hypoglycaemia, jaundice and the need for neonatal intensive care unit for babies born by elective caesarean section decrease linearly from 37 weeks to 41 weeks gestation.[4] That is, the earlier the planned birth in this period, the greater these risks.[4] For example, among babies born by elective caesarean section, serious respiratory morbidity requiring neonatal intensive care occurred in 1.2% of those born at 37–38 weeks, compared with 0.5% of those born at 39–40 weeks, in an Australian study.[10] Other potential consequences include negative psychological effects on parents from having their baby hospitalised in a neonatal intensive care unit.[11]

The risk of neonatal death after elective caesarean section, although small, reaches the lowest point at 39 weeks, and then increases again.[4] The risks of neonatal sepsis and of needing hospitalisation for five days or more also have a U-shaped course, with the lowest risk at 39 weeks.[4]

The risk of needing hospitalisation for infection in the first five years of life is higher among children born by planned caesarean section performed at 37–38 weeks gestation rather than at 39 weeks gestation.[12]

Figure 1.1: Every week counts towards the end of pregnancy*



* Reproduced with permission from Women and Babies Research, The Kolling Institute. Every Week Counts – version 1, 2019. Sydney: University of Sydney. everyweekcounts.com.au

Early planned births without medical or obstetric indication

Long-term risks

More recently, evidence has grown of an increased risk of effects on brain development from early-term birth. Compared with children born at 39–40 weeks, those born at 37–38 weeks (either vaginally or by caesarean section) have up to a 30% higher risk of ADHD and a 10–40% higher risk of cognitive problems.[5] This evidence is based on observational studies, and includes spontaneous early births.

In some cases, poorer developmental outcomes may be explained by the obstetric factors that prompted the earlier birth. Studies that accounted for these factors still found poorer outcomes with birth at early term rather than full term.[13,14] This suggests that harm is associated with the earlier timing, rather than the factors that prompted it.[13,14] For example, a United States study of 128,050 children in third grade at school found that those born at early term (either vaginally or by caesarean section) had significantly poorer performance in maths than those born at full term.[13] This effect remained even after accounting for the effect of obstetric factors such as caesarean birth, birth weight and maternal age, as well as socioeconomic disadvantage.[13]

Although developmental risks are greater for babies born before 37 weeks gestation, the greater frequency of births at 37 or 38 weeks gestation means that these births have larger implications at a population level.[15,16] For example, children born at 37–39 weeks (either vaginally or by caesarean section) accounted for 5.5% of cases of special educational needs, compared with children born preterm (less than 37 weeks gestation), who accounted for 3.6% of cases, in a study of Scottish schoolchildren.[16]

Aboriginal and Torres Strait Islander children born at early term have a higher risk of developmental vulnerability than other Australian children born at the same gestational age.[17] This is largely accounted for by the socioeconomic disadvantage experienced by Aboriginal and Torres Strait Islander people.[17]

Risks of waiting until 39 weeks

Stillbirth

The benefits of waiting until 39 weeks for birth must be weighed against the risk of stillbirth (Figure 1.2).[18] The risk of stillbirth in Australia is 0.5 per 1,000 babies in utero at 36–39 weeks, rising to 0.8 per 1,000 at 40–41 weeks, and then rising more steeply to 2.3 per 1,000 at 42 weeks or more.[19]

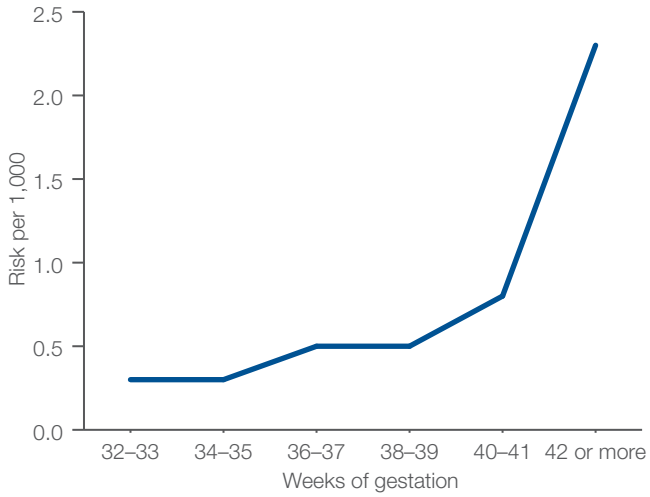
Identifying which babies are at risk and would benefit from earlier birth is challenging. Consequently, a large number of babies who would have benefited from longer gestation may need to be born early to prevent one stillbirth. The effects on neurodevelopmental outcomes from these early births are important and have been estimated.[18] Although such estimates are complex and difficult to apply to decision-making for individuals, the risk of stillbirth and the risk of developmental problems appear to be at a minimum at 39–41 weeks for women and babies without known complications.

The assessment of risk versus benefit is likely to be different between ethnic groups. For example, the rate of stillbirth in south Asian- and African-born women is higher than in Australian-born women after 37 weeks gestation.[20]

Risk of spontaneous labour

Another common concern about waiting until 39 weeks gestation for a planned caesarean section is the risk of the mother going into spontaneous labour beforehand, and possibly requiring an emergency caesarean section.[21] This is a particular concern for women who live far from 24-hour emergency obstetric services. Emergency caesarean section is associated with higher risks of complications and higher costs.[22,23] If caesarean section is planned for 39 weeks gestation, an estimated 13–25% of women will end up having a caesarean section after labour has started, compared with 8–11% if it is planned for 38 weeks gestation.[21]

Figure 1.2: Risk of stillbirth per 1,000 fetuses remaining in utero, by gestational age, Australia, 2015 and 2016



Source: *Stillbirths and Neonatal Deaths in Australia 2015 and 2016: In brief.*[19]

Guidelines for timing of planned birth

Several Australian states and territories have initiatives in place to reduce preterm and early-term births. These include guidance to avoid caesarean section and induction before 39 weeks gestation without a medical or obstetric indication – for example, The Whole Nine Months' in Western Australia and Every Week Counts in New South Wales.[24,25]

Guidelines for timing of planned caesarean section

Waiting until 39 weeks gestation for a planned caesarean section, if there are no medical or obstetric reasons for earlier birth, is now recommended by some Australian states and territories and several international organisations, including the American College of Obstetricians and Gynecologists, and the United Kingdom (UK) National Institute for Health and Care Excellence.[26-28] A position statement from the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) states: 'On balance, weighing up the risk of respiratory morbidity following elective caesarean section and the risk of labouring prior to caesarean section, it is recommended that elective caesarean section in women without additional risks should be carried out at approximately 39 weeks gestation'.[6,29]

Guidelines for timing of induction of labour without a medical or obstetric indication

Some international guidelines give recommendations on the timing of non-medically indicated induction of labour. For example, United States guidelines state that non-medically indicated inductions should not occur before 39 weeks gestation.[27] UK guidelines state that 'Induction of labour should not routinely be offered on maternal request alone. However, under exceptional circumstances (for example, if the woman's partner is soon to be posted abroad with the armed forces), induction may be considered at or after 40 weeks'.[30]

No national Australian guidelines were found on the lower limit of gestational age for induction without a medical or obstetric indication.

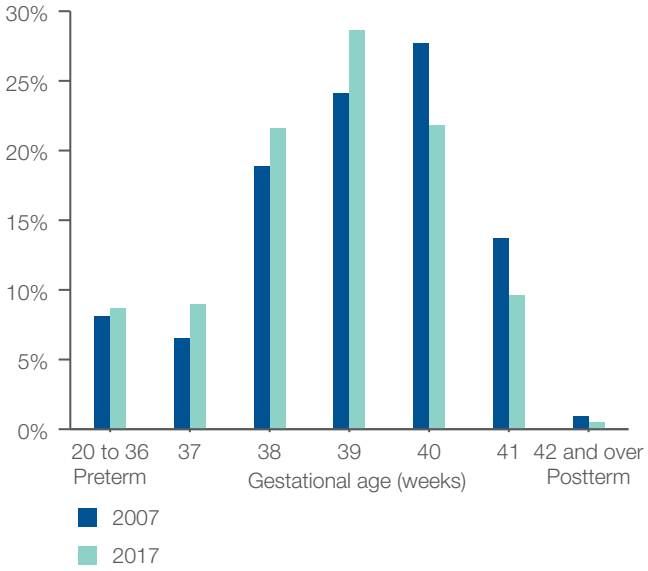
Early planned births without medical or obstetric indication

Trends in Australia

Gestational age at birth

Of all babies born each year in Australia, the proportion born at early term (37 or 38 weeks gestation) has increased in recent years. Between 2007 and 2017, the proportion of all babies born at 37, 38 or 39 weeks gestation increased, while the proportion born at 40 or 41 weeks gestation decreased (Figure 1.3).[31]

Figure 1.3: Percentage of babies, by gestational age in weeks, Australia, 2007 and 2017



Caesarean section

Rates of caesarean section overall have risen steadily in Australia since the early 1990s. In 2017, 35% of births in Australia were by caesarean section, compared with 31% in 2007 and 18% in 1990.[31,32] Australia's rate is higher than the average for countries in the Organisation for Economic Co-operation and Development (34 per 100 live births and 28 per 100 live births, respectively, in 2017).[33]

Planned early-term caesarean section

Few Australian data are available on trends in the proportion of caesarean sections that are planned and occur at early term. In New South Wales, the proportion of all singleton births that were prelabour caesarean sections almost doubled between 1994 and 2009, increasing from 9.1% to 17.1%.[34] Another New South Wales study showed that, between 2001 and 2009, the rate of planned caesarean section at 38 weeks gestation increased from 4.3% to 5.4%, and at 39 weeks gestation from 4.2% to 7.1%.[35] The proportion of all caesarean sections or inductions reported with established medical or obstetric indications, such as maternal hypertension or fetal distress, decreased between 2001 and 2009, while the proportion increased for conditions in which evidence is equivocal (for example, diabetes mellitus).[35]

Induction of labour

Rates of induction of labour have increased in Australia in recent years. Between 2007 and 2017, the percentage of mothers who had an induced labour increased from 25% to 33%.[31] Diabetes and prolonged pregnancy are the most common reasons for induction.[31]

Patterns of gestational age at induction have also changed. In New South Wales, between 1994 and 2009, the rate of inductions at 40 weeks gestation decreased, and rates of induction at 37–39 weeks increased.[34]

Note:
Pre-term births may include a small number of births of less than 20 weeks gestation.
Source: *Australia's Mothers and Babies 2017: In brief.*[31]

Rates of induction at early term (37–38 weeks) vary substantially between hospitals in New South Wales (3.3–13.9%). Early-term inductions are more common among women from the highest socioeconomic status areas than among those from the lowest socioeconomic status areas (24.1% compared with 15.2%).[36]

Gestational diabetes

Gestational diabetes increases the risk of complications, including gestational hypertension, pre-eclampsia and having a baby that is large for gestational age.[37-39] Among women who have a vaginal birth, the rate of shoulder dystocia and third- or fourth-degree perineal tears is higher for mothers with gestational diabetes than for those without diabetes.[38]

The rate of gestational diabetes increased from 5.2% to 15.1% in Australia between 2000–01 and 2016–17.[40] A change in recommended diagnostic criteria in 2014 is likely to be responsible for part of this substantial rise.[41] Other factors that are likely to have contributed to the increase in gestational diabetes include:

- Increased rates of obesity
- Increased age at child-bearing
- Immigration of women from ethnicities with higher rates of gestational diabetes, such as Asian, Indian, Torres Strait Islander, Pacific islander, Maori, Middle Eastern and non-white South African women.[42]

Women diagnosed with gestational diabetes are more likely to have a planned birth than women without diabetes. They are also more likely to have a caesarean section than women without diabetes (40.4% and 33.0%, respectively, in Australia in 2014–15)[43] and more likely to have an induction than women without diabetes (44.4% and 27.2%, respectively, in 2014–15).[44]

Planned birth by caesarean section or induction may be recommended as a result of conditions that develop because of gestational diabetes (for example, gestational hypertension) or conditions that are more common among mothers with gestational diabetes (for example, pre-existing hypertension).[39,45] Caesarean section may be recommended to prevent shoulder dystocia and brachial plexus palsy, depending on the estimated weight of the baby.[46] Recommendations in Australian local guidelines for timing of birth for women with gestational diabetes vary.[47,48]

Early planned births without medical or obstetric indication

Previous Atlas findings on early planned caesarean section

The *Third Australian Atlas of Healthcare Variation* included a special report on early planned caesarean section without a medical or obstetric indication. Although data collection by states and territories for this indicator was in its early stages, and was not yet complete enough to allow the usual maps and graphs presented for other Atlas topics, a combination of factors prompted the Australian Commission on Safety and Quality in Health Care to publish the available data:

- Growing evidence of long-term impacts on brain development in children who had a planned birth before 39 weeks gestation
- Increased risks of short-term adverse effects in babies born before 39 weeks, such as respiratory problems and the need for intensive care
- The large number of children affected in Australia and the potential to prevent substantial unnecessary adverse effects in the future.

What were the findings in the third Atlas?

The third Atlas reported that, in 2015, the percentage of planned caesarean sections performed at less than 39 weeks gestation without an obstetric or medical indication ranged from 42% to 60% in the four states and territories with data that could be presented.[49] The percentage of planned caesarean sections performed at less than 37 weeks gestation without an obstetric or medical indication ranged from 10% to 22% in the four states and territories with data that could be presented.

Rates were generally higher for patients with private accommodation status (private patients) than for patients with public accommodation status (public patients) for planned caesareans performed before 37 or 39 weeks. For example, in 2015, in the four states and territories with published data, the percentage of caesarean sections at less than 39 weeks gestation without an obstetric or medical indication was 51.6% for public patients, compared with 60.1% for private patients.[49]

Why are we revisiting this topic?

This update includes an additional year of data (births in 2017) and provides a more complete picture of planned early births with the following additions:

- Publishable contributions from an additional three states and territories, allowing data from seven of the eight states and territories of Australia to be presented
- Data on planned caesarean section at less than 38 weeks, in addition to less than 37 and less than 39 weeks, as presented in the third Atlas; this shows the proportion of planned births that are carried out more than a week earlier than many guidelines recommend
- Data on inductions of labour without a medical or obstetric indication, as a proportion of all inductions for any reason, at less than 37, less than 38 and less than 39 weeks.

Important notes on the data used in this report

The draft National Core Maternity Indicator 18 – 'Caesarean sections <39 completed weeks (273 days) without obstetric or medical indication' used in this report was developed by the Expert Commentary Group responsible for the National Core Maternity Indicators to benchmark practice and to reduce neonatal respiratory morbidity by minimising early births. The indicator has not yet been endorsed by the National Health Data and Information Standards Committee and is not routinely reported. The potential to reduce avoidable harm prompted the Commission to publish data for this indicator.

A number of limitations with this indicator should be noted.

Birth without established labour is interpreted as planned birth in this report.

Data on the reason for early planned birth (by any method) are not available at the national level. Therefore, as a proxy measure, this indicator uses data collected on the main reason for caesarean section. The main reason for caesarean section may be unrelated to the reason for early birth. For example, there are a number of medical or obstetric reasons for early birth that will not appear as a reason for caesarean section, including pre-eclampsia and stillbirth. The induction indicator uses reason for induction as a proxy measure for early planned birth.

Differences exist between states and territories in definitions and methods used for collection of data on the main reasons for caesarean section and for induction. For this reason, data are not comparable across states and territories.

Some state and territory health departments found in their review of data that recording of the main reason for caesarean section was not always updated as the clinical situation evolved. For example, medical or obstetric indications for early birth, such as fetal compromise, were not always recorded as the main indication for early caesarean section if a caesarean section had already been planned for other reasons. Similarly, clinical events such as pre-labour rupture of membranes may lead to an unplanned early caesarean section, but these were not always recorded if the caesarean section had already been planned for other reasons. This means that the count of planned caesarean sections performed before 39 weeks without medical or obstetric indication is an overestimate for some states. This may also apply to the recording of the reason for induction of labour. South Australia was unable to collect data for the main reason for caesarean section according to revised specifications introduced from 1 July 2015. Data were mapped by the Australian Institute of Health and Welfare (AIHW) to the revised specifications, where possible.

Data on the main indication for caesarean section are published at the state and territory level in the supplementary tables for the AIHW report *Australia's Mothers and Babies*.[31] It is anticipated that, as clinicians start to use the data for quality improvement purposes, all states and territories will be able to report according to the specifications.

Caesarean section without medical or obstetric indication

The numerator for this indicator is caesarean sections 'without medical or obstetric indication' where the caesarean section occurred in the absence of labour and at less than 39 completed weeks for the following reasons:

- Maternal choice in the absence of any obstetric, medical, surgical or psychological indication
- Previous caesarean section
- Previous severe perineal trauma
- Previous shoulder dystocia.

Although these may be indications for planned caesarean section, they were not considered reasons for early planned caesarean section – that is, before 39 weeks.

Early planned births without medical or obstetric indication

The listed reasons included in the data element 'Main indication for caesarean section' in the perinatal data collection were used in the development of the indicator for this report. For the purposes of this report, all indications in the data element, except the four listed above, were considered medical or obstetric indications for early planned caesarean section.

The denominator is the total number of women who gave birth by caesarean section at less than 39 completed weeks gestation and where there was no established labour.

Induction of labour without medical or obstetric indication

The numerator for this indicator is induction of labour 'without medical or obstetric indication' at less than 39 completed weeks gestation for the following reasons:

- Administrative or geographical indication
- Maternal choice in the absence of any obstetric, medical, fetal, administrative or geographical indication.

The denominator is the total number of women who gave birth following induction of labour at less than 39 completed weeks gestation.

Data source and subanalyses

Data are sourced from the National Perinatal Data Collection, which includes births that occur in hospitals, birth centres and the community (such as home births), for patients with public or private elected accommodation status. Because of small numbers, data are reported only at the state and territory level. Reporting by smaller geographical area, remoteness and socioeconomic disadvantage is not possible.

Data availability

Data were available for publication for seven states and territories for the caesarean section indicator. Nationally, there were 37,709 caesarean sections before 39 weeks gestation without established labour (denominator of this indicator) in 2017. Of these, 37,182 caesarean sections (98.6%) were from the seven reporting states and territories; 527 (1.4%) were from the remaining territory and are not included in the analysis.

Data were available for publication for six states and territories for the induction of labour indicator. Nationally, there were 37,278 inductions before 39 weeks gestation without established labour (denominator for this indicator) in 2017. Of these, 26,992 inductions (72.4%) were from the six reporting states and territories; 10,286 (27.6%) were from other states and territories and are not included in the analysis.

What do the data show?

Early planned birth without a medical or obstetric indication

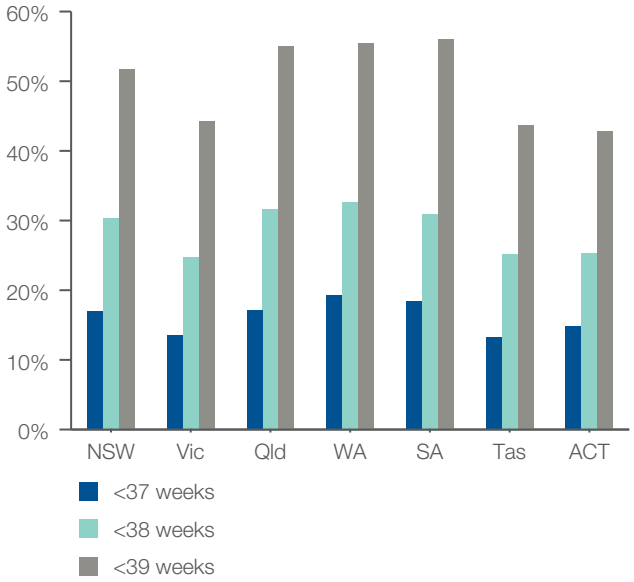
Caesarean section without a medical or obstetric indication

In 2017, the ranges of state and territory rates for caesarean sections without a medical or obstetric indication, as a percentage of all caesarean sections at these gestational ages, were (Figure 1.4)*:

- <37 weeks, 13.3–19.3%
- <38 weeks, 24.8–32.7%
- <39 weeks, 42.8–56.1%.

* Excludes the Northern Territory
Birth without established labour is interpreted as planned birth in this report.

Figure 1.4: Caesarean sections at <37, <38 or <39 weeks without a medical or obstetric indication, as a percentage of all caesarean sections at these gestational ages, by state and territory of usual residence, 2017[a-g]



The data for Figure 1.4 are available at safetyandquality.gov.au/atlas

Notes:

(a) Because of differences in definitions used and methods of data collection, these data are not comparable across states and territories.
(b) Data include women who gave birth by caesarean section with no established labour only.
(c) 'Without obstetric or medical indication' includes the following reasons for caesarean section: previous caesarean section; previous severe perineal trauma; previous shoulder dystocia; and maternal choice in the absence of any obstetric, medical, surgical or psychological indications. Although these may be indications for planned caesarean section, they were not considered reasons for planned caesarean section before 39 weeks. See page 49 for more information on obstetric and medical indications.
(d) Clinical indications for early delivery, such as fetal compromise, were not always recorded as the main indication for caesarean section when the decision to deliver by caesarean section was pre-planned in the antenatal period.
(e) South Australia was unable to collect data for this item according to revised specifications introduced from 1 July 2015. Data have been mapped to the new specifications, where possible.
(f) Data for the Northern Territory were not published.
(g) For Tasmania, the majority of private hospitals were unable to collect data for this item according to revised specifications introduced from 1 July 2015. Data have been mapped to the new specifications where possible. Care must be taken when interpreting these numbers.

Source: AIHW analysis of National Perinatal Data Collection.

Early planned births without medical or obstetric indication

Analysis by funding status

Rates of caesarean section at less than 39 weeks without a medical or obstetric indication were higher for private patients than for public patients in New South Wales, Queensland and Western Australia (Figure 1.5). The rates for public and private patients were similar in both South Australia and the Australian Capital Territory.

Figure 1.5: Women who gave birth by caesarean section at less than 39 completed weeks gestation without medical or obstetric indication, by state and territory of usual residence and admitted patient elected accommodation status, 2017[a-i]

The data for Figure 1.5 are available at safetyandquality.gov.au/atlas

Analysis by Aboriginal and Torres Strait Islander status

Data on rates of caesarean section at less than 39 weeks gestation without a medical or obstetric indication for Aboriginal and Torres Strait Islander women were available for publication from four states. Data were available from three other states and territories but could not be published for confidentiality reasons due to small numbers.

The percentages of caesarean sections performed at less than 39 weeks gestation without an obstetric or medical indication in the states with published data were lower among Aboriginal and Torres Strait Islander women than among other Australian women (Figure 1.6). The difference was 2 to 4 percentage points in each state.

The denominators are low for this category (for example, for one state, the denominator is 110), so caution should be used in judging whether differences are significant.

Notes:
(a) Because of differences in definitions used and methods of data collection, these data are not comparable across states and territories.
(b) Data include women who gave birth by caesarean section with no established labour only.
(c) 'Without obstetric or medical indication' includes the following reasons for caesarean section: previous caesarean section; previous severe perineal trauma; previous shoulder dystocia; and maternal choice in the absence of any obstetric, medical, surgical or psychological indications. Although these may be indications for planned caesarean section, they were not considered reasons for planned caesarean section before 39 weeks. See page 49 for more information on obstetric and medical indications.
(d) Clinical indications for early delivery, such as fetal compromise, were not always recorded as the main indication for caesarean section when the decision to deliver by caesarean section was pre-planned in the antenatal period.
(e) For Western Australia, some private hospitals admit public women; hence, the number of women who elected private status might be lower than the number of women admitted to private hospitals. Care must be taken when interpreting these numbers.
(f) South Australia was unable to collect data for this item according to revised specifications introduced from 1 July 2015. Data have been mapped to the new specifications, where possible.
(g) For Tasmania, the majority of private hospitals were unable to collect data for this item according to revised specifications introduced from 1 July 2015; this may affect women with an admitted patient elected accommodation status of both public and private. Data have been mapped to the new specifications where possible. Data for public hospitals were collected according to the new specifications. Care must be taken when interpreting these numbers.
(h) Data for the Northern Territory were not published.
(i) Excludes women who gave birth in birth centres attached to hospitals.
Source: AIHW analysis of National Perinatal Data Collection.

Figure 1.6: Women who gave birth by caesarean section at less than 39 weeks gestation without medical or obstetric indication, by state of usual residence and Aboriginal and Torres Strait Islander status, 2017[a-g]

Notes:
(a) Because of differences in definitions used and methods of data collection, these data are not comparable across jurisdictions.
(b) Data include women who gave birth by caesarean section with no established labour only.
(c) 'Without obstetric or medical indication' includes the following reasons for caesarean section: previous caesarean section; previous severe perineal trauma; previous shoulder dystocia; and maternal choice in the absence of any obstetric, medical, surgical or psychological indications. Although these may be indications for planned caesarean section, they were not considered reasons for planned caesarean section before 39 weeks. See page 49 for more information on obstetric and medical indications.
(d) Clinical indications for early delivery, such as fetal compromise, were not always recorded as the main indication for caesarean section when the decision to deliver by caesarean section was pre-planned in the antenatal period.
(e) Data for South Australia, Tasmania and the Australian Capital Territory are not published for confidentiality reasons due to small numbers (less than 5) of Aboriginal and Torres Strait Islander women.
(f) Data for the Northern Territory were not published.
(g) In 2017, 4.5% of women who gave birth in Australia identified as Aboriginal and/or Torres Strait Islander.[31]

Source: AIHW analysis of National Perinatal Data Collection.

Induction of labour without a medical or obstetric indication

State and territory rates for induction of labour at less than 39 weeks gestation without a medical or obstetric indication ranged from 0.2% to 6.0% (excludes New South Wales and the Northern Territory; Figure 1.7).

Figure 1.7: Inductions at less than 39 weeks without a medical or obstetric indication, as a percentage of all inductions at less than 39 weeks, by state and territory of usual residence, 2017[a-g]

The data for Figures 1.6 and 1.7 are available at safetyandquality.gov.au/atlas

Notes:
(a) Includes women who had induced labour and gave birth vaginally (including non-instrumental, forceps and vacuum extraction); or induced labour and gave birth by caesarean section.
(b) 'Without obstetric or medical indication' includes the following reasons for induction of labour: administrative or geographical indication; and maternal choice in the absence of any obstetric, medical, fetal, administrative or geographical indication.
(c) Because of differences in definitions used and methods of data collection, these data are not comparable across states and territories.
(d) Data not provided for New South Wales, because data for reason for induction of labour could not be collected according to revised specifications introduced from 1 July 2015.
(e) South Australia was unable to collect data for reason for induction of labour according to revised specifications introduced from 1 July 2015. Data have been mapped to the new specifications, where possible.
(f) Data for the Northern Territory were not published.
(g) For Tasmania, the majority of private hospitals were unable to collect data for this item according to revised specifications introduced from 1 July 2015. Data have been mapped to the new specifications where possible. Care must be taken when interpreting these numbers.

Source: AIHW analysis of National Perinatal Data Collection.

Early planned births without medical or obstetric indication

Analyses by remoteness and socioeconomic status

Small numbers made analyses by remoteness and socioeconomic status difficult to interpret. Data are available at safetyandquality.gov.au/atlas

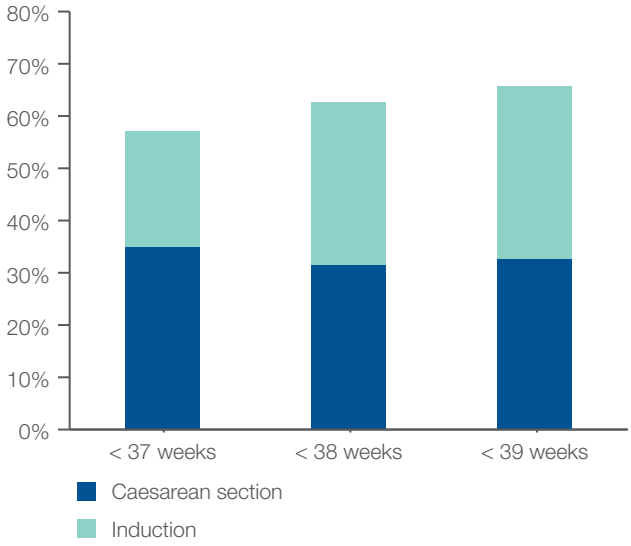
Early planned births, for any reason

Data presented in the previous section related to planned births without a medical or obstetric indication. The data in this section show planned births for any reason – that is, caesarean section or induction with or without a medical or obstetric indication.

The rates of women who gave birth by caesarean section (without labour) or following induction, as a percentage of all births at these gestational ages, for six states and territories were (Figure 1.8)*:

- <37 weeks, 57.1%
- <38 weeks, 62.7%
- <39 weeks, 65.7%.

Figure 1.8: Women who gave birth by caesarean section or who had labour induced, for any reason, as a percentage of all women giving birth at each gestational age, six states and territories, by gestational age, 2017[a-d]



The data for Figure 1.8 are available at safetyandquality.gov.au/atlas

* Excludes New South Wales and the Northern Territory.

Notes:

(a) Excludes New South Wales and the Northern Territory. Data were not provided for New South Wales, because data for reason for induction of labour could not be collected according to revised specifications introduced from 1 July 2015. Data for the Northern Territory were not published.
(b) Caesarean section data include women who had no established labour and gave birth by caesarean section. Induction data include women who had induced labour and gave birth vaginally (including non-instrumental, forceps and vacuum extraction); or induced labour and gave birth by caesarean section.
(c) Data exclude Australian non-residents, residents of external territories and records where state or territory of residence was not stated.
(d) In the case of multiple births, gestational age and method of birth are based on the first-born baby.

Source: AIHW analysis of National Perinatal Data Collection.

Interpretation

Despite data limitations (see 'Important notes on the data used in this report'), the estimates presented in this chapter suggest that the percentage of caesarean sections performed before 39 weeks without a medical or obstetric indication may be substantial, and action is needed to reduce these rates. See 'Planned early caesarean section without a medical or obstetric indication', below.

In the case of inductions of labour, almost all were performed with a medical or obstetric indication, but the number of babies in this group is large and the indications are not universally agreed. Further debate, and weighing of the risks and benefits could shed light on whether reducing the rate of inductions before 39 weeks could produce better outcomes for children overall. See 'Influences on induction rates' (page 56).

Planned early caesarean section without a medical or obstetric indication

Approximately half of the planned caesarean sections performed before 39 weeks did not have a stated medical or obstetric indication in 2017. This translates into a large number of children who may have an increased risk of adverse outcomes.

The availability of publishable data improved between 2015 and 2017, increasing from four to seven states and territories, which is an encouraging development.

Planned early caesarean section at less than 38 weeks

The third Atlas noted that the gestational age recommended in the RANZCOG position statement differed from the cut-off age used in the data item ('approximately 39 weeks' and '39 weeks', respectively), which would have affected the interpretation of findings.[6] For example, planned births at 38 weeks and 6 days gestation are appropriate according to the RANZCOG position statement, but were counted in the numerator of the third Atlas data.[6] In the fourth Atlas, additional analyses with less than 38 weeks and less than 37 weeks as the cut-off gestation period have been included, to clarify the proportion of planned caesarean sections that occurred well before the RANZCOG recommended minimum gestational age of approximately 39 weeks.

The percentage of planned caesarean sections without obstetric or medical indication occurring before 37 weeks gestation (13.3–19.3%) and before 38 weeks gestation (24.8–32.7%) shows that a substantial number are occurring well before the RANZCOG recommendation of approximately 39 weeks gestation.[50]

Public versus private funding

The relationship between elected public or private accommodation status and rate of early planned caesarean section varied considerably among states and territories.

Aboriginal and Torres Strait Islander women

In 2017, 29% of Aboriginal and Torres Strait Islander women gave birth by caesarean section, compared with 35% of all women giving birth in Australia.[31] The rates of early-term caesarean section without a medical or obstetric indication were lower among Aboriginal and Torres Strait Islander women than among other Australian women in the four reporting states. The difference was between 2 and 4 percentage points in each of the four states. Analysis by remoteness was not possible with the available data, but the rate of early planned birth among Aboriginal and Torres Strait Islander women living in remote areas may be greater because of the need to travel to a major centre.

Early planned births without medical or obstetric indication

Potential reasons for variation

The reported rates of early planned births could be influenced by a number of factors, such as variation in:

- Data factors (see 'Important notes on the data used in this report' (page 49)
- Clinician and organisational factors
  - failure to implement best-practice guidelines
  - MBS item descriptor and private health insurance payment do not reflect best practice
  - culture within individual hospitals and individual clincians[51]
  - method for calculating estimated due date, which may give differing estimates
  - opinion on what constitutes a valid medical or obstetric indication for early planned birth
  - accountability for the decision to schedule an early planned birth[52]
  - quality of information provided to enable shared decision making and informed consent
  - operating theatre capacity
- Health system factors
  - proportion of smaller units in each state or territory – limited capacity may increase rates of early planned birth
  - implementation of stillbirth prevention initiatives[53]
  - access to midwife-led care
  - state and territory training requirements for general practitioners (GPs) providing antenatal shared care – mandatory training and refresher courses may increase awareness of risks of early planned birth
- Demographic and consumer factors
  - social factors – for example, timing to ensure that the partner is present for the birth in areas with military bases or fly-in-fly-out workers
  - rates of private health insurance – early planned birth rates are higher among private patients in some states and territories; lower rates of early planned birth among Aboriginal and Torres Strait Islander women may reflect lower rates of private health insurance in this population
  - maternal obesity
  - proportion of pregnancies resulting from assisted reproduction technologies
  - rates of induction of labour without a medical or obstetric indication before 39 weeks – a proportion become caesarean section births.

Influences on induction rates

Hospital factors appear to play a substantial role in decision-making about induction.[36] A New South Wales study found large variation in induction rates overall, and in early-term induction rates, between hospitals, even after accounting for differences in casemix (for example, rates of diabetes or hypertension).[36] Overall, half of the variation in hospital rates of induction at 37–38 weeks could be explained: 7% was explained by patient factors, and 43% by hospital factors.[36] Hospital factors included annual number of births, neonatal care facilities, region, and obstetric training provided. Culture within hospitals also appears to play a substantial role in influencing rates of induction.[36]

A qualitative study of decision-making about induction in New South Wales hospitals found the following[52]:

- Obstetricians in hospitals with high rates of induction tended to have less accountability for the decision to induce labour
- A common decision point that determined whether an induction went ahead was the acceptance of the booking in the hospital – if the bookings were taken by a senior midwife who had the authority to question the decision, the hospital was more likely to have a lower rate of induction
- Variations in decisions about induction were based on obstetricians' perceptions of risk in the pregnancy

- Where obstetricians within the same hospital had substantially different approaches to induction, induction rates tended to be higher – if a hospital had one obstetrician with a greater tendency to induce labour than their colleagues, women were able to 'doctor shop' within the hospital and have the induction that the previous obstetrician had refused.

Inconsistencies in guideline recommendations about indications and timing could contribute to variation in rates of induction.[54] Guidelines are most consistent on the following indications for induction:

- Prolonged pregnancy
- Decreased fetal movements and oligohydramnios, although recommendations on timing are absent or inconsistent.[54]

There is little consensus on the validity or timing of induction for:

- Gestational diabetes
- Fetal macrosomia
- Elevated maternal body mass index
- Maternal age
- Ethnicity.

A lack of high-quality evidence to drive recommendations in guidelines is likely to contribute to variation in the level of consensus.[54]

Distance from metropolitan areas

The need to avoid an emergency caesarean section is greater in settings without rapid, 24-hour access to an operating theatre. Rates of caesarean section before 39 weeks gestation may be higher in some nonmetropolitan areas for this reason.

Policy and guideline differences

Differences in the gestational age used as the cut-off for this indicator ('less than 39 completed weeks') versus that recommended in the RANZCOG position statement ('approximately 39 weeks') may have inflated rates reported for this item.[6]

For example, births at 38 weeks and 6 days gestation are appropriate according to the RANZCOG position statement, but are included in some of the data in this analysis.[6]

Reducing rates of early planned birth

The high rates reported for planned caesarean sections without an obstetric or medical indication occurring before 39 weeks, 38 weeks and 37 weeks gestation highlight the need for a concerted effort to address this issue.

Multifaceted approaches

The Western Australian Preterm Birth Prevention Initiative to reduce the rate of preterm births and non-medically indicated early-term births was implemented from 2014.[55] The initiative includes education materials and workshops for health professionals, as well as a consumer education campaign. The rate of preterm birth (20–37 weeks) was significantly reduced over the three years evaluated in tertiary centres.[55] The greatest reduction in preterm birth (from 16.1% in 2013 to 12.8% in 2017) was seen in pregnancies classified as low risk at the first attendance, and in established tertiary centres.[55] In non-tertiary centres, preterm birth was reduced in the first year, but not in the subsequent two years. No benefit was seen in the private sector. The rate of stillbirth did not change significantly after the program was implemented.[55] The Australian Preterm Birth Alliance grew out of the Western Australian experience, and is now adapting similar prevention strategies for implementation across Australia.[56]

Many organisations in the United States have worked to reduce rates of preterm birth and birth before 39 weeks gestation without a medical or obstetric indication, and large improvements have been seen in recent years.[57] Strategies have included publishing data, undertaking public awareness campaigns, educating clinicians and prohibiting bookings for births before full term.

Early planned births without medical or obstetric indication

A multifaceted approach is also needed in Australia. This could include:

- Providing parents with information about fetal development, and the risks (and benefits, in some cases) of early-term births
- Providing support for shared and informed decision making
- Implementing hard-stop policies in hospitals (see 'Clinician education and hospital policies')
- Providing information to clinicians about the risks and benefits of early-term births, and advice about how to have conversations with parents about the issue
- Collecting data on reasons for early birth
- Using the Robson classification system to assess caesarean section practices over time at a hospital level
- Ensuring that hospital-level public reporting includes planned births without a medical or obstetric indication before 39 weeks
- Supporting case load midwifery models of care
- Including balance measures to minimise unnecessary early births prompted by initiatives to reduce stillbirth
- Supporting local initiatives to reduce early planned birth without a medical or obstetric indication
- Supporting further research to determine the risk of outcomes by gestational age, and maternal and fetal characteristics (for example, ethnicity, fetal size).

Women's knowledge, shared decision making and informed consent

Gaps in women's knowledge about the optimal timing of birth were shown in Australian research that reported that more than half of the pregnant women surveyed believed that 37–38 weeks gestation was the earliest time for safe birth.[7] Women support education initiatives and decision aids as strategies to improve shared decision making about planned caesarean section.[58] Providing education to parents about difference in outcomes, particularly effects on long-term child development, between early-term and full-term births could be a powerful strategy to reduce early planned birth where there are no medical or obstetric indications. Making this information available at the beginning of pregnancy and again halfway through would provide time for women to consider it before discussions about the timing of planned birth, if this was being contemplated. Decision aids show promise as a strategy to improve shared decision making about planned caesarean section, and are viewed positively by both women and clinicians.[58]

Greater engagement with consumers is needed to support woman-centred maternity care. Meaningful collaboration with consumers in policy development and at an organisational level is needed to ensure that health service planning and delivery reflect consumer values and priorities.

Clinician education and hospital policies

Providing information for clinicians about the most recent evidence for optimal timing of planned birth, and how to have conversations with parents about the issue, may be useful. However, combining education with changes to hospital policies is more effective for reducing early planned birth that is not medically indicated.[59] This was shown in a United States study of three different approaches to reducing elective early-term births (inductions and caesarean sections):

- Education only – physicians were given literature and recommendations against performing purely elective births at less than 39 weeks gestation
- Education plus a 'soft-stop' approach – compliance with a policy of not scheduling purely elective births at less than 39 weeks gestation was left up to individual physicians, but all exceptions to the policy were referred to a local peer review committee
- Education plus a 'hard-stop' approach – purely elective planned births at less than 39 weeks gestation were prohibited, and the policy was enforced by hospital staff who were empowered to refuse to schedule such births.[59]

During the two-year study period, the hard-stop policy was associated with the largest drop in elective births before 39 weeks (from 8.2% to 1.7%).[59] The soft-stop approach was associated with a smaller drop (from 8.4% to 3.3%).[59] Clinician education alone was less effective in changing practice, with a drop in rates from 10.9% to 6.0%.[59] Note that the data used in the study are not directly comparable with those in this report because of different denominators. For all groups combined, the rate of admissions to neonatal intensive care units fell during the study (from 8.9% to 7.5%).[59]

An education campaign on optimal timing for planned birth, specifically focusing on Australian GPs, could be worthwhile, as GPs sometimes undertake shared care with obstetricians.

Increasing flexibility of access to operating theatres

In some cases, a lack of capacity in theatre lists allocated for planned caesarean section once a woman has reached 39 weeks gestation may lead to theatre bookings at an earlier gestation. Hospital policies to increase flexibility of access to operating theatres may reduce rates of planned caesarean section before 39 weeks.

Balance measures with stillbirth prevention programs

Initiatives that reduce the risk of stillbirth can come at the cost of increasing intervention in normal pregnancies, due to the lack of specificity of techniques for identifying fetuses at greatest risk.[60] This can result in increases in early planned births. Potential harms (such as early planned births), as well as benefits, of initiatives to reduce the rate of stillbirth need to be measured so that the overall impact on children at a population level can be seen and considered.

Improving detection and management of fetal growth restriction and reduced fetal movements is part of the Safer Baby Bundle, an initiative implemented in New South Wales, Queensland and Victoria to reduce the risk of stillbirth.[61] These changes in practice could increase early planned birth in healthy pregnancies, as well as those at risk of stillbirth. The Safer Baby Bundle includes messages about the need to consider the adverse consequences of planned birth before 39 weeks, but these may be overshadowed by the influence of measures to avoid stillbirth.

The risk of unintended consequences was shown in a large UK trial of a program that aimed to reduce stillbirth.[62] Data from 409,175 pregnancies showed significant increases in rates of caesarean section and inductions, without any reduction in rates of stillbirth.[62] The program aimed to increase women's awareness of the need for prompt reporting of reduced fetal movements, and involved standardised management, including timely planned birth.[62]

This pattern has also been seen in Victoria in management of suspected fetal growth restriction, which is the strongest contributor to stillbirth. The number of babies born early as a result of suspected fetal growth restriction almost quadrupled between 2000 and 2017 in Victoria.[60] This increase coincided with introduction of public reporting of a hospital performance indicator of babies born severely small-for-gestational-age.[60] Births of severely small-for-gestational-age babies decreased, and the stillbirth rate fell by 3.3 per 1,000 births. However, among babies delivered because they were suspected small-for-gestational-age, the percentage with birthweights in the top 10th centile increased from 41% to 53% over the same period. In addition, admissions to a neonatal intensive care unit for babies born early for being suspected small-for-gestational-age but with a birthweight in the top 10th centile increased from 0.8% to 2.0%.[60]

More accurate methods of detecting fetal growth restriction are urgently needed to reduce the harm associated with increased early intervention to reduce the risk of stillbirth. In the interim, the balance measures included in the ongoing evaluation of the Safer Baby Bundle that record harms associated with early planned births will be important for clinicians and policymakers to consider.[53]

Early planned births without medical or obstetric indication

Hospital monitoring and public reporting of local rates

Ensuring that hospital-level public reporting includes data on planned births before 39 weeks without a medical or obstetric indication would allow women to make more informed choices. Quality improvement activities by hospitals, obstetricians and neonatologists could also provide insights into local rates of planned birth without a medical or obstetric indication before 39 weeks gestation. For example, local monitoring of clinical variation, as required by Action 1.28 of the Clinical Governance for Health Service Organisations Standard in the National Safety and Quality Health Service Standards (second edition)[63], could include monitoring of variation between the local rate and the state or territory rate, variation between practitioners, and deviation from evidence-based guidelines.

Midwifery continuity of care

Collaboration between midwives, obstetricians and GPs is a key element of providing safe and high-quality maternity care.[64] In Australia, a range of models of care exist for low-risk pregnant women. Continuity-of-care models that include case load midwifery have been found to be effective in reducing the rate of caesarean section in women at low risk from vaginal birth, with no change in perinatal deaths. In midwifery continuity-of-care models, antenatal care and care during labour are provided by the same midwife or small group of midwives (for example, one to three midwives), who work in collaboration with obstetricians.

In the COSMOS trial of more than 2,300 low-risk women at a Victorian maternity hospital (2007–2010), case load midwifery care, compared with standard care, reduced the rate of caesarean section (19.4% versus 24.9%).[65] The difference was primarily related to a fall in unplanned caesareans.[65] Case load midwifery may not be as effective in reducing the risk of caesarean section in women at higher risk. In the M@NGO trial of more than 1,700 pregnant women of any risk level, case load care did not affect the overall caesarean rate, but the rate of pre-labour caesarean section was lower with case load care than with standard care (8% compared with 11%).[66] Neonatal outcomes did not differ between the two groups.[66]

Improving data collection and monitoring

Collecting data on the reason for early planned birth would clarify the proportion of these births that did not have a medical or obstetric indication in Australia. This would allow efforts to be targeted where they are most needed, and show whether interventions are having an effect.

Additional data improvements could include:

- Reporting of gestational age in days to allow a better understanding of the distribution of births occurring before 39 weeks (currently a voluntary data item)
- Hospital monitoring and public reporting of local rates
- Inclusion of early planned caesarean section and early inductions without a medical or obstetric indication as hospital-acquired complications.

In the United States, planned early-term birth without a medical indication is a national perinatal quality benchmark monitored by the National Quality Forum and the Joint Commission.[67] Consumers in the United States also have access to published rates of early elective births for many hospitals.[57,67]

Reducing early-term and preterm birth in Aboriginal and Torres Strait Islander women

Aboriginal and Torres Strait Islander mothers require access to culturally secure models of maternity care, provided by a culturally competent health system.[68] This care should be based on woman-centred principles, including continuity of care and carer; it should be integrated with culturally safe mainstream services, and committed to employment of Aboriginal and Torres Strait Islander people in a variety of roles.[68]

A number of maternity indicators among Aboriginal and Torres Strait Islander mothers have shown improvements in recent years. For example, among Aboriginal and Torres Strait Islander mothers:

- The percentage who attended antenatal care in the first trimester increased from 50% in 2012 to 63% in 2017
- The proportion who reported smoking during pregnancy decreased from 52% in 2009 to 44% in 2017.[31]

Preterm birth (before 37 weeks) may be a substantially larger contributor to adverse outcomes among Aboriginal and Torres Strait Islander children than early-term planned birth, and a larger contributor than in other Australian children. In 2016–17, 14% of babies born to Aboriginal and Torres Strait Islander mothers were preterm, compared with 8.4% of babies born to other Australian mothers.[69]

The Birthing in Our Community maternity service in Brisbane has demonstrated a halving of the preterm birth rate among Aboriginal and Torres Strait Islander mothers using the service.[70] The service was co-designed by two Aboriginal Community Controlled Health Organisations and a tertiary maternity hospital with the aim of reducing preterm birth. The service design included principles of[70]:

- Increasing Aboriginal and Torres Strait Islander governance of, and workforce in, maternity services
- Midwifery continuity of care
- An integrated approach to supportive family services
- A community-based hub.

The rate of preterm birth was compared in records of women who gave birth to an Aboriginal or Torres Strait Islander baby between 2013 and 2017, 345 of whom attended the new service and 345 of whom received standard care. The rate of preterm birth was 7.5% in the Birth in Our Community service, and 13.9% for mothers receiving standard care.[70]

The service redesign was based on the RISE framework that was developed to increase the effectiveness and cultural acceptability of services for Aboriginal and Torres Strait Islander people[71]:

- Redesign the health service
- Invest in the workforce
- Strengthen families
- Embed Aboriginal and Torres Strait Islander community governance and control.

Further testing of this framework may show improvements in other outcomes, including reducing early planned births, among Aboriginal and Torres Strait Islander mothers.

Early planned births without medical or obstetric indication

Resources

- Western Australian Preterm Birth Prevention Initiative
- The whole nine months consumer and health professional resources, thewholeninemonths.com.au[24]
- Women and Babies Research, The Kolling Institute. Every Week Counts – consumer and health professional resources, everyweekcounts.com.au. version 1, 2019. Sydney: The University of Sydney[25]
- Australian Preterm Birth Prevention Alliance statement on balancing the risks and benefits of early planned birth, and joint decision making[72]
- Antenatal care for Aboriginal and Torres Strait Islander women[73]
- Birthing on Noongar Boodjar (Cultural Security & Aboriginal Birthing Women) project recommendations[68]
- Reducing preterm birth amongst Aboriginal and Torres Strait Islander babies: a prospective cohort study[70]
- *Safer Baby Bundle – Working Together to Reduce Stillbirth: Handbook and resource guide*[61]
- *Position Statement: Improving decision-making about the time of birth for women with risk factors for stillbirth*[74]
- *Playbook for the Successful Elimination of Early Elective Deliveries*[75]
- *Elimination of Non-medically Indicated (Elective) Deliveries Before 39 Weeks Gestational Age*[76]
- *WHO Statement on Caesarean Section Rates*[77]

Australian initiatives

The information in this chapter will complement work already under way to reduce rates of non-medically indicated early caesarean section and induction in Australia. At a national level, this work includes:

- Australian Preterm Birth Prevention Alliance Initiative: The Whole Nine Months[56]
- Safer Baby Bundle handbook and resource guide, Centre of Research Excellence in Stillbirth[61]
- Woman-centred care: strategic directions for Australian maternity services[72]
- RANZCOG statement on timing of elective caesarean section at term[6]
- RANZCOG statement on caesarean delivery on maternal request[50]
- National Agreement on Closing the Gap, Outcome 2: Aboriginal and Torres Strait Islander children are born healthy and strong[73]
- Birthing on Country Project; Congress of Aboriginal and Torres Strait Islander Nurses and Midwives, Australian College of Midwives, CRANAplus.

Many state and territory initiatives are also in place, including:

- Policy of booking all elective caesarean sections for 39 weeks unless there is an obstetric or medical indication for earlier delivery, Australian Capital Territory (ACT)
- Canberra hospital and health services clinical guideline: induction of labour, ACT[74]
- The Whole Nine Months program, ACT
- Guideline on timing of elective or pre-labour caesarean section, New South Wales[28]
- Women and Babies Research, The Kolling Institute. Every Week Counts – consumer and health professional resources, everyweekcounts.com.au. version 1, 2019. Sydney: The University of Sydney[25]

- NSW Health translational research project grant for 'Are we there yet? Optimising timing of planned birth to improve newborn outcomes and reduce health service costs'
- Queensland clinical guidelines: vaginal birth after caesarean section[81]
- Scoping to improve maternal and child continuity of care, Queensland
- Birthing in Our Community, Queensland[71]
- Waijungbah Jarjums, a service that connects Aboriginal and Torres Strait Islander parents with an Aboriginal and Torres Strait Islander midwife, Gold Coast, Queensland
- Queensland community maternity hubs, such as Logan Hospital and Logan Together
- Perinatal practice guidelines for caesarean section, South Australia[82]
- Preterm birth prevention initiative, Tasmania
- Planning for birth after caesarean, Victoria[83]
- Maternity eHandbook: induction of labour, Victoria[84]
- Publication of early-term birth data, Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity
- Birthing on Noongar Boodjar (Cultural Security and Aboriginal Birthing Women) project, Western Australia[68]
- Preterm birth prevention initiative: The Whole Nine Months, Western Australia (now expanded nationally).[55]

Early planned births without medical or obstetric indication

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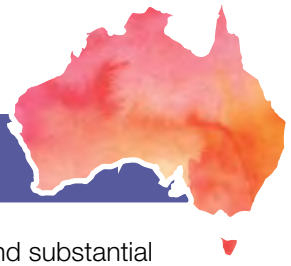
Chapter 2

Chronic disease and infection: potentially preventable hospitalisations



At a glance

Potentially preventable hospitalisations are an indicator in the National Healthcare Agreement, and include hospitalisations that may have been prevented by appropriate management earlier in the disease. Rates of potentially preventable hospitalisations are likely to reflect sociodemographic factors as well as the quality of early disease management.

More than 330,000 potentially preventable hospitalisations in Australia in 2017–18 were due to the conditions examined in this chapter: chronic obstructive pulmonary disease (COPD), kidney infections and urinary tract infections, heart failure, cellulitis, and diabetes. After standardising to remove age and sex differences, substantial variation was seen between local areas (Statistical Area 3 – SA3) in the rates of hospitalisation. Variation was greatest for COPD (the highest rate was about 18 times higher than the lowest), cellulitis (about 16 times) and diabetes complications (about 12 times). For all the conditions, hospitalisation rates were higher among Aboriginal and Torres Strait Islander people, people living in areas of socioeconomic disadvantage, and those living in remote areas.

The high hospitalisation rates and substantial variation show that recommended care is not always provided for people with chronic conditions. Despite the considerable funding provided through Medicare to better coordinate primary care for people with chronic diseases, health care can be fragmented and less than ideal.

Other likely contributors to variation include a higher proportion in some areas of patients with the most complex chronic disease, for whom hospitalisation may be inevitable. Poor access to health services in the community is also related to higher rates of potentially preventable hospitalisations.

Our health system must become better at reducing the progression of chronic disease and improving patients' quality of life. Several case studies in this chapter show how innovative solutions can improve health outcomes, such as integrated care for people with chronic conditions. Implementing successful interventions on a larger scale requires effective diffusion mechanisms, as well as funding reform.

Patients live with their chronic disease all day, every day. They must be put at the centre of prevention and management.

Recommendations

The Commission consulted widely, but is solely responsible for making the recommendations; as such, the recommendations may not reflect the views of all contributors to the Atlas.

2a. Consistent with the commitments made under the National Health Reform Agreement and building on the activities set out in the 2017 Bilateral Agreement on Coordinated Care, Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to implement the following principles in developing chronic disease management programs consistent with the National Strategic Framework for Chronic Conditions:

i. Patients, families and carers as partners in care, where patients are activated to maximise their knowledge, skills and confidence to manage their health, aided by technology and with the support of a healthcare team

ii. A risk stratification approach that supports identification of patients with high coordination and multiple provider needs, to ensure personalisation of service provision

iii. Flexible service delivery and team-based care that supports integrated patient care across the continuum of the health system through shared information and care planning

iv. A commitment to care that is of high quality and safe, including care planning and clinical decisions that are guided by evidence-based patient healthcare pathways, appropriate to the patient's needs

v. Data collection and sharing by patients and their healthcare teams to measure patient health outcomes and improve performance.

2b. The Commission, the Independent Hospital Pricing Authority and the Administrator of the National Health Funding Pool to identify and develop alternative approaches to funding for chronic disease and infection that could be applied to the National Health Reform Agreement Pricing and Funding model so that pricing and funding are aligned with best-practice guidelines. The alternative models could include bundled payments, capitation payments or regionally coordinated service responses.

COPD

2c. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to implement appropriate care for the management of people with chronic obstructive pulmonary disease (COPD) using the *COPD-X Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease 2020* as the routine model of care.

Heart failure

2d. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to implement process improvement for the effective management of people with heart failure, including:

i. Multidisciplinary care across the acute and primary care sectors

ii. A combination of strategies, including non-pharmacological approaches such as physical activity programs and fluid or dietary management, and pharmacotherapy.

Diabetes

2e. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to promote appropriate care for the management of people with diabetes aligned with:

i. *The Management of Type 2 Diabetes: A handbook for general practice* (2020)

ii. The Australian National Diabetes Strategy 2016–2020.

2.1 Chronic obstructive pulmonary disease (COPD)

Why is this important?

Chronic obstructive pulmonary disease (COPD) is a serious, chronic lung disease that impairs quality of life and shortens lives. Approximately 8% of people in Australia aged 40 years and over and 29% of those aged 75 years and over have at least moderate symptoms of COPD.[1] COPD accounts for a substantial number of hospital bed days every year in Australia – for example, 392,434 bed days in 2017–18. Better health care can sometimes keep people with COPD well enough to reduce their need for hospitalisation.

What did we find?

Between 2014–15 and 2017–18, the rate of COPD hospitalisations per 100,000 people nationally increased by 8%. In 2017–18, the rate of hospitalisations for COPD was **18.1 times as high** in the area with the highest rate compared with the area with the lowest rate.

In 2017–18, the rate for Aboriginal and Torres Strait Islander people was 4.8 times as high as the rate for other Australians. Rates were also higher in remote areas and in socioeconomically disadvantaged areas than elsewhere.

What can be done?

The high rate of hospitalisations for COPD reported in this chapter is unacceptable, and we must implement the strategies we know can improve the health of people with this condition. This is particularly important for the groups with higher rates of hospitalisation for COPD: Aboriginal and Torres Strait Islander peoples, and those living outside metropolitan areas or in socioeconomically disadvantage areas.

Pulmonary rehabilitation – that is, health professional–led programs of exercises and education strategies to improve breathing and function – can reduce hospitalisations among people with COPD by 36–56%.[2,3] Priority should be given to improving access to culturally safe pulmonary rehabilitation programs for Aboriginal and Torres Strait Islander people with COPD, and people living in remote areas of Australia. There should also be a focus on improving data collection and reporting for pulmonary rehabilitation programs to help health services and general practices monitor their effectiveness in improving patient outcomes. Pharmacist interventions, including providing education about medicines and lifestyle, and influenza vaccination are other interventions that can reduce hospitalisations for people with COPD.[4]

Smoking cessation can improve lung function in people with COPD.[5] Reducing smoking rates is key to reducing hospitalisations for COPD.

Chronic obstructive pulmonary disease (COPD)

Context

COPD is a chronic lung disease that often impairs quality of life and reduces life expectancy.[6,7] The term COPD encompasses chronic bronchitis and emphysema. Symptoms of COPD include shortness of breath with little or no exertion, as well as coughing, sputum production and wheezing. Patients with COPD may require hospitalisation for severe exacerbations, which are often caused by infections of the respiratory tract.

Evidence-based care for people with COPD may reduce the need for hospitalisation by reducing exacerbations.[4]

In 2017–18, COPD accounted for 392,434 hospital bed days in Australia, second only to heart failure for potentially preventable hospitalisations due to chronic diseases (412,693 bed days).[8] Approximately 7% of Australians aged 65 years and over have COPD.[9] It is more common in older people: approximately 8% of people in Australia aged 40 years and over and 29% of those aged 75 years and over have at least moderate symptoms of COPD.[1] The rate of hospitalisations for COPD was 235 per 100,000 in Canada, compared to 332 per 100,000 in Australia, for people aged 15 years and over in 2016.[10]

Smoking is the most common cause of COPD. There is typically a lag of decades between starting regular smoking and the appearance of symptoms.[4] Genetic factors, chronic asthma, environmental exposures (for example, to occupational fumes and dust, indoor and outdoor air pollution), pulmonary tuberculosis and failure to achieve maximal lung growth during development are also associated with an increased risk of COPD.[6] These additional risk factors may contribute to the markedly different rates of decline in lung function in people with COPD, despite similar smoking exposure.[11] Approximately 30–40% of people with COPD continue to smoke, and people with COPD often find it more difficult to quit than other smokers.[12] People with COPD also have a higher risk of lung cancer.[13]

Interventions to reduce exacerbations of COPD and hospitalisations include inhaled medicines.[4] Vaccination against influenza has been estimated to reduce, by approximately 37%, the risk of exacerbations, hospitalisations and death in people with COPD.[14] Pulmonary rehabilitation is recommended to improve exercise capacity and quality of life, and reduce hospitalisations and length of hospital stay for COPD.[3,15-18] Further details of recommended management are in the COPD-X guidelines.[4]

Who is at greater risk?

Rates of smoking, or a history of smoking, are high in regional and remote areas, and among people with socioeconomic disadvantage. Higher smoking rates among disadvantaged groups are associated with a complex interaction between social, economic, physiological, commercial and cultural factors.[19] Many of these factors originate in childhood and accumulate through an individual's lifetime.[19]

COPD and Aboriginal and Torres Strait Islander people

Aboriginal and Torres Strait Islander people have approximately 2.5 times the prevalence of COPD as other Australians.[20] COPD was the most common cause of potentially preventable hospitalisations among Aboriginal and Torres Strait Islander people in 2017–18, and the second most common cause among other Australians.[8]

A lack of culturally safe services for Aboriginal and Torres Strait Islander people may be a barrier to accessing health care effectively.[21] This may contribute to poorer medication management, continued smoking and lower influenza vaccination rates, with resulting higher hospitalisation rates. Smoking rates among Aboriginal and Torres Strait Islander people have fallen in the past decade, but remain higher than in the Australian population as a whole.[9,22]

About the data

Data are sourced from the National Hospital Morbidity Database, and include admitted patients in both public and private hospitals, as well as hospital care in the home.

Rates are based on the number of hospitalisations for COPD per 100,000 people of all ages in 2017–18.

Because a record is included for each hospitalisation for the condition, rather than for each patient, patients hospitalised more than once in the financial year will be counted more than once.

The analysis and maps are based on the usual residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence variations seen.

What do the data show?

Magnitude of variation

In 2017–18, there were 77,754 hospitalisations for COPD, representing 260 hospitalisations per 100,000 people of all ages (the Australian rate).

The number of hospitalisations for COPD across 328* local areas (Statistical Area Level 3 – SA3) ranged from 56 to 1,013 per 100,000 people. The rate was **18.1 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 218 per 100,000 people in the Australian Capital Territory to 693 in the Northern Territory (Figures 2.2–2.5).

After the highest and lowest 10% of results were excluded and 264 SA3s remained, the number of hospitalisations per 100,000 people was 3.3 times as high in the area with the highest rate compared with the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates of hospitalisation for COPD were substantially higher in remote areas than in other areas. Hospitalisation rates also increased with socioeconomic disadvantage, regardless of remoteness category (Figure 2.6).

* There are 340 SA3s. For this item, data were suppressed for 12 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

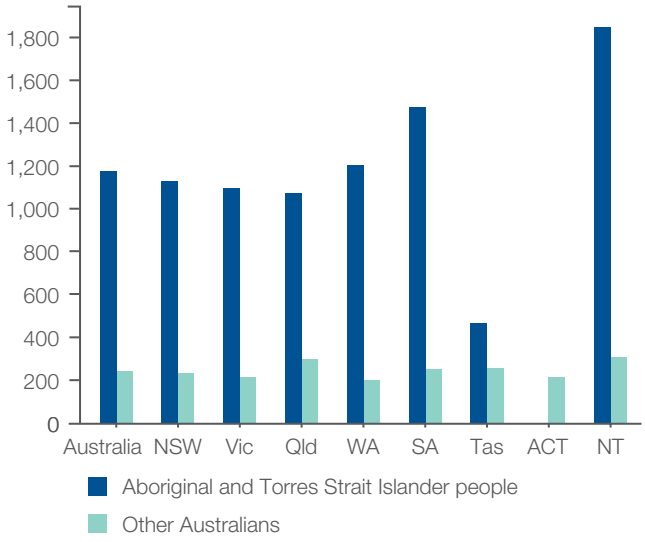
For further detail about the methods used, please refer to the Technical Supplement.

Chronic obstructive pulmonary disease (COPD)

Analysis by Aboriginal and Torres Strait Islander status

The rate of hospitalisations for Aboriginal and Torres Strait Islander people (1,178 per 100,000 people) was 4.8 times as high as the rate for other Australians (243 per 100,000 people) (Figure 2.1).

Figure 2.1: Number of potentially preventable hospitalisations – COPD per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2017–18



The data for Figure 2.1, and the data and graphs for Analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

Trends over time

Between 2014–15 and 2017–18, the rate of COPD hospitalisations per 100,000 people nationally increased by 8% (Figure 2.7).

For Aboriginal and Torres Strait Islander people, the rate of COPD hospitalisations per 100,000 people nationally increased by 16% between 2014–15 and 2017–18 (Figure 2.8).

Interpretation

Potential reasons for the variation include differences in:

- Demographic and consumer factors
  - prevalence of COPD and comorbidities
  - rates of smoking, which are influenced by socioeconomic disadvantage, psychological distress, Aboriginal and Torres Strait Islander status, and remoteness
  - rates of respiratory infections
  - patients' health literacy and ability to self-manage exacerbations
  - patients' ability to afford medicines
  - patients' social supports, frailty and comorbidities
  - air quality and occupational exposures (for example, to fumes and dust)
  - the proportion of people from non-English speaking backgrounds – the risk of hospitalisations for COPD is higher in these groups[6]
- Clinician factors
  - concordance with evidence-based guidelines by clinicians and service providers[23-25]
  - clinician focus on smoking cessation
  - diagnostic error

Notes:
Data for ACT (Aboriginal and Torres Strait Islander people) have been suppressed. Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated, with variation among states and territories.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

- Health system factors
  - access to community pulmonary rehabilitation and multidisciplinary care
  - access to secondary prevention programs
  - rates of influenza and pneumococcal vaccination
  - primary care services that are affordable, culturally appropriate and accessible
  - emergency department admission policies (that is, admitting all COPD patients, or discharging some patients where there are sufficient community resources).

Variations between areas may not directly reflect the practices of the clinicians who are based in those areas. Area boundaries reflect where people live rather than where they obtain their health care. Patients who live in metropolitan, regional and rural areas may all travel outside their local area to receive care.

Smoking rates

The pattern of COPD hospitalisations mirrors the pattern of smoking in different population groups. The rate of smoking among Aboriginal and Torres Strait Islander people is 41%, which is approximately triple the rate for the Australian population as a whole.[26] Rates of smoking are higher among people living in outer remote and remote areas of Australia (19%) than among those living in inner regional areas (15%) or major cities (13%).[9]

Rates of smoking are higher in areas of greatest socioeconomic disadvantage. In areas of most disadvantage (first quintile), 22% of adults are current daily smokers, compared with 7% in the least disadvantaged areas (fifth quintile).[9]

System factors

System factors likely to influence hospitalisation rates for COPD include access to multidisciplinary respiratory specialty care (which is particularly lacking in regional and remote areas), integrated care and telehealth. Hospital management of common comorbidities in people with COPD also plays an important role, as does good discharge planning to reduce readmissions.

Primary care

Lack of concordance with best practice in primary care can contribute to variation in hospitalisation through differences in advice to patients on how to manage exacerbations, education on inhaler technique, rates of influenza and pneumonia vaccination, and recommendations for pulmonary rehabilitation.[23,25,27]

Reducing COPD hospitalisations

The high rate of hospitalisations for COPD reported in this chapter is unacceptable, and we must implement the strategies we know can improve the health of people with this condition. This is particularly important for the groups with higher rates of hospitalisation for COPD: Aboriginal and Torres Strait Islander peoples, and those living outside metropolitan areas or in socioeconomically disadvantage areas.

Reducing smoking rates is also key to reducing COPD rates and hospitalisations. This is particularly true for groups with high smoking rates, such as Aboriginal and Torres Strait Islander people, people at socioeconomic disadvantage, and people living in regional or remote areas.[9] Increasing influenza vaccination rates could also reduce hospitalisations among people with COPD.[14]

Systems to support early diagnosis and management of COPD, and integrated services, could reduce the need for some COPD hospitalisations.[28] Increases in access to spirometry, smoking cessation supports and education on appropriate inhaler use have also been identified as priorities for supporting people with COPD.[28] Pharmacist interventions, pulmonary rehabilitation and telehealth (including remote monitoring) may reduce hospitalisations among people with COPD.

Chronic obstructive pulmonary disease (COPD)

Pulmonary rehabilitation

Pulmonary rehabilitation is a program of exercises and education strategies delivered by health professionals to improve breathing and function. A review of randomised controlled trials of pulmonary rehabilitation found that COPD-related hospitalisations were reduced by 36% in patients undertaking pulmonary rehabilitation.[2] Another review found that, among patients undertaking pulmonary rehabilitation after being hospitalised for an exacerbation of symptoms, the risk of readmission for any reason was reduced by 56%.[3]

Estimates of the use of pulmonary rehabilitation by people with COPD in Australia have ranged from less than 5% to 10%.[29] Uptake of pulmonary rehabilitation by Aboriginal and Torres Strait Islander people with COPD is lower than for other Australians.[30] One reason for the low uptake by Australian COPD patients is difficulty in accessing services.[17,18,31] For example, access has been limited by the small number of services, restriction of services to hospital settings in many cases, and difficulties with transport and comorbidities.[32,33] Depression and a lack of perceived benefit also prevent some people with COPD from attending pulmonary rehabilitation.[33] Access to pulmonary rehabilitation in rural and remote areas is particularly challenging.

Providing pulmonary rehabilitation in community settings with easy access to transport has shown positive results in improving attendance and reducing hospitalisations.[17,18] A training program for health professionals in rural and remote areas in providing pulmonary rehabilitation has been trialled successfully and improved access in these areas.[17] Access to culturally sensitive pulmonary rehabilitation programs will be important if these programs are to benefit Aboriginal and Torres Strait Islander people with COPD (see 'Case study: Pulmonary rehabilitation for Aboriginal and Torres Strait Islander people' on this page). Improving health literacy and self-management is particularly important for people with COPD who do not have access to pulmonary rehabilitation.

Home-based pulmonary rehabilitation may be useful for engaging people with COPD who are unable to access traditional models. A home-based pulmonary rehabilitation program, which included one home visit and seven once-weekly phone calls from a physiotherapist, was shown to have outcomes at least as beneficial as traditional centre-based programs.[34]

Case study: Pulmonary rehabilitation for Aboriginal and Torres Strait Islander people

Aboriginal and Torres Strait Islander people with COPD have lower rates of participation in pulmonary rehabilitation than the Australian population as a whole, but a program in Hobart and Launceston, Tasmania, has succeeded in engaging patients and improving outcomes. The program combined cardiac and pulmonary rehabilitation and prevention. It was open to Aboriginal and Torres Strait Islander people with COPD, heart failure, ischaemic heart disease or at least two cardiovascular risk factors (for example, smoking, obesity, hypertension).[30]

Dyspnoea, fatigue and mental health scores improved significantly after the eight-week program, which comprised two exercise sessions and one self-management education session per week in 2013.[30] The program encouraged participation by providing a variety of exercise types and transport, if required; 79% of the 92 participants attended at least half of the sessions. Aboriginal health workers recruited and supported participants, and liaised between the Aboriginal health service and external clinicians. Co-location with the Aboriginal health service and leadership by Aboriginal and Torres Strait Islander health workers were thought to be key factors in the program's success.[30]

Reducing COPD hospitalisations among Aboriginal and Torres Strait Islander people

Complex social determinants underlie the disparities in health, and in risk factors such as smoking rates, between Aboriginal and Torres Strait Islander people and other Australians.[35,36] Impacts of colonisation, including racism and intergenerational trauma, contribute to these determinants. To address health inequities, improvements in social factors are required – for example, in education, employment and living conditions.[35] In addition, the logistical and financial barriers to accessing timely and effective health care for Aboriginal and Torres Strait Islander people who live in remote areas need to be addressed.[35]

Smoking rates among Aboriginal and Torres Strait Islander people aged 15 years and over fell from 45% in 2008 to 37% in 2018–19, although there was no significant change in remote areas.[22] Further reductions in smoking and COPD rates are most likely to be achieved with multifaceted interventions that incorporate Aboriginal and Torres Strait Islander leadership, partnership and engagement.[37]

Cultural safety and culturally appropriate care

Barriers to Aboriginal and Torres Strait Islander people accessing chronic disease care include cost, lack of transport, fear and distrust of services, and lack of culturally safe services.[38] Cultural safety means that health consumers are safest when health professionals have considered power relations, cultural differences and consumers' rights.[21]

Expanding use of spirometry

Early diagnosis may prevent progressive functional deterioration in COPD.[4] Spirometry is essential for the diagnosis of COPD, and opportunistic screening of symptomatic smokers and ex-smokers in general practice could facilitate early diagnosis and management.[4] Barriers to providing spirometry include equipment costs and insufficient remuneration, according to a survey of Australian general practitioners (GPs).[39]

Primary Health Network support

Primary Health Networks (PHNs) support general practices managing people with COPD by providing education for clinicians and consumers, quality improvement support, data extraction and analysis, and resources such as cycle-of-care plans. In some areas, PHNs support integrated care models for chronic diseases, including COPD – for example, nurse-led respiratory disease management clinics and integrated care programs for chronic diseases.[40,41]

Integrated care

An integrated care model for people with chronic diseases, such as COPD and diabetes, in Western Sydney included:

- Care facilitators – nurses who linked hospital, GP and allied health care; supported self-management and smoking cessation; and oversaw annual cycles of care and vaccinations
- Specialist rapid access and stabilisation services – pathways other than the emergency department to fast access to specialist care, and better transition back to primary care
- GP support line – answered by specialists to provide immediate advice on management of patients
- IT systems – including a web-based portal for healthcare provider information.[41]

Preliminary analysis showed that potentially preventable hospitalisations were reduced by 37% among chronic disease patients who were enrolled in, or who had attended, the rapid access and stabilisation service.[41]

Chronic obstructive pulmonary disease (COPD)

Pharmacist interventions

Interventions by pharmacists, either alone or as part of a multidisciplinary team, can reduce hospital admissions by 50% among people with COPD.[42] Interventions, conducted in outpatient clinics and/or community pharmacies, include:

- Education and counselling about medicines and lifestyle
- Assessment of medicines adherence, or medicines review
- Reminder systems, through either phone contact or home visits
- Smoking cessation programs
- Feedback to healthcare professionals.

Nutrition

Dietitians and nutritionists have a central role in managing excess weight, as well as unwanted weight loss, in people with COPD.[4] Obesity in people with COPD is associated with carbon dioxide retention, sleep apnoea and other health problems.[4] Excessive weight loss is a common problem in people with end-stage COPD. Nutritional supplementation can promote significant weight gain in people with COPD, improving respiratory muscle strength, walking ability and quality of life, especially in people who are malnourished.[43]

Telehealth

Telehealth for people with COPD includes a wide range of interventions, from simple telephone support to remote monitoring of symptoms. Some meta-analyses have shown significant reductions in hospitalisations (for example, a reduction of 54% over 12 months, compared with usual care).[44] The effectiveness of different models varies widely, and identifying the common components of successful programs would help guide the future use of telehealth.

Palliative care

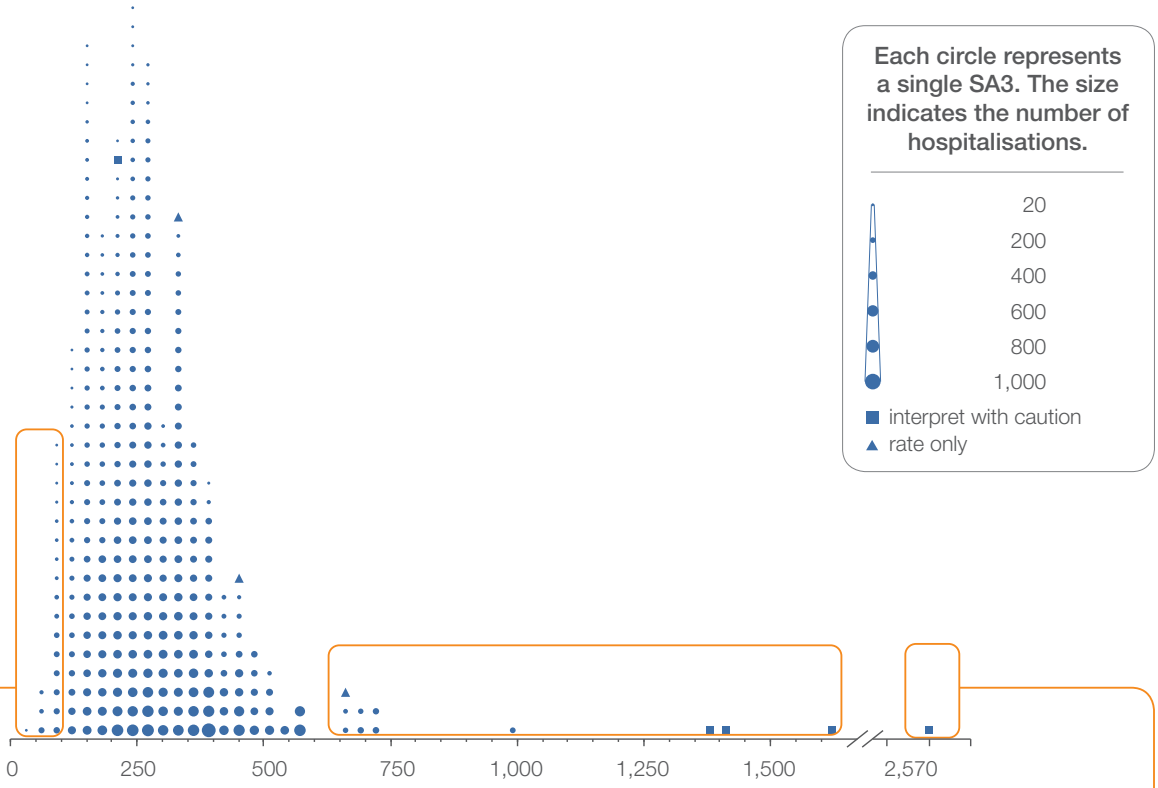
People with COPD experience distressing symptoms, such as breathlessness, anxiety and insomnia, which are often poorly controlled and under-treated in advanced disease.[4] Early access to palliative care is recommended for people with persisting symptoms of COPD. Symptom palliation should be implemented early, and concurrently with active treatment.[4]

To avoid under-treatment of distressing symptoms of COPD, referral to palliative care should not rely on clinicians' estimates of prognosis but rather on the person's symptoms.[45] Management of distressing symptoms may be improved by introducing new models of integrated respiratory and palliative care that routinely offer all people with advanced COPD both disease-directed treatment and palliative care, as well as access to specialist palliative care.[45]

A recent Australian study reported that only 5% of people who died in hospital from COPD had a written advance care directive before the admission.[45] Discussion of advance care directives may be useful for ensuring that the person's wishes regarding active treatment are considered early and documented.

Rates by local area

Figure 2.2: Number of potentially preventable hospitalisations – COPD per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Pennant Hills - Epping	NSW	56	35
Boroondara	Vic	82	192
North Sydney - Mosman	NSW	85	112
Cottesloe - Claremont	WA	86	93
Burnside	SA	92	77
Hobart - South and West	Tas	94	44
Stonnington - East	Vic	95	51
Manningham - West	Vic	101	186
Hobart Inner	Tas	101	69
Manningham - East	Vic	101	41
Ku-ring-gai	NSW	105	217
Eastern Suburbs - North	NSW	105	178
Nillumbik - Kinglake	Vic	105	70
Canada Bay	NSW	109	123
Dural - Wisemans Ferry	NSW	109	41
Pittwater	NSW	110	113
Whitehorse - West	Vic	112	163
Baulkham Hills	NSW	114	197
Melville	WA	114	182
Unley	SA	119	70

Highest rate areas

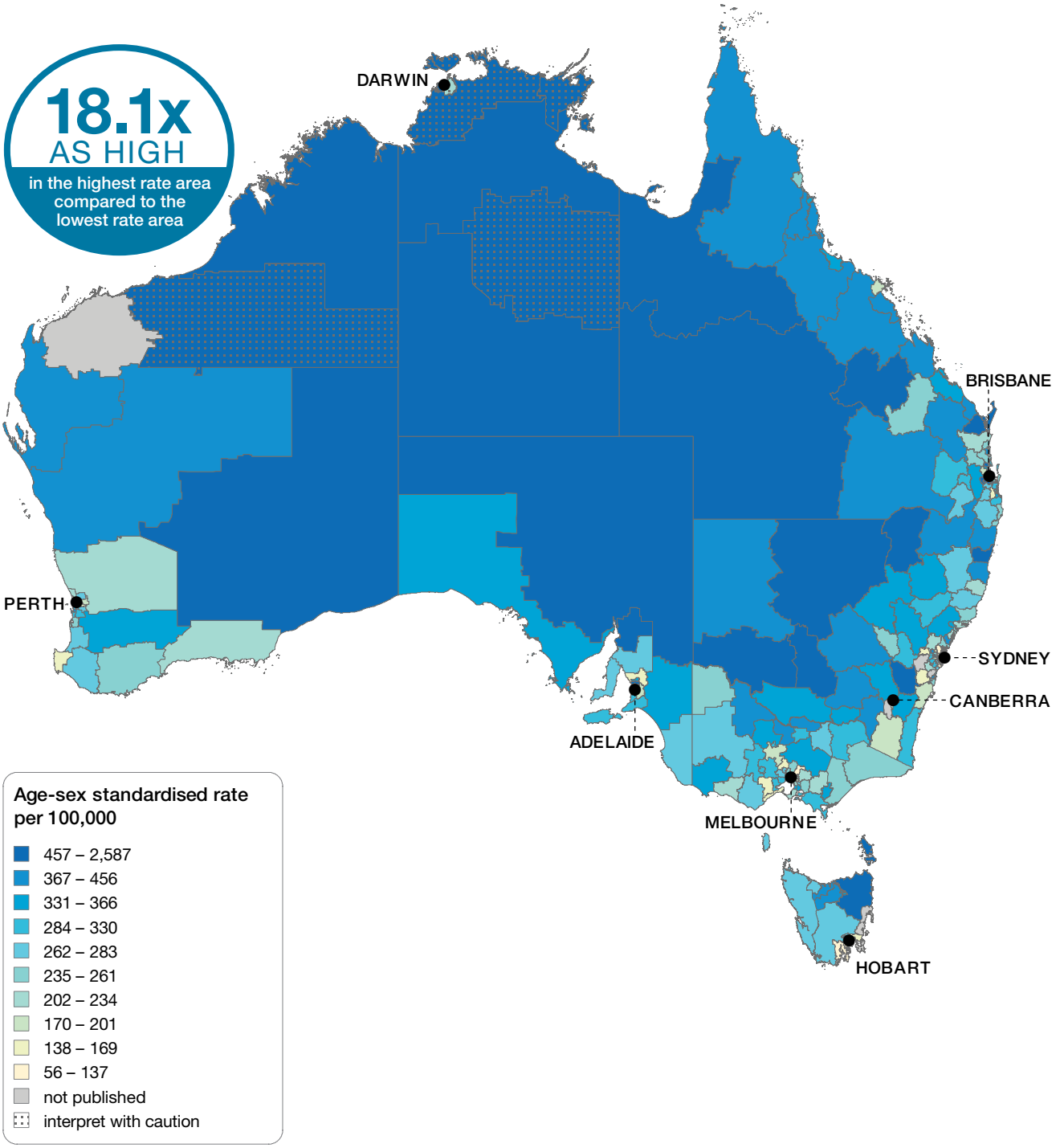
SA3	State	Rate	Hospitalisations
East Arnhem	NT	2,587*	201
Barkly	NT	1,631*	40
Daly - Tiwi - West Arnhem	NT	1,423*	214
East Pilbara	WA	1,386*	125
Katherine	NT	1,013	172
Alice Springs	NT	744	210
Bourke - Cobar - Coonamble	NSW	728	224
Outback - North and East	SA	696	214
Outback - North	Qld	693	153
Kimberley	WA	684	n.p.
Palmerston	NT	682	120
Outback - South	Qld	667	155

Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published (n.p.) for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Chronic obstructive pulmonary disease (COPD)

Rates across Australia

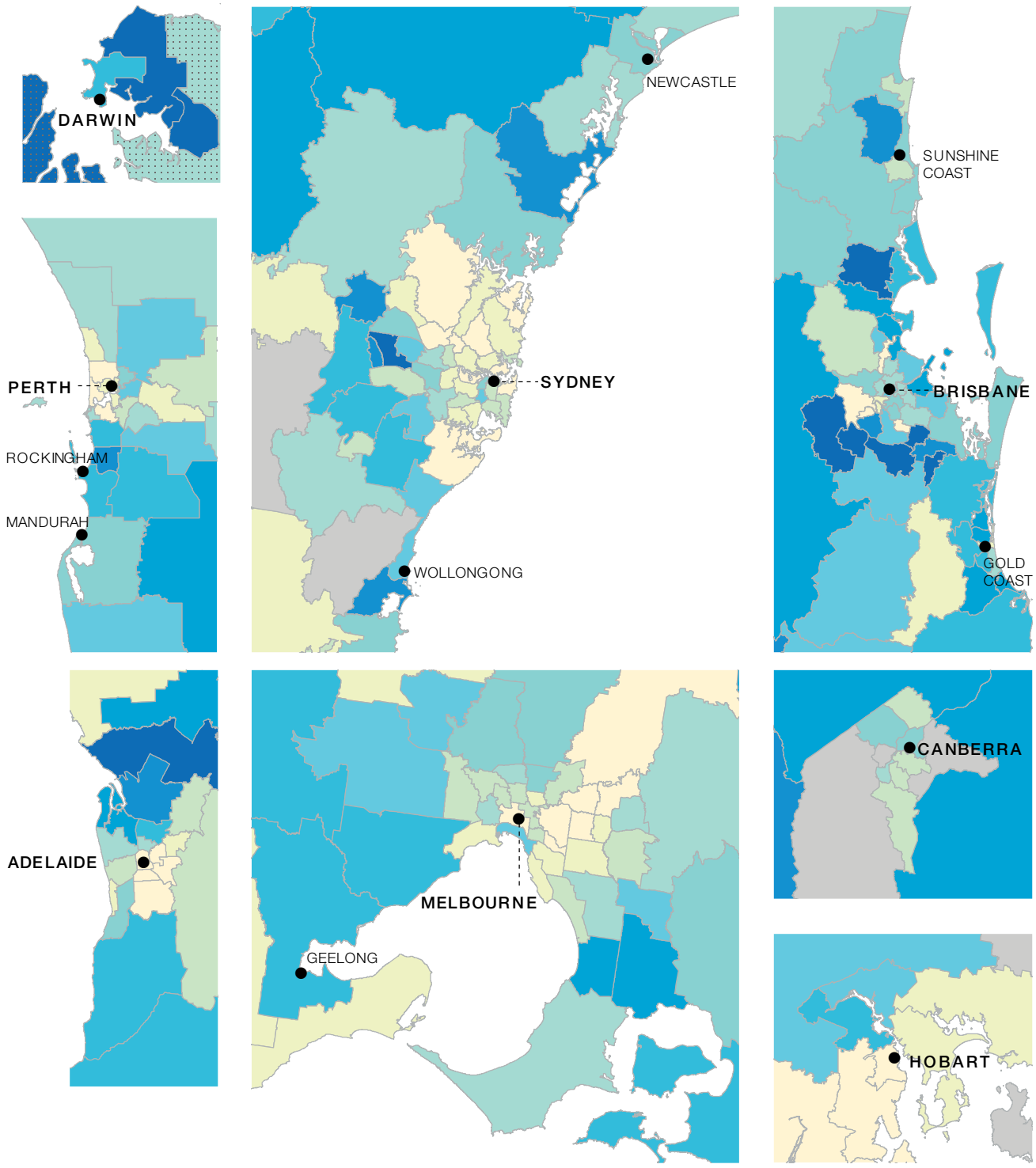
Figure 2.3: Number of potentially preventable hospitalisations – COPD per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates across capital city areas

Figure 2.4: Number of potentially preventable hospitalisations – COPD per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



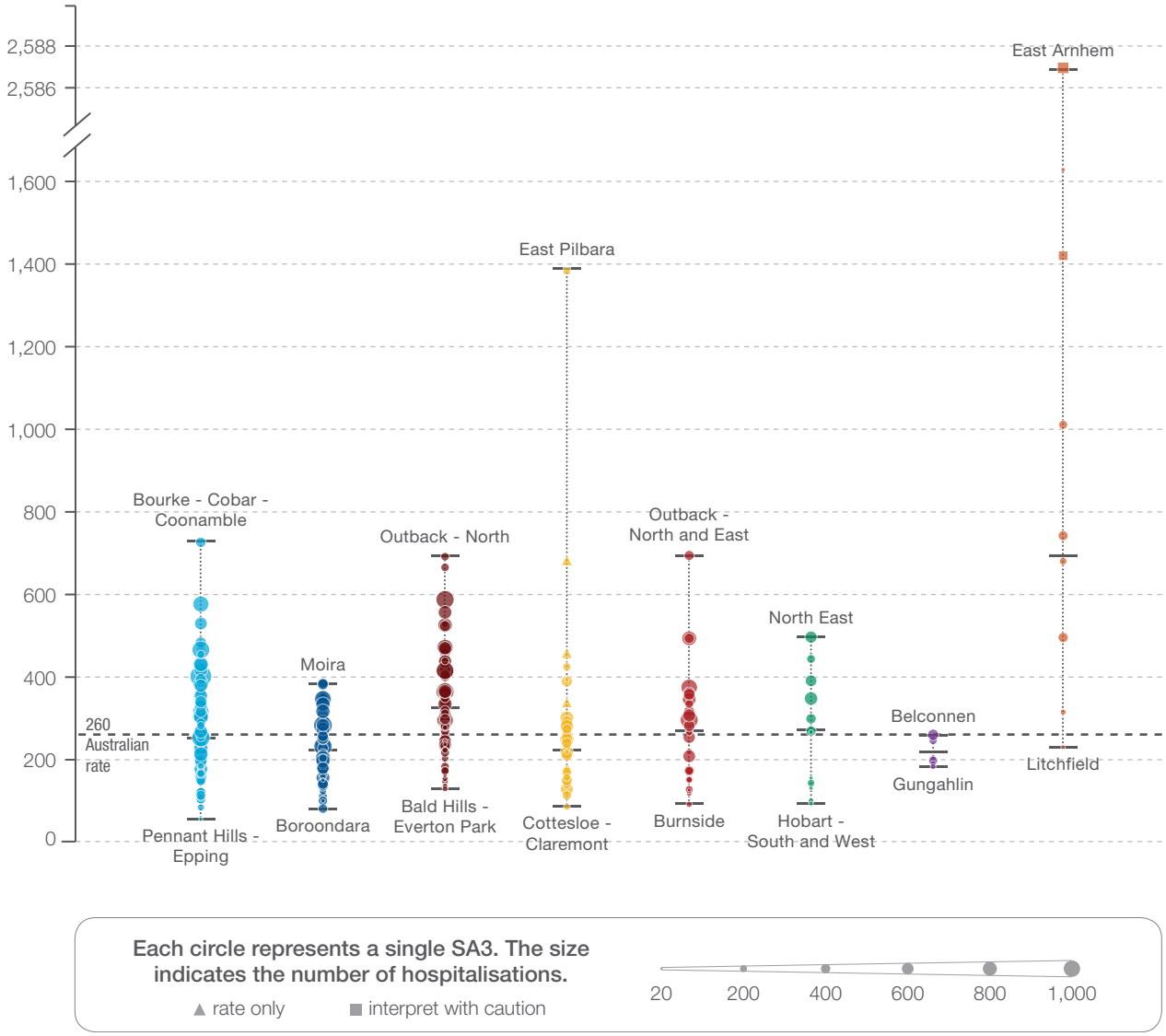
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Chronic obstructive pulmonary disease (COPD)

Rates by state and territory

Figure 2.5: Number of potentially preventable hospitalisations – COPD per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

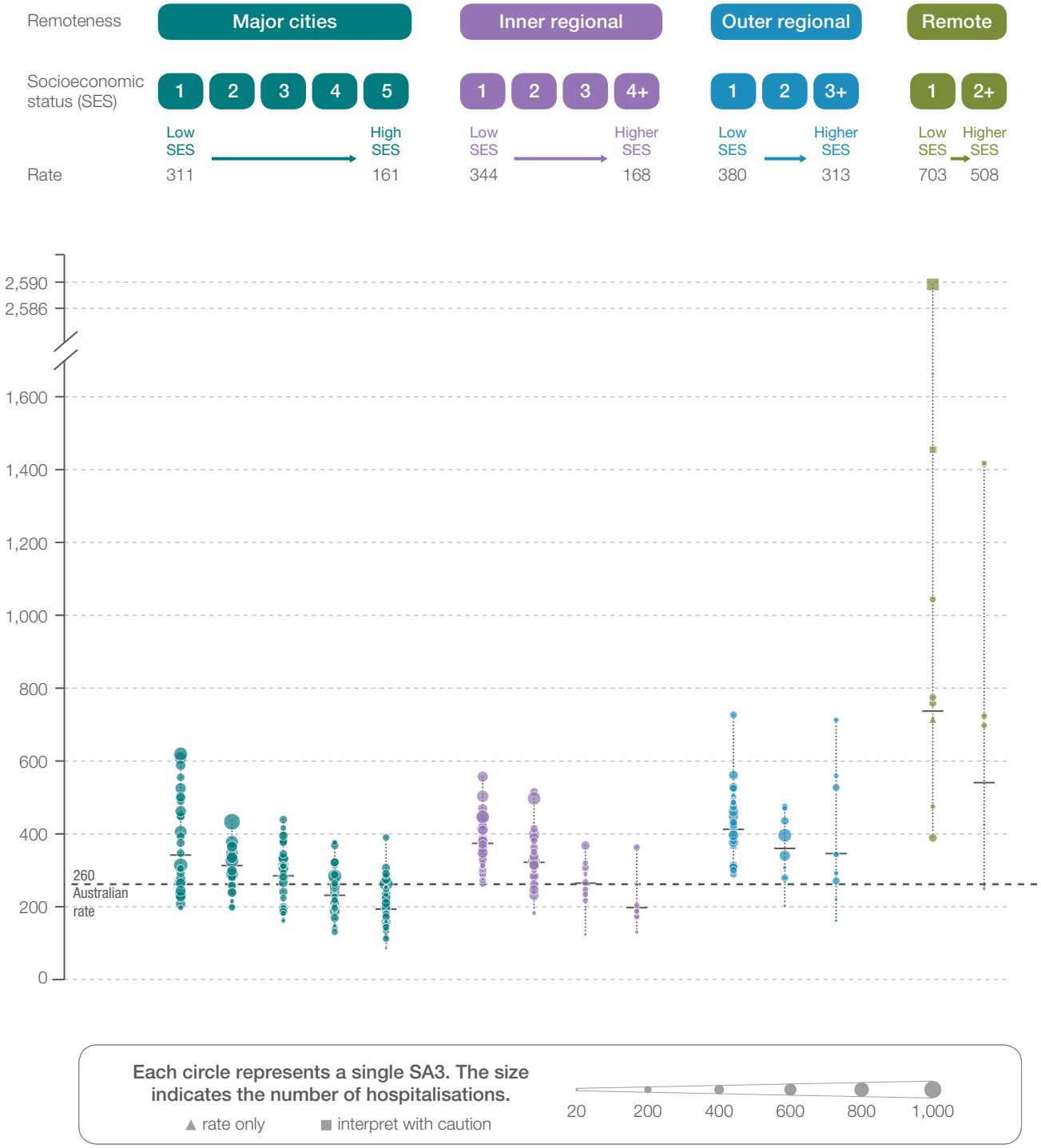
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	728	386	693	1,386*	696	498	261	2,587*
State/territory	250	223	323	225	268	270	218	693
Lowest rate	56	82	130	86	92	94	184	231*
No. hospitalisations	24,509	17,041	18,869	6,499	6,384	2,065	916	1,299



Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

Figure 2.6: Number of potentially preventable hospitalisations – COPD per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



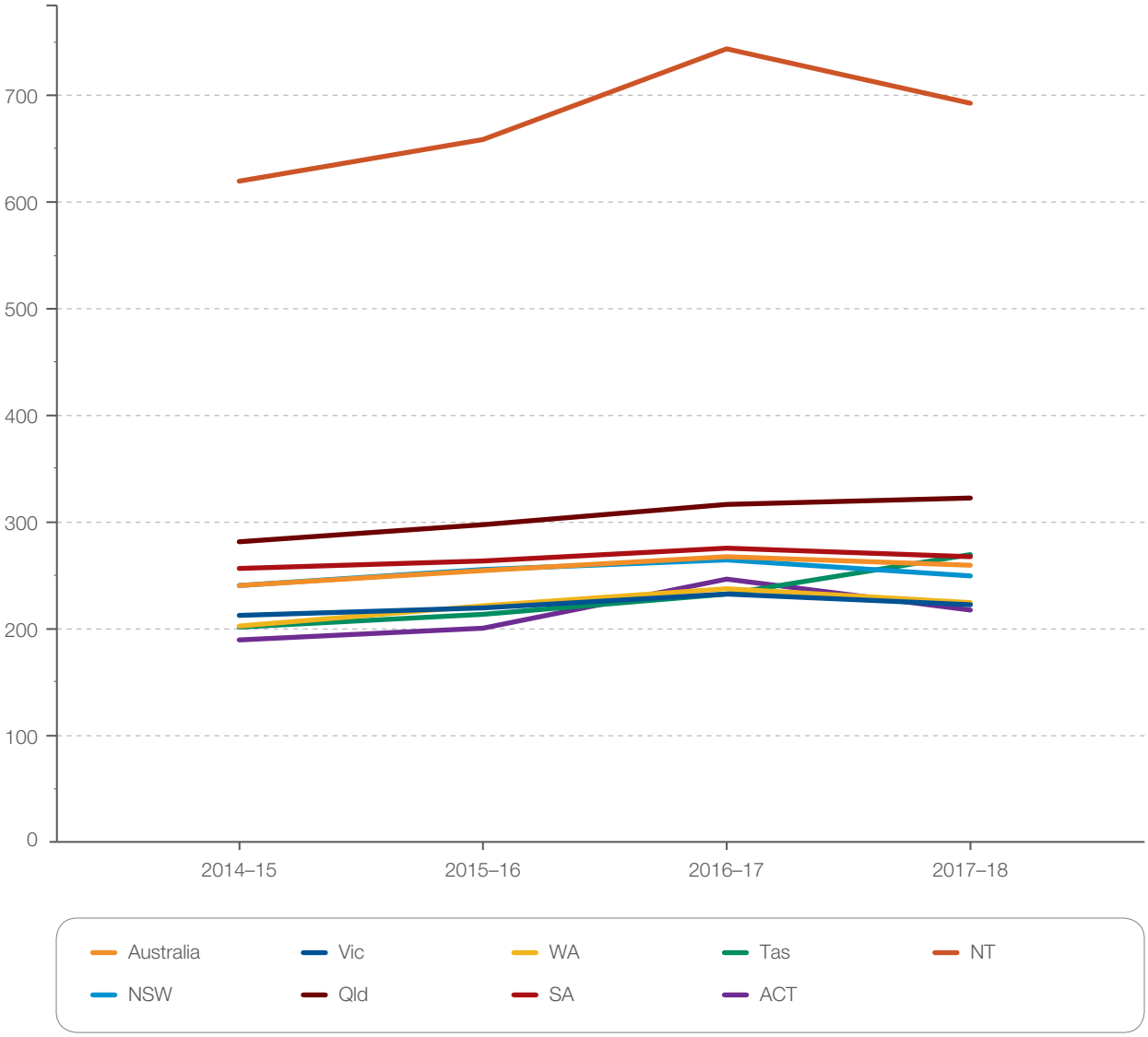
Notes:
Squares (■) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Chronic obstructive pulmonary disease (COPD)

Rates across years

Figure 2.7: Number of potentially preventable hospitalisations – COPD per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, 2014–15 to 2017–18

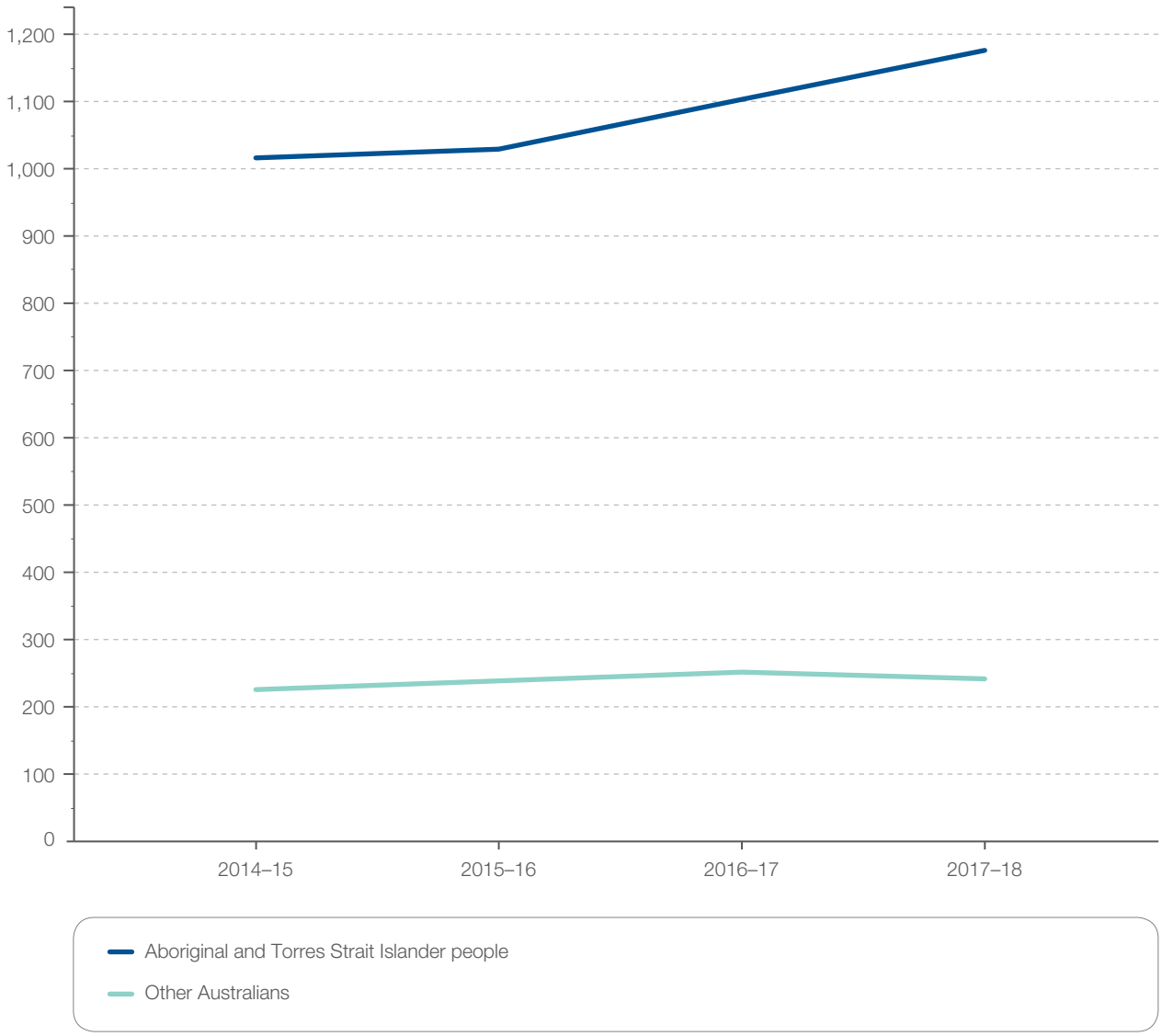
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	2,080*	2,556*	3,289*	2,587*
Australian rate	**241**	**255**	**268**	**260**
Lowest SA3 rate	64	77	75	56
Magnitude of variation	15.7	11.7	12.8	18.1
Magnitude of variation without top & bottom 10% SA3	3.3	3.0	3.6	3.3



Notes:
The asterisks (*) indicate rates that are considered more volatile than others, and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Rates for Aboriginal and Torres Strait Islander people across years

Figure 2.8: Number of potentially preventable hospitalisations – COPD per 100,000 people of all ages, age and sex standardised, by Aboriginal and Torres Strait Islander status, 2014–15 to 2017–18



Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated, with variation among states and territories.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Chronic obstructive pulmonary disease (COPD)

Resources

- *The COPD-X Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease*[4]
- Pulmonary Rehabilitation Toolkit, Australian Lung Foundation and Australian Physiotherapy Association, pulmonaryrehab.com.au
- *Therapeutic Guidelines: Respiratory*, Chronic obstructive pulmonary disease (COPD) exacerbations (in eTG complete)
- Pharmacological therapies for chronic obstructive pulmonary disease in Australia, NPS MedicineWise, nps.org.au/radar/articles/pharmacological-therapies-for-chronic-obstructive-pulmonary-disease-in-australia
- Information and assistance for smokers to quit, quitnow.gov.au
- COPD flipchart and action plan for Aboriginal and Torres Strait Islander people, Queensland Health, Indigenous Respiratory Outreach Care program, Menzies School of Health and Lung Foundation

Australian initiatives

The information in this chapter will complement work already underway to prevent COPD and improve its management in Australia. At a national level, this work includes:

- National Tobacco Campaign
- National Strategic Action Plan for Lung Conditions
- Tackling Indigenous Smoking program
- Lung Foundation Australia education and support programs
- Lung Foundation Australia's Breathe Easy, Walk Easy training program for rural and remote healthcare providers.

Many state and territory initiatives are also in place, including:

- State- and territory-based tobacco control strategies
- Quitline, including Aboriginal and Torres Strait Islander counsellors
- Leading Better Value Care COPD program, New South Wales (NSW)
- Smoking Cessation Framework, NSW
- A Strategic Framework for Aboriginal Tobacco Resistance and Control in NSW
- Reports on hospital readmission rates for COPD, NSW Bureau of Health Information
- Delivering Connected Care for Complex Patients with Multiple Chronic Needs, Tasmania
- Hospital Admissions Risk Program, Victoria
- Improving Care for Aboriginal and Torres Strait Islander Patients program, Victoria
- Quit Victoria
- Aboriginal Tobacco Control Project, Western Australia
- *Respiratory Health Policy Position for the Procurement of Community Based Services*, Western Australia.[28]

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2.2 Heart failure

Why is this important?

Heart failure affects about 1–2% of people in Australia. People with heart failure often have multiple hospitalisations, and have a mortality rate of 50–75% within five years of diagnosis.[1] In 2017–18, heart failure accounted for 412,693 hospital bed days.[2] Hospital care is appropriate when the condition is severe, but well-coordinated care in the community can keep people with heart failure well enough to reduce their need for hospitalisation.

What did we find?

Between 2014–15 and 2017–18, the rate of heart failure hospitalisations per 100,000 people nationally increased by 4%. In 2017–18, the rate of hospitalisations for heart failure was **5.8 times as high** in the area with the highest rate compared with the area with the lowest rate. The rate for Aboriginal and Torres Strait Islander people was 2.3 times as high as that for other Australians, but decreased by 4% between 2014–15 and 2017–18.

What can be done?

Reducing hospitalisations for heart failure will take a combination of approaches:

- Primary prevention
- Consumer enablement
- More effective use of medicines
- Greater use of exercise and cardiac rehabilitation programs
- Better care in the community, including improved integration with hospital care and greater access to multidisciplinary care.

Major system changes that support widespread implementation of these changes are needed to reduce hospitalisations for heart failure. For example, system redesign to ensure outpatient clinic review within 30 days of an admission may have a marked effect on mortality. Better integration of care in the community with acute hospital care can improve outcomes for people with heart failure. Specific interventions, such as medication management and rehabilitation programs, can also reduce hospitalisations for heart failure.

Heart failure is not a new problem, and the health system must do better to manage it. Priority should be given to improving care for groups with higher rates of hospitalisation for heart failure, such as Aboriginal and Torres Strait Islander people and those living outside metropolitan areas or in socioeconomically disadvantaged areas.

Heart failure

Context

Chronic heart failure is a condition that occurs when the heart becomes weaker and/or less effective at pumping blood around the body. Symptoms of chronic heart failure include fluid accumulation in the body and breathlessness.

Ejection fraction is a measure of the volume of blood the heart pushes out with each heart beat. The major categories of heart failure are heart failure with reduced ejection fraction and heart failure with preserved ejection fraction.

The most common cause of heart failure is underlying heart disease due to impaired coronary blood supply, usually accompanied by a history of myocardial infarction (heart attack).[3] Other causes include hypertension and valvular heart disease.[3] Risk factors for these conditions and heart failure include age, family history, smoking, obesity and diabetes.[3] Reducing these modifiable risk factors could reduce the prevalence of heart failure.

People with heart failure have high rates of hospitalisation to manage acute episodes of decompensation (severe symptoms), and have a mortality rate of 50–75% within five years of diagnosis.[1] In 2017–18, heart failure accounted for 412,693 hospital bed days.[2] The rate of hospitalisations for heart failure was 227 per 100,000 in Australia, compared to 164 per 100,000 in Canada, in people aged 15 years and over in 2016.[4]

The most common events that lead to hospitalisation are infection, non-adherence to fluid restrictions and non-adherence to medicines.[5] People admitted to hospital with acute decompensation of chronic heart failure often have comorbidities with shared risk factors, such as renal disease, diabetes and pulmonary disease.[5]

Prevalence

The prevalence of heart failure in Australia is estimated at 1–2%. The prevalence of heart failure rises steeply with age, and the rate of hospitalisations for heart failure is approximately 20 times higher among people aged 75–79 years than among those aged 45–49 years.[2] There may be substantial numbers of people with undiagnosed heart failure in Australia.[1]

National data on long-term trends in the prevalence of heart failure are not available. A Western Australian study reported that the incidence of first hospitalisations for heart failure decreased steadily between 1990 and 2005 – from 191 to 103 per 100,000 in men, and from 130 to 75 per 100,000 in women.[6] However, hospitalisations for heart failure increased by 15% over this period, partly due to the ageing population and improved survival among people with heart failure.[6]

Rates of heart failure are higher in rural and remote areas than in metropolitan areas of Australia.[1] A combination of factors is likely to contribute to this:

- Social determinants such as education, income and employment
- Risk factors such as smoking
- Lack of access to health care or health professionals.[7]

Heart failure in Aboriginal and Torres Strait Islander people

Rates are higher among Aboriginal and Torres Strait Islander people.[1] Estimates of heart failure prevalence among Aboriginal and Torres Strait Islander people range from 1% to 5.3%.[1]

Timely diagnosis of heart disease and heart failure is one of the priority areas in the Better Cardiac Care Measures for Aboriginal and Torres Strait Islander People initiative of the Australian Health Ministers' Advisory Council.[8] The number and proportion of Aboriginal and Torres Strait Islander people, compared with other Australians, who received one or more relevant cardiac-related Medicare Benefits Schedule (MBS) diagnostic services in the previous 12 months is reported as a measure of timely diagnosis. This measure showed some improvement between 2004–05 and 2017–18, when MBS claims for cardiac-related diagnostic items rose from 7% to 11% for Aboriginal and Torres Strait Islander people and from 7% to 9% for other Australians.[8]

Management

Better health care can keep people with heart failure well enough to reduce their need for hospitalisation. However, for people with chronic progressive diseases such as heart failure with exacerbating features, hospital presentation is appropriate when the patient is decompensating.

Best-practice management of people with chronic heart failure involves evidence-based, multidisciplinary care.[9] Effective management involves a combination of strategies, which may include:

- Non-pharmacological approaches, such as physical activity programs, and consumer and carer education about self-management of heart failure[10]
- Pharmacotherapy, including diuretics, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers, mineralocorticoid receptor antagonists and angiotensin neprilysin receptor inhibitors (a newer type of medicine)[10]; note that recommended therapy differs between heart failure with reduced ejection fraction and heart failure with preserved ejection fraction
- Surgical procedures and supportive devices – for example, coronary artery bypass graft surgery, cardiac resynchronisation therapy with or without insertion of an implantable cardiac defibrillator, and heart transplant.[10]

About the data

All hospitalisations with a principal diagnosis of heart failure (with reduced or preserved ejection fraction) are included.

Data are sourced from the National Hospital Morbidity Database, and include admitted patients in both public and private hospitals, as well as hospital care in the home.

Rates are based on the number of hospitalisations for heart failure per 100,000 people of all ages in 2017–18.

Because a record is included for each hospitalisation for the condition, rather than for each patient, patients hospitalised for the condition more than once in the financial year will be counted more than once.

The analysis and maps are based on the residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence variations seen.

Heart failure

What do the data show?

Magnitude of variation

In 2017–18, there were 62,554 hospitalisations for heart failure, representing 201 hospitalisations per 100,000 people of all ages (the Australian rate).

The number of hospitalisations for heart failure across 325* local areas (Statistical Area Level 3 – SA3) ranged from 91 to 531 per 100,000 people. The rate was **5.8 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 172 per 100,000 people in Tasmania to 324 in the Northern Territory (Figures 2.10–2.13).

After the highest and lowest 10% of results were excluded and 260 SA3s remained, the number of hospitalisations per 100,000 people was 2.0 times as high in the area with the highest rate compared with the area with the lowest rate.

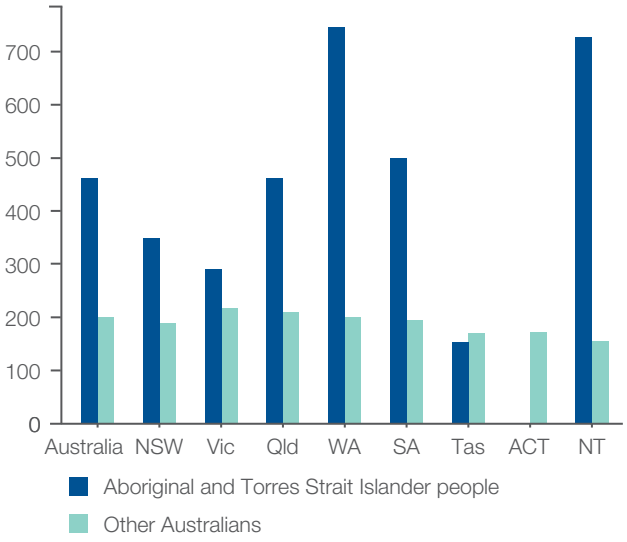
Analysis by remoteness and socioeconomic status

Rates of hospitalisation for heart failure were substantially higher in remote areas than in other areas. Hospital admission rates also increased with socioeconomic disadvantage in major cities, and inner regional and remote areas (Figure 2.14).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander people (462 per 100,000 people) was 2.3 times as high as the rate for other Australians (201 per 100,000 people) (Figure 2.9).

Figure 2.9: Number of potentially preventable hospitalisations – Heart failure per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2017–18†



The data for Figure 2.9, and the data and graphs for analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, rates were suppressed for 15 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

† Data for ACT (Aboriginal and Torres Strait Islander people) have been suppressed. Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated, with variation among states and territories.

Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.

For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Trends over time

Between 2014–15 and 2017–18, the rate of heart failure hospitalisations per 100,000 people nationally increased by 4% (Figure 2.15).*

For Aboriginal and Torres Strait Islander people, the rate of heart failure hospitalisations per 100,000 people nationally decreased by 4% between 2014–15 and 2017–18 (Figure 2.16).

Interpretation

Potential reasons for the variation include differences in:

- Clinician factors:
  - non-concordance with management guidelines
  - diagnostic error
  - failure to refer to heart failure multidisciplinary programs that include education, psychosocial support, exercise training and optimal pharmacotherapy[11]
- Health system factors:
  - access to post-discharge, multidisciplinary disease management programs (either hospital or community based)
  - access to review within 7–14 days of discharge to avert readmission[10]
  - quality of both hospital and community care, which can be affected by suboptimal communication between clinicians
  - quality, efficiency and effectiveness of primary health care
  - availability of health care that is compatible with Aboriginal and Torres Strait Islander culture[12]
  - access to dialysis for Aboriginal and Torres Strait Islander people; in areas with large Aboriginal and Torres Strait Islander populations requiring dialysis for kidney disease, inadequate access to dialysis may worsen heart failure and contribute to hospitalisation numbers
  - availability of primary care clinicians to increase primary and secondary prevention
  - availability of services that are appropriate to the local population's health literacy levels
- Demographic and consumer factors:
  - socioeconomic disadvantage, as heart failure appears to be more prevalent among people living in lower socioeconomic areas[2]
  - prevalence of risk factors for heart failure, such as coronary heart disease, rheumatic fever and rheumatic heart disease, diabetes, hypertension, smoking, obesity and obesogenic environments, kidney disease and psychological distress
  - severity of heart failure and comorbidities
  - health literacy about medicines, concordance with medication regimens, ability to afford medicines.

Variations between areas may not directly reflect the practices of the clinicians who are based in those areas. Area boundaries reflect where people live rather than where they obtain their health care. Patients who live in metropolitan, regional and rural areas may all travel outside their local area to receive care.

Note:
* Since June 2017, emergency department–only episodes in New South Wales have not been counted as hospitalisations, and this will affect the time trends described above.

Heart failure

Non-concordance with guidelines

Translation of clinical guidelines into practice is poor, according to results of a recent Victorian study: only 13% of heart failure patients received an outpatient review and heart failure home visit review, and were prescribed medicines according to guidelines, within 30 days of discharge.[13] Rates of guideline-concordant management after discharge were lower in regional areas than in metropolitan areas.[13]

Rates of prescription of ACE inhibitors and beta-blockers among patients admitted to hospital for heart failure also showed shortfalls compared with recommended use in a study in New South Wales (NSW) and the Australian Capital Territory (ACT), suggesting that uptake of evidence-based guidelines can be improved.[5]

Readmissions

Readmissions make a substantial contribution to hospitalisations for people with heart failure. The rate of readmission within 30 days, for any cause, among people with heart failure in Australia is approximately 24%.[14] Factors that increase the risk of readmission for heart failure include male gender, socioeconomic disadvantage, numerous comorbidities and being admitted from an aged care setting.[15] A recent study of hospitalisations with acute heart failure in NSW and the ACT found that 11% of patients were residents of aged care homes.[5]

Addressing variation

Rates of hospitalisation for heart failure in Australia have increased since publication of the *Second Australian Atlas of Healthcare Variation* in 2017. Heart failure is not a new problem, and the health system must do better to care for people with this condition.

There are pockets of excellence in managing heart failure, but major system changes are needed if we are to make meaningful progress in this area. And it is vital that we do make progress, to improve the quality of life, outcomes and experience for people with heart failure.

Reducing hospitalisations for heart failure will take a combination of approaches:

- Primary prevention
- Better care in the community, including improved integration with hospital care
- Consumer enablement
- More effective use of medicines
- Greater use of exercise and cardiac rehabilitation programs.

Primary prevention

Reducing the prevalence of risk factors for heart failure, such as hypertension, diabetes, smoking and obesity, is fundamental to reducing the prevalence of, and hospitalisations for, heart failure.[16]

Primary care

General practitioners (GPs) have a vital role in the community management of people with heart failure. Barriers to effective primary care for heart failure patients, and potential solutions, were identified in focus groups of GPs and practice nurses from five general practices in Sydney.[17] Suggested improvements to support effective delivery of heart failure management included:

- Thorough, accurate discharge summaries from hospitals, with clear medication instructions at an appropriate level for the health literacy of the patient

- Closer contact between GPs and hospital specialists and clinical nurse consultants
- More consistent coding of heart failure, because the use of alternative terms can result in the diagnosis not being flagged and some patients being unaware of their diagnosis
- Appropriate Medicare rebates for practice nurse consultations in chronic disease management
- A Medicare rebate for outpatient testing of B-type natriuretic peptide levels, which is often useful in confirming the diagnosis of heart failure.[17]

Other strategies to support GP care of people with heart failure include community rapid response initiatives. For example, in Tasmania, people are referred to the Community Rapid Response Service by their GP. A nurse practitioner, community nurses, GP and other health professionals, as required, plan care together with the person referred.[18] Care is delivered to the person in their home or other community setting such as an aged care home.[18] Health conditions treated include exacerbations of chronic conditions such as heart failure.[18]

Transition to community care

The first few weeks after hospital discharge are a high-risk period for people with heart failure, but early follow-up can reduce the risk of readmission and death. Australian guidelines advise starting discharge planning early during hospitalisation for heart failure, including review within 7–14 days of discharge, an early outpatient clinic appointment and community services, as needed.[10]

A recent study from Victoria found that the readmission rate was 24%, and the mortality rate was 9%, within 30 days of discharge after hospitalisation for heart failure.[14] Having an outpatient appointment within 30 days of discharge reduced the mortality risk by 81%.[14] The referral rate at discharge was 63% for an outpatient clinic appointment, but, at 30 days post-discharge, 26% of patients with a referral were waiting for an appointment date.[14] The average time to an outpatient clinic visit was 27 days.[14] Rates of review in an outpatient clinic, and of referral to heart failure programs, were lower for people living in rural areas compared with metropolitan areas.[14]

The authors of the study suggested that system redesign is warranted to ensure rapid referrals and post-discharge review within the transitional period. This includes streamlining hospital systems to facilitate rapid follow-up and community support in this high-risk period.[14]

Integrated care

Better integration of care in the community with acute hospital care may improve outcomes for people with heart failure. See page 75 for a description of an integrated care model in western Sydney that reported a 37% reduction in potentially preventable hospitalisations among chronic disease patients in a preliminary evaluation.[19]

Consumer enablement

Ongoing self-management for heart failure is required to slow progression of the disease. Self-management includes taking prescribed medicines, modifying sodium intake and undertaking physical exercise. Consumer activation is a measure of the extent of consumers' involvement in their own health care, and is correlated with better self-management in people with heart failure.[20] Australian guidelines recommend that education for people with heart failure, and their carers, starts soon after diagnosis and is tailored to the person's level of health literacy.[10] The National Heart Foundation website has heart failure resources for people with either low health literacy or higher health literacy.

The person's overall health, literacy and cognition are likely to affect their degree of success with self-management. A holistic approach is needed to improve outcomes in people with heart failure and cognition problems.[21]

Heart failure

Improving use of medicines

Current prescribing of medicines for heart failure with reduced ejection fraction is suboptimal, according to recent Victorian data showing that only 42% of eligible patients were prescribed the recommended triple therapy medication.[13] Lack of prescriber confidence or awareness of gold-standard pharmacotherapy in heart failure is likely to contribute to this low rate, along with perceived difficulty in prescribing for elderly people and those with multimorbidity.[13] Strategies to improve prescribing for heart failure have focused on monotherapy, but the study authors suggested that the focus should now be expanded to consider triple therapy in heart failure with reduced ejection fraction.[13]

Pharmacist-based interventions

Pharmacist interventions in transitions of care to improve medicines use by heart failure patients can reduce the risk of 30-day all-cause hospital readmission by 54%, compared with standard discharge processes.[22] Pharmacist interventions in the transition of care process include:

- Medication reconciliation
- Patient education
- Follow-up
- Monitoring of medication adherence.[22]

Another systematic review examined the impact of multidisciplinary interventions involving a pharmacist on all-cause hospitalisations over longer periods among people with heart failure. The review reported a 24% reduction in all-cause hospitalisations, which were measured over a period of six weeks to 55 months.[23] The interventions included:

- Discharge counselling
- Home visits
- Liaison with GPs
- Telephone follow-up
- Education on medicines, lifestyle changes and self-care.[23]

Nurse-led titration clinics

Use of beta-adrenergic blocking agents, ACE inhibitors and angiotensin receptor blockers can reduce hospital readmissions and improve survival in people with heart failure with reduced ejection fraction. However, insufficient dosage is a common problem in primary care. Nurse-led titration clinics to optimise dosage of these medicines may reduce the risk of all-cause hospitalisations by 20% and all-cause mortality by 34% compared with usual primary care.[24] Interventions include:

- Patients attending a clinic primarily for the titration of beta-blockers, ACE inhibitors and angiotensin receptor blockers, based on a predetermined protocol, by a senior heart failure nurse
- Consumer and carer education about heart failure, management of heart failure at home, medicines and self-management
- Monitoring of medication adherence
- Patient assessment and symptom monitoring
- Liaison with GPs and community nurses.[24]

Exercise and cardiac rehabilitation

Exercise and cardiac rehabilitation (which may include patient education and psychosocial support) may reduce heart failure hospitalisations by 41–43%, and all-cause hospitalisations by 23–30%.[25,26] Barriers to providing cardiac rehabilitation in Australia include low referral rates, limited funding and geographic isolation.[27,28]

A lack of knowledge about the benefits and safety of heart failure rehabilitation programs may contribute to low referral rates by medical professionals.[28] Poor transition from acute hospital care to community follow-up may also contribute to breakdown of the referral process.[28]

Improving heart failure outcomes for Aboriginal and Torres Strait Islander people

Prevention

Complex social determinants underlie the disparities in health, including in heart failure rates and outcomes, between Aboriginal and Torres Strait Islander people and other Australians.[29,30] Impacts of colonisation, including racism and intergenerational trauma, contribute to these determinants. To address health inequities, improvements in social factors are required – for example, in education, employment and living conditions.[29] In addition, the logistical and financial barriers to accessing timely and effective health care for Aboriginal and Torres Strait Islander people who live in remote areas must be addressed.[29]

Rheumatic heart disease, which develops after acute rheumatic fever, can lead to heart failure.[31] Approximately 90% of people living with rheumatic heart disease are Aboriginal and/or Torres Strait Islander people, and, of these, nearly 60% were under 25 years of age when diagnosed, according to 2018 data from four states and territories.[32] Among people with rheumatic heart disease, 19% developed heart failure within 10 years of diagnosis, in a Northern Territory study.[31] Acute rheumatic fever and rheumatic heart disease are preventable diseases, and improved living conditions reduce the risk.[33]

Management

Earlier detection and management of cardiac conditions is likely to reduce the risk of heart failure among Aboriginal and Torres Strait Islander people, and cardiovascular disease assessments are now recommended from 18 years of age in these groups.[34] Other suggested strategies to improve heart failure management among Aboriginal and Torres Strait Islander people include:

- Increasing access to heart failure multidisciplinary disease management programs that include education, psychosocial support, exercise training and optimal pharmacotherapy[11]
- Ensuring appropriate and timely follow-up of patients after discharge
- Incorporating family-based and outreach programs into models of care[11]
- Improving prevention, early diagnosis and treatment of rheumatic fever[35]
- Preventing progression of kidney disease
- Improving access to dialysis for Aboriginal and Torres Strait Islander communities.

Cardiac or heart failure rehabilitation programs are most likely to be successful if they are run collaboratively with local Aboriginal and Torres Strait Islander people, because developing community trust and working with local people are important for participation (see Case study: Work it Out – chronic disease management program for Aboriginal and Torres Strait Islander people' on page 96). Services that provide coordinated, holistic care and assist with navigating the health system would also benefit Aboriginal and Torres Strait Islander people with heart failure.

Cultural safety and culturally appropriate care

Misalignment of mainstream health services with Aboriginal and Torres Strait Islander culture is a barrier to accessing health care.[36] Increasing access to culturally safe health care will involve developing partnerships with the Aboriginal Community Controlled Health Service sector, increasing the Aboriginal and Torres Strait Islander health workforce, and improving cultural awareness and competency of mainstream health services.

Heart failure

Case study: Work it Out – chronic disease management program for Aboriginal and Torres Strait Islander people

Work it Out is a combined education and exercise program for chronic disease management for urban Aboriginal and Torres Strait Islander people.[37,38] The program was designed, and is monitored, by an Aboriginal community controlled health organisation to be flexible and culturally accommodating. The program has been running since 2011, with Aboriginal and Torres Strait Islander participants who have, or are at risk of, cardiovascular disease. It is now running in 15 urban and regional city locations in south-east Queensland.

An Aboriginal health worker or other Aboriginal and Torres Strait Islander staff member is usually present, and works closely with an exercise physiologist and participants at each session. Sessions consist of a 45-minute 'yarning' (education) session, followed by an hour-long exercise program tailored to individual participants' chronic conditions. The program runs for 12 weeks, and has flexible entry and exit points to allow for family and community responsibilities. Participants can attend two or more sessions per week.

Over the four-year study period, 1,007 patients were referred to the program, and 406 participants who completed an initial assessment and one or more 12-weekly review assessments were included in the analysis. The participants had an average of six chronic conditions, and 68% were obese. Results were assessed after participants attended between one and 11 cycles of the program, and baseline assessments were compared with participants' last assessments.

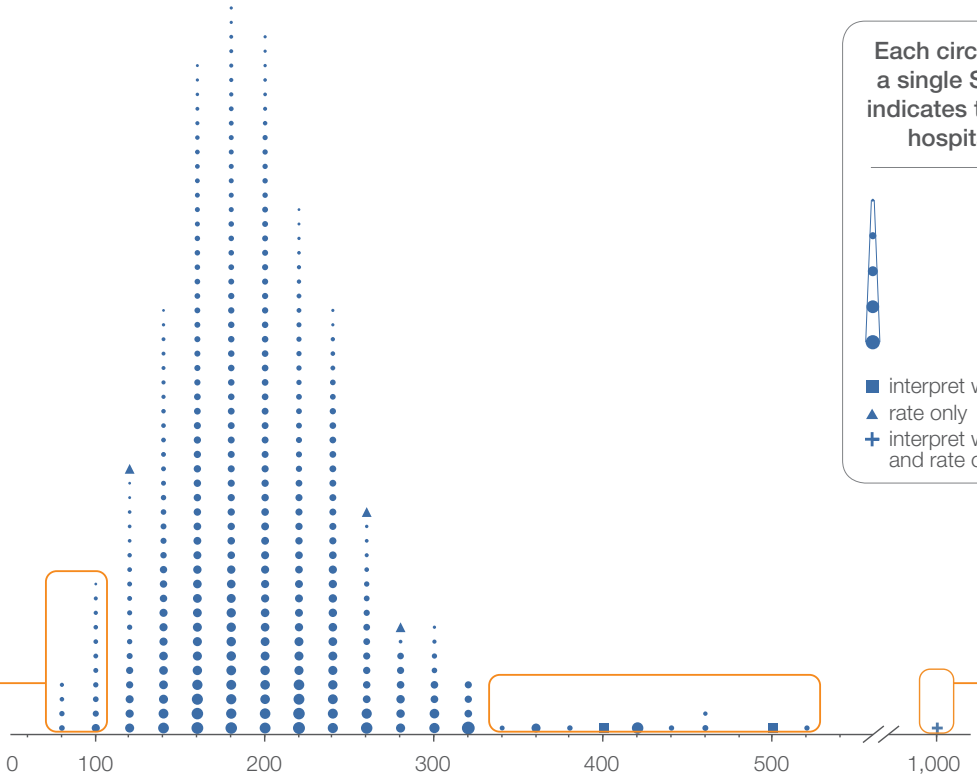
Participants achieved significant improvements in functional exercise capacity: six-minute walk distance increased by an average of 77 m. Reductions in waist and hip circumference were not significant in the group as a whole, but participants in the top tertile for waist circumference lost an average of 5.1 cm, and those in the top tertile for hip circumference lost an average of 3.2 cm.

More than half the participants attended the program for two or more 12-week cycles. Greater benefits were seen in those who attended for more than one cycle of the program. The improvement in functional exercise capacity is likely to have important clinical significance in improving health and reducing mortality risk among the participants, including those with heart failure, the authors commented.

Aboriginal staff were identified as an important factor in the success of the program: 'I have been to other exercise places before where they are all white, and wear leotards, and no one talks to you … I felt so uncomfortable … whereas we can come here, not worrying how we are looking, and we still feel good.'[39]

Rates by local area

Figure 2.10: Number of potentially preventable hospitalisations – heart failure per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
North Sydney - Mosman	NSW	**91**	130
Surf Coast - Bellarine Peninsula	Vic	**92**	116
Southern Highlands	NSW	**92**	85
Pennant Hills - Epping	NSW	**98**	72
Surfers Paradise	Qld	**100**	66
Melbourne City	Vic	**101**	85
Adelaide Hills	SA	**103**	90
Pittwater	NSW	**106**	114
Warringah	NSW	**107**	268
Burnside	SA	**111**	100
Mitcham	SA	**115**	152
Hobart Inner	Tas	**115**	96
Stonnington - East	Vic	**115**	74
Blue Mountains	NSW	**118**	132
Adelaide City	SA	**119**	29

Highest rate areas

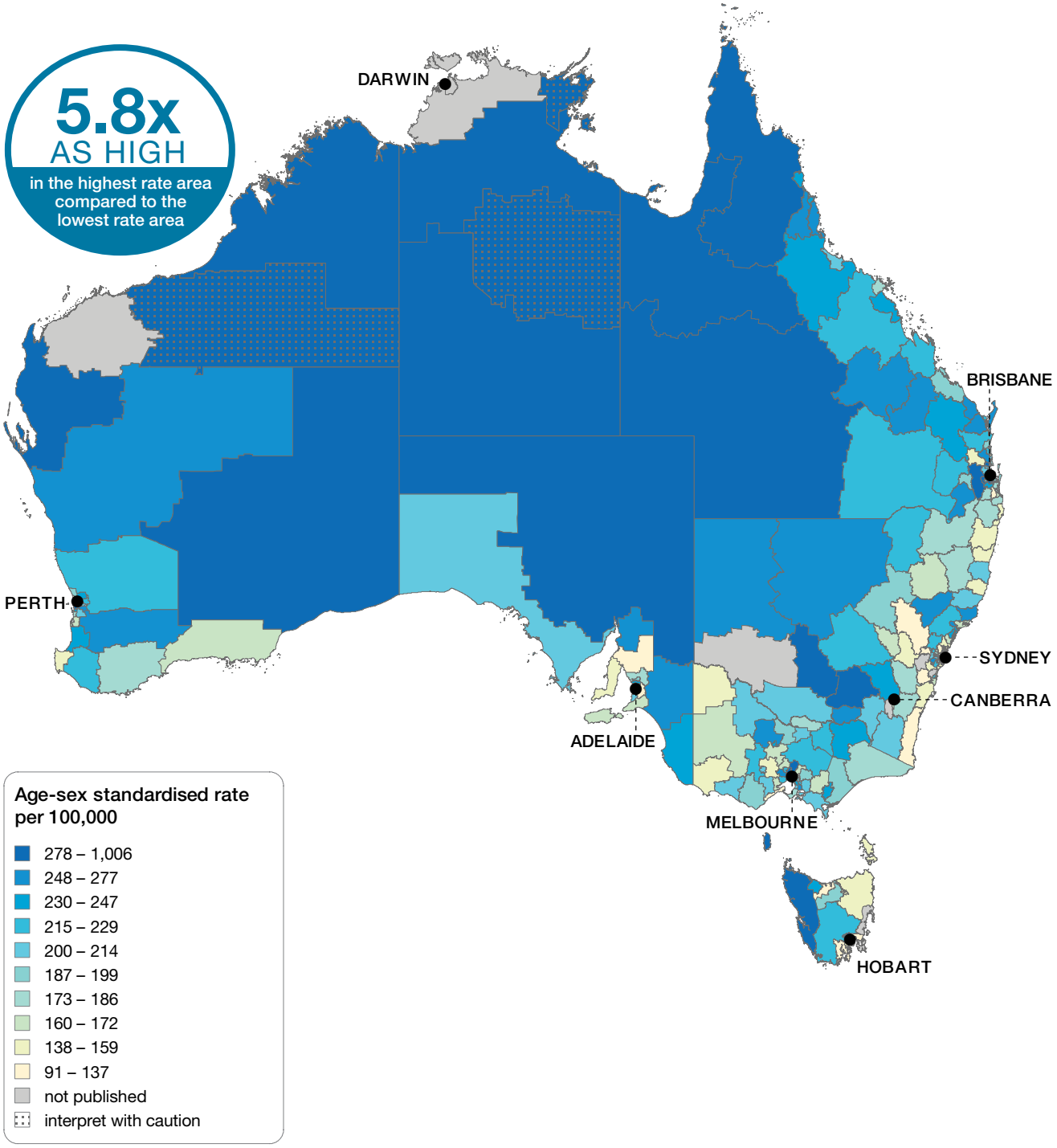
SA3	State	Rate	Hospitalisations
Barkly	NT	**1,006***	n.p.
Outback - North	Qld	**531**	113
East Arnhem	NT	**507***	54
Alice Springs	NT	**475**	144
Katherine	NT	**467**	80
Kimberley	WA	**457**	117
Tullamarine - Broadmeadows	Vic	**429**	536
East Pilbara	WA	**410***	52
Goldfields	WA	**398**	120
Mount Druitt	NSW	**373**	330
Outback - North and East	SA	**348**	99

Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published (n.p.) for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution. The numbers of hospitalisations are not published (n.p.) for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Heart failure

Rates across Australia

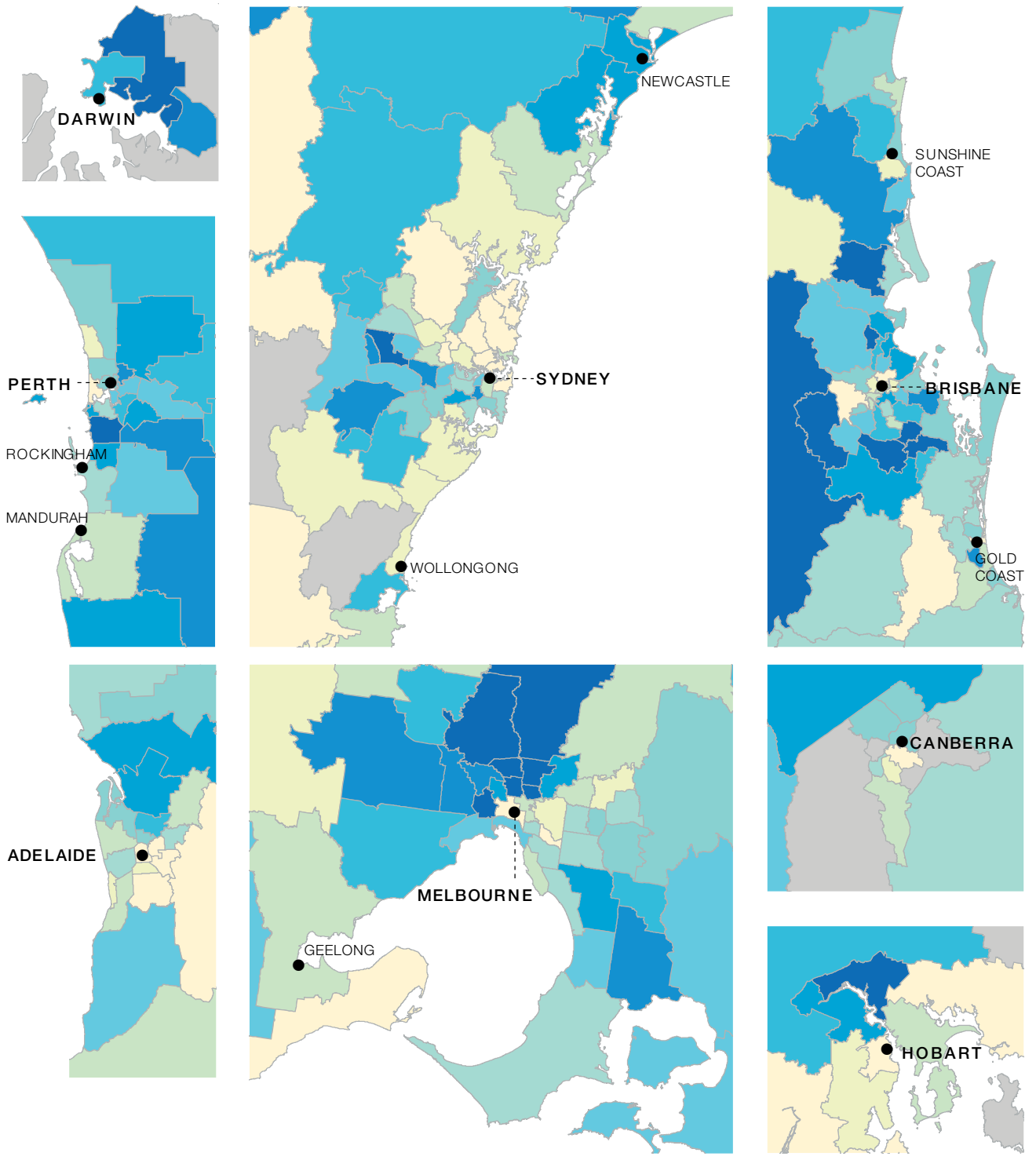
Figure 2.11: **Number of potentially preventable hospitalisations – heart failure per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18**



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates across capital city areas

Figure 2.12: Number of potentially preventable hospitalisations – heart failure per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



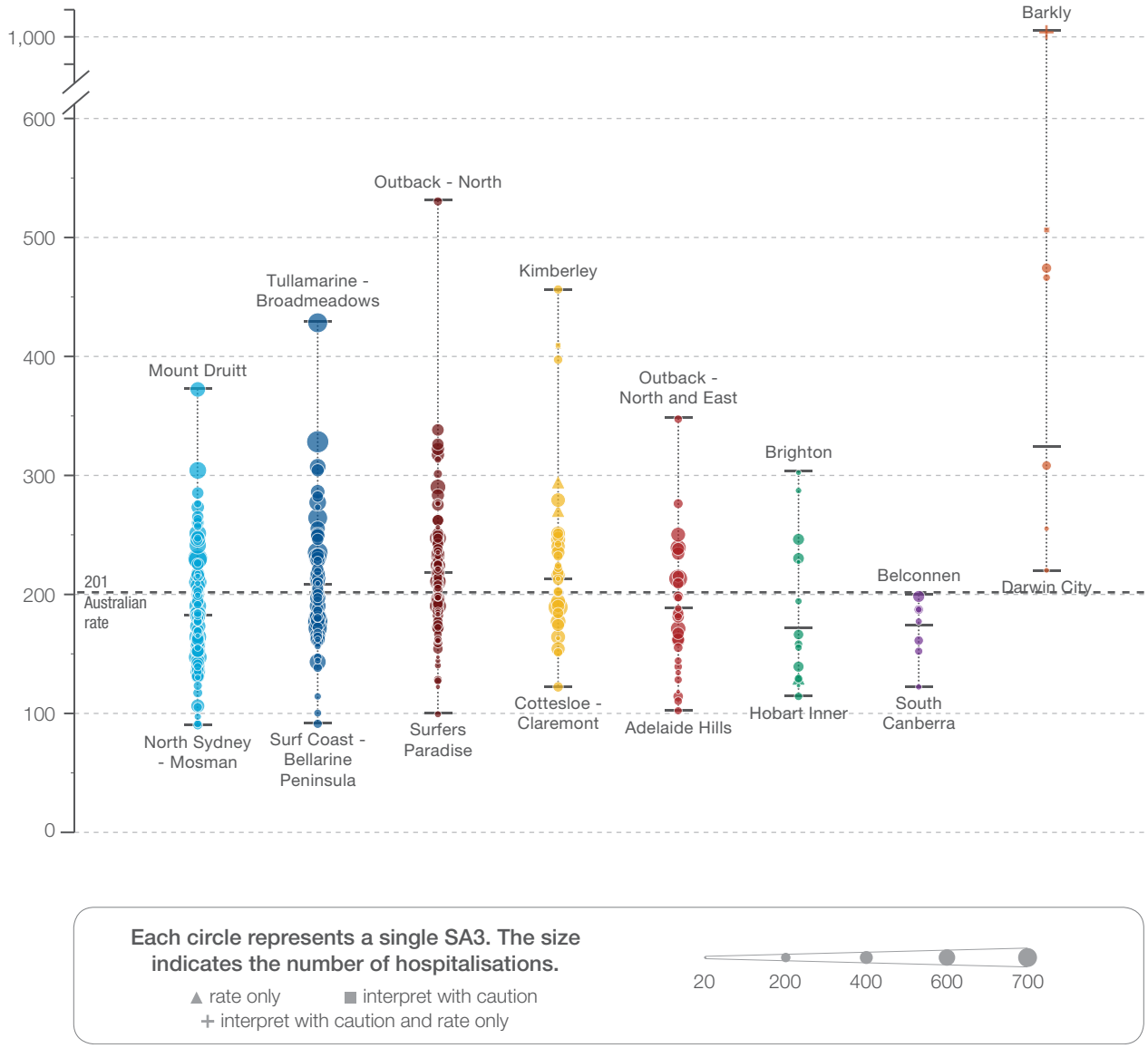
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Heart failure

Rates by state and territory

Figure 2.13: Number of potentially preventable hospitalisations – heart failure per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

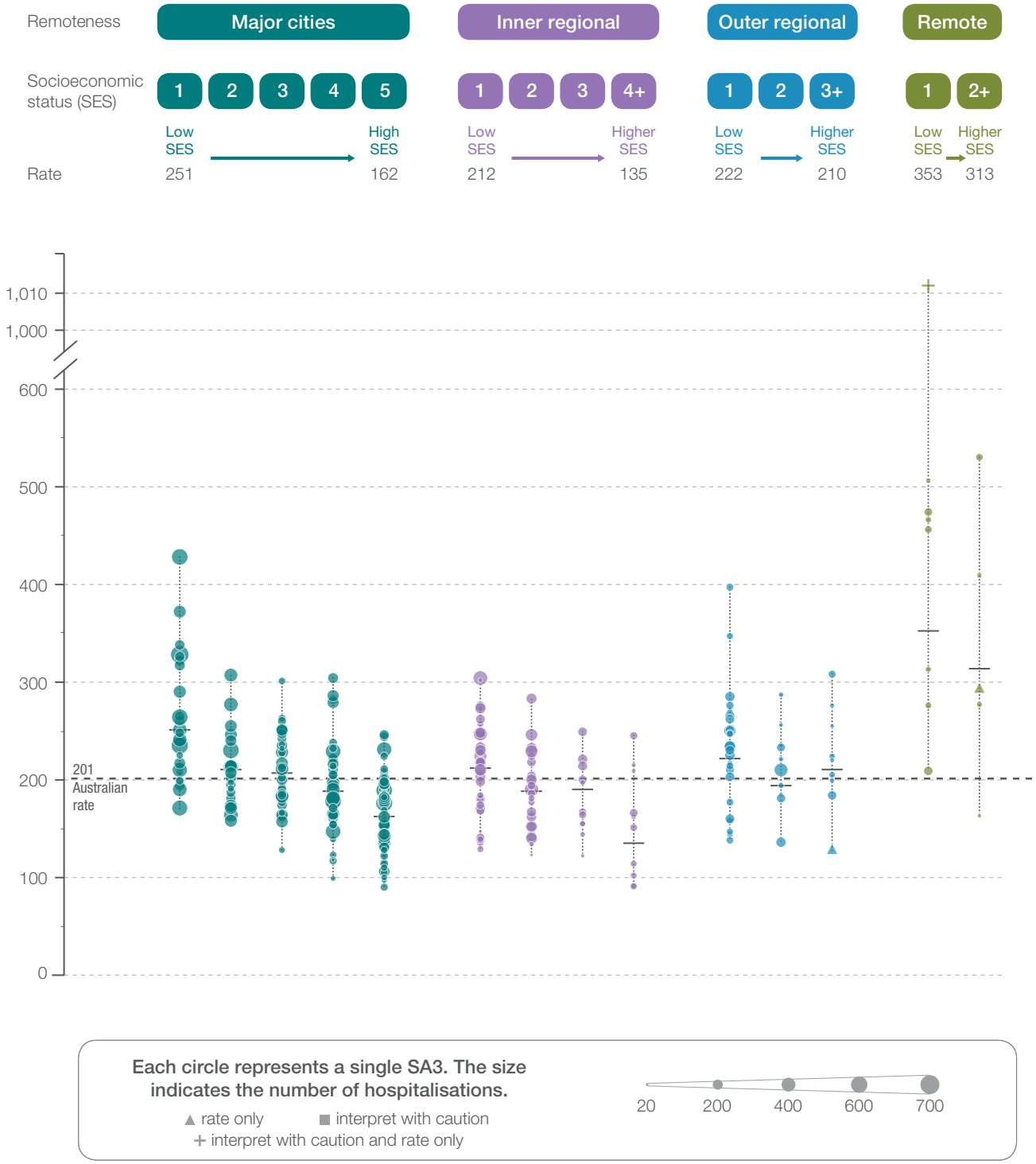
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	373	429	531	457	348	303	199	1,006*
State/territory	183	208	218	213	188	172	174	324
Lowest rate	91	92	100	123	103	115	123	221
No. hospitalisations	19,112	16,763	12,782	6,212	4,856	1,344	726	574



Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

Figure 2.14: Number of potentially preventable hospitalisations – heart failure per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



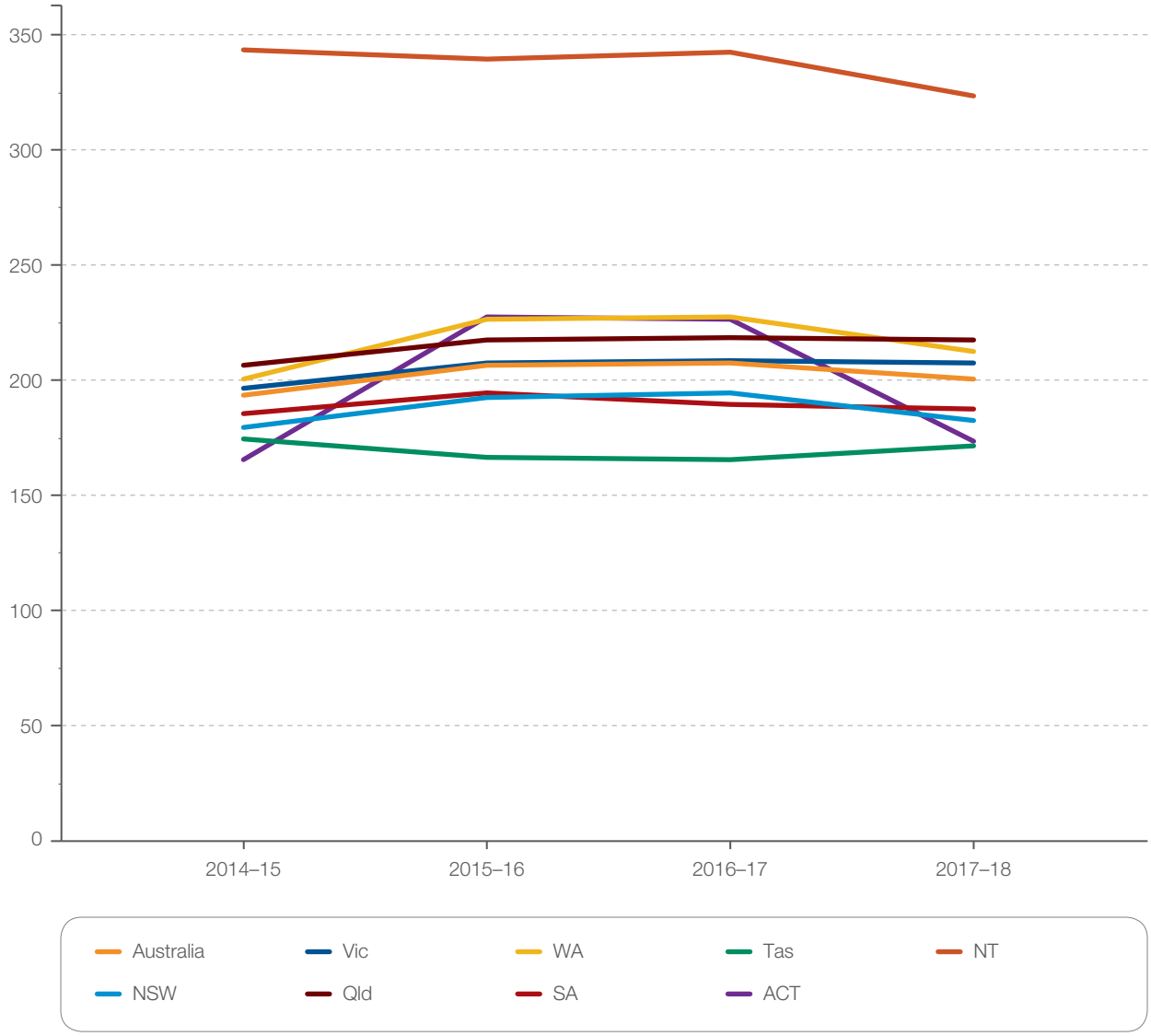
Notes:
Squares (■) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Heart failure

Rates across years

Figure 2.15: Number of potentially preventable hospitalisations – heart failure per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, 2014–15 to 2017–18

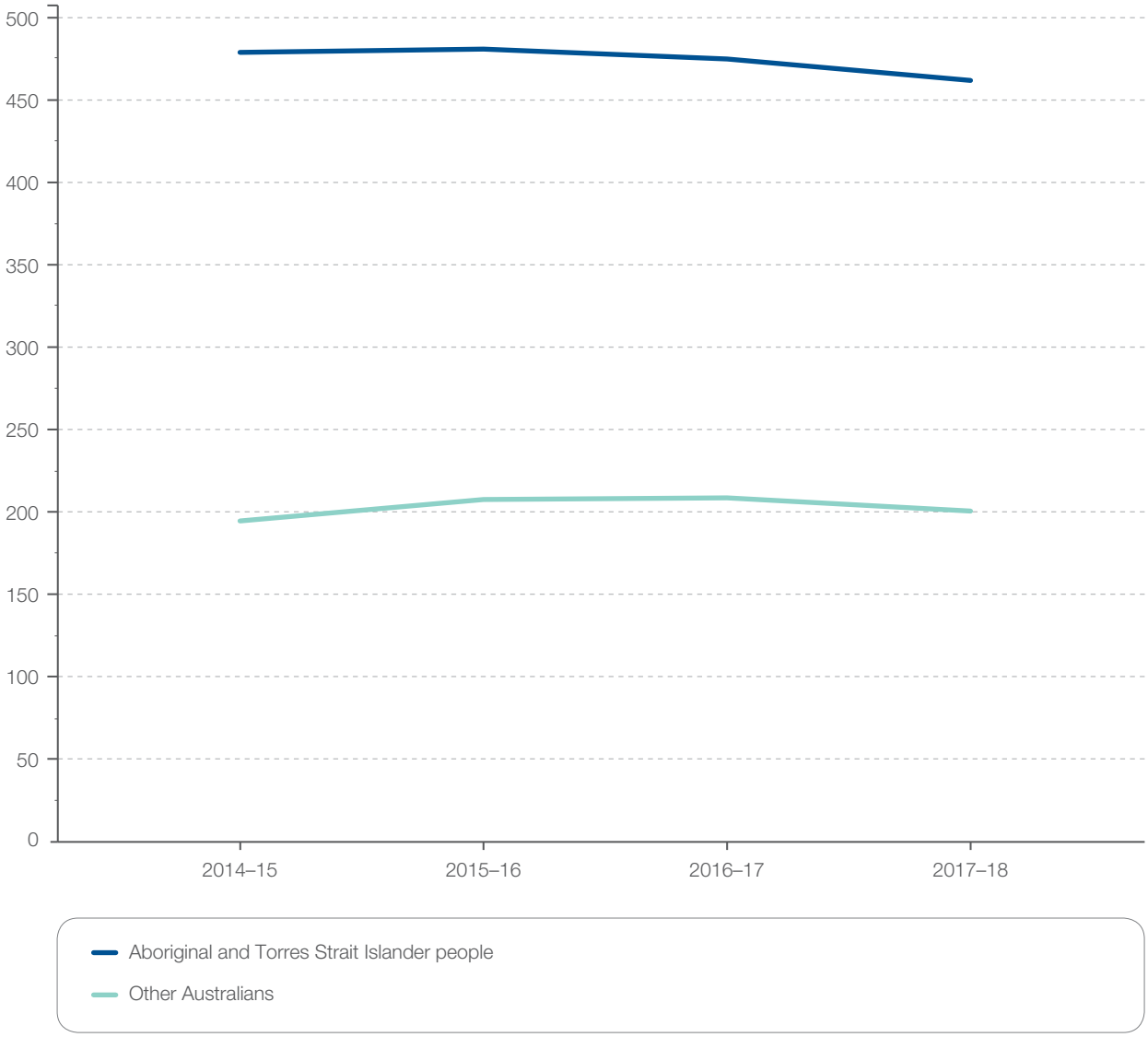
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	1,084*	1,104*	562*	1,006*
Australian rate	**194**	**207**	**208**	**201**
Lowest SA3 rate	86	94	85	91
Magnitude of variation	7.5	6.1	5.6	5.8
Magnitude of variation without top & bottom 10% SA3	2.1	2.0	2.1	2.0



Notes:
The asterisks (*) indicate rates that are considered more volatile than others, and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Rates for Aboriginal and Torres Strait Islander people across years

Figure 2.16: Number of potentially preventable hospitalisations – heart failure per 100,000 people of all ages, age and sex standardised, by Aboriginal and Torres Strait Islander status, 2014–15 to 2017–18



Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated, with variation among states and territories.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Heart failure

Resources

- NSW Clinical Service Framework for Chronic Heart Failure
- *Primary Health Tasmania Needs Assessment: Health intelligence report*[40]
- Improving cardiovascular outcomes among Aboriginal Australians: lessons from research for primary care[41] (includes a management toolkit)
- Heart Online, clinician resources for cardiac rehabilitation and heart failure management, including access to evidence-based guidelines, templates, protocols, calculators, patient resources and videos (heartonline.org.au/)
- *National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand: Guidelines for the prevention, detection, and management of heart failure in Australia 2018*[10]
- Improving Health Outcomes for Aboriginal and Torres Strait Islander Peoples with Acute Coronary Syndrome: A practical toolkit for quality improvement[42]
- NPS MedicineWise – Heart failure: taking an active role – Clinical resources and tools, and information for consumers[43]
- Recommendations arising from the inaugural Cardiac Society of Australia and New Zealand conference on Indigenous cardiovascular health[35]

Available at heartfoundation.org.au:

- Consumer resources for people with heart failure, including resources specific to Aboriginal and Torres Strait Islander Australians, translated resources, videos, and resources for people with low and higher health literacy
- *Heart Failure Guidelines: A concise summary for the GP*
- *Pharmacological Management of Chronic Heart Failure with Reduced Left Ventricular Ejection Fraction* (clinical fact sheet)
- *Diagnosis and Classification of Heart Failure* (clinical fact sheet).

Australian initiatives

The information in this chapter will complement work already underway to reduce the rate of hospitalisations for heart failure in Australia. At a national level, this work includes:

- NPS MedicineWise – Heart failure: taking an active role – Clinical resources and tools, and information for consumers[43]
- The Heart Foundation's Heart Failure Toolkit – a targeted approach to reducing heart failure readmissions
- Essential Service Standards for Equitable National Cardiovascular Care (ESSENCE) for Aboriginal and Torres Strait Islander people
- Rheumatic fever strategy.

Many state and territory initiatives are also in place to reduce the rate of hospitalisations for heart failure, including:

- Heart Failure Care Initiative – Development of Model of Care and Outcomes Framework, Capital Health Network, Australian Capital Territory
- Northern Territory Heart Failure Initiative – Clinical Audit
- Queensland Heart Failure Services
- Telephone-based lifestyle coaching (My Health for Life, Get Healthy, COACH), Queensland
- Wellness Initiative, supporting consumers to participate in telephone-based lifestyle coaching programs before surgical procedures, Queensland
- Heart failure guides in HealthPathways, Tasmanian Cardiac Network
- Heart failure education program, Tasmanian Cardiac Network
- Delivering Connected Care for Complex Patients with Multiple Chronic Needs, Tasmania
- Community Rapid Response Service, Tasmania[18]
- *Primary Health Tasmania Needs Assessment: Health intelligence report*[40]
- Heart Health: Improved Services and Better Outcomes for Victorians policy

- Reducing heart failure admissions program. Heart Foundation Victoria; Victorian Government
- HealthLinks: Chronic Care, Victoria
- PROMETHEUS (Patient Reported Outcome Measure Education Transitions Heart failure Expertise Unifying Systems), pilot implementation of the Heart Foundation Heart Failure Toolkit, Victorian Cardiac Clinical Network
- Reports on hospital readmission rates for heart failure, NSW Bureau of Health Information
- Bettering Aboriginal Heart Health in Western Australia project
- 1 Deadly Step program, NSW Health and the Australian Rugby League
- State and territory cardiac networks.

Heart failure

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2.3 Diabetes complications

Why is this important?

Approximately 6% of adults in Australia had diabetes in 2017–18.[1] The prevalence of diabetes in adults has almost doubled since 2001, although there was little change between 2014–15 and 2017–18.[1] Long-term complications of diabetes include stroke, heart disease, kidney disease, eye disease, nerve problems and foot ulcers.[2] Diabetes complications accounted for 276,965 hospital bed days and 7% of all potentially preventable hospitalisations in Australia in 2017–18.[3]

What did we find?

Between 2014–15 and 2017–18, the rate of hospitalisations for diabetes complications nationally increased by 7%.

In 2017–18, the rate was **12.2 times as high** in the area with the highest rate compared with the area with the lowest rate. Rates of hospitalisations for diabetes complications were markedly higher in remote areas than in other areas. Rates increased with socioeconomic disadvantage in major cities, and outer regional and remote areas. The rate for Aboriginal and Torres Strait Islander people was 3.7 times as high as the rate for other Australians.

What can be done?

Successful interventions for reducing hospitalisations for diabetes complications include supporting self-management; for example, a six-week structured program of education on self-management for people with diabetes reported an 88% reduction in hospitalisations.[4] A model of integrated care in Australia has reduced hospitalisations for diabetes complications by 47% in an early evaluation.[5] Telehealth program types and outcomes vary widely, but can reduce haemoglobin A1c (HbA1c) levels by approximately half[6], and some have led to reported reductions in hospitalisations.[7] HbA1c levels give an indication of average blood glucose levels and are used to estimate how well a person's diabetes is being managed.

Long-term interventions to address the social determinants of health may also reduce the rate of diabetes and its complications in Australia.

Diabetes complications

Context

Approximately 6% of adults in Australia had diabetes in 2017–18.[1] The prevalence in adults has almost doubled since 2001, although there was little change between 2014–15 and 2017–18.[1] Long-term complications of diabetes include stroke, heart disease, kidney disease, eye disease, nerve problems and foot ulcers.[2] Short-term complications include diabetic ketoacidosis.

Diabetes complications accounted for 276,965 hospital bed days and 7% of all potentially preventable hospitalisations in Australia in 2017–18.[3] The rate of hospitalisations for diabetes was 144 per 100,000 in Australia, and 93 per 100,000 in Canada, in people aged 15 years and over, in 2016.[8]

Of hospitalisations with a principal diagnosis of diabetes, type 2 diabetes accounts for most (64%), followed by type 1 diabetes (29%), gestational diabetes (5%) and other or unspecified diabetes (1%).[9]

Risk factors for type 2 diabetes

Risk factors for developing type 2 diabetes include physical inactivity, excess weight, poor diet and a genetic predisposition.[1] Aboriginal and Torres Strait Islander people are almost 3 times as likely to have diabetes as are other Australians, as a result of higher rates of risk factors for type 2 diabetes.[1,10]

Socioeconomic disadvantage strongly increases the risk: in 2011–12, adults in the lowest socioeconomic group had twice the rate of diabetes as those in the highest socioeconomic group (8% and 4%, respectively).[11] People who live in outer regional or remote areas of Australia have higher rates of diabetes than those in major cities or inner regional areas (7% and approximately 5%, respectively).[12]

Preventing complications

Hospitalisation is appropriate for certain complications of diabetes, such as kidney and foot damage, which are likely to require hospitalisation for effective treatment.[13] Some of these hospitalisations are considered potentially preventable because optimal management of blood glucose levels reduces the risk of diabetes complications.

Access to comprehensive, systematic care and follow-up reduces complications and preventable hospitalisations among people with diabetes.[14,15] For example, hospitalisation and lower-extremity amputation may be avoided by regular care in a high-risk foot clinic that includes vascular, orthopaedic, endocrine and podiatry services.[16]

About the data

All hospitalisations with a principal diagnosis of type 1, type 2 and unspecified diabetes are included.

Data are sourced from the National Hospital Morbidity Database, and include admitted patients in both public and private hospitals, including hospital care in the home.

Rates are based on the number of hospitalisations for diabetes complications per 100,000 people of all ages in 2017–18.

Because a record is included for each hospitalisation for the condition, rather than for each patient, patients hospitalised for the condition more than once in the financial year will be counted more than once.

The analysis and graphs are based on the usual residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence variations seen.

What do the data show?

Magnitude of variation

In 2017–18, there were 50,273 hospitalisations for diabetes complications, representing 184 hospitalisations per 100,000 people of all ages (the Australian rate).

The number of hospitalisations for diabetes complications across 325* local areas (Statistical Area Level 3 – SA3) ranged from 64 to 782 per 100,000 people. The rate was **12.2 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 147 per 100,000 people in New South Wales to 277 in the Northern Territory (Figures 2.18–2.21).

After the highest and lowest 10% of results were excluded and 261 SA3s remained, the number of hospitalisations per 100,000 people was 2.9 times as high in the area with the highest rate compared with the area with the lowest rate.

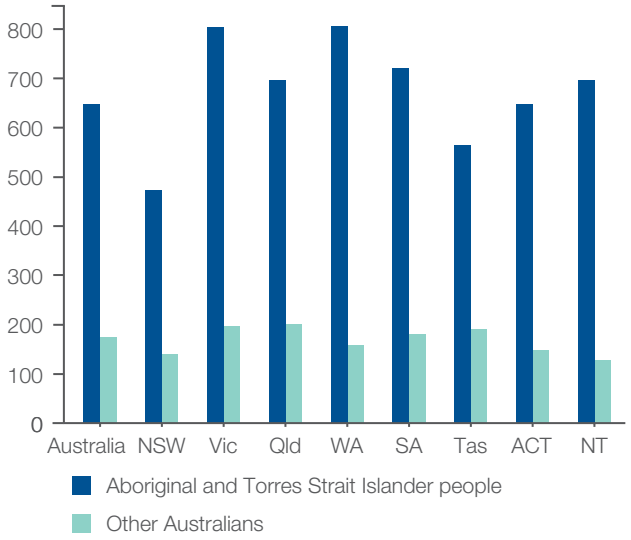
Analysis by remoteness and socioeconomic status

Rates of hospitalisations for diabetes complications were markedly higher in remote areas than in other areas. Rates increased with socioeconomic disadvantage in major cities, and outer regional and remote areas (Figure 2.22).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander people (647 per 100,000 people) was 3.7 times as high as the rate for other Australians (173 per 100,000 people) (Figure 2.17).

Figure 2.17: Number of potentially preventable hospitalisations – Diabetes complications per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2017–18†



The data for Figure 2.17, and the data and graphs for analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, data were suppressed for 15 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

† Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated, with variation among states and territories.

Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.

For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Diabetes complications

Trends over time

Between 2014–15 and 2017–18, the rate of hospitalisations for diabetes complications per 100,000 people nationally increased by 7% (Figure 2.23).

For Aboriginal and Torres Strait Islander people, the rate of hospitalisations for diabetes complications per 100,000 people nationally increased by 8% between 2014–15 and 2017–18 (Figure 2.24).

Interpretation

The reported variation in the rate of hospitalisations for diabetes complications could be influenced by a number of factors, such as variation in:

- The prevalence of diabetes and risk factors for type 2 diabetes
- The level of concordance with guidelines by clinicians
- Access to integrated hospital and primary care
- Availability of out-of-hospital models of care, which may be lower outside major cities
- Systems for recall, referral and follow-up of people with diabetes
- Implementation of preventive health strategies
- The availability of allied health care and services for complications (for example, clinics for foot, eye and kidney complications)
- The availability of diabetes educators and access to support for diabetes self-management
- The level of consumer enablement
- Prevalence of mental health disorders that affect the ability to self-care, and use of antipsychotic medicines that increase the risk of obesity
- The frequency of preventive checks in primary care
- Socioeconomic disadvantage, health literacy and access to healthy food
- The ability to self-manage diabetes, including access to refrigeration for insulin
- The prevalence of risk factors for complications, including smoking, suboptimal management of blood glucose levels and dialysis (which can contribute to suboptimal management of blood glucose levels)[17]
- Clustering of populations with higher prevalence of type 2 diabetes, such as Aboriginal and Torres Strait Islander people, people born in the Pacific islands, and people born in southern and central Asia[2,18]
- Clustering of people with diabetes in aged care homes
- Access to healthcare services that provide culturally appropriate care
- The availability of Aboriginal and Torres Strait Islander staff for diabetes prevention and management
- The availability of health staff in remote areas
- Resourcing of primary care services relative to the local prevalence of diabetes
- Diagnostic error.

Because a record is included for each hospitalisation for the condition, rather than for the patient, patients hospitalised more than once for the condition or transferred between hospitals in the financial year will be counted more than once. This may increase the apparent rates of hospitalisations for people from outer regional or remote areas, who are more likely to be transferred to a major hospital.

Variations between areas may not directly reflect the practices of the clinicians who are based in these areas. Area boundaries reflect where people live, rather than where they obtain their health care. Patients may travel outside their local area to receive care.

Socioeconomic and demographic factors

Socioeconomic and demographic factors have a strong influence on rates of potentially preventable hospitalisations for chronic conditions, and are a greater influence than availability of primary care.[19] In some areas, the socioeconomic profile may have changed over the course of the time series.

Variation in health care and self-care

Quality of health care and self-care among people with diabetes varies. For example, people with diabetes in Australia receive care that corresponds to best-practice guidelines in approximately 63% of encounters with healthcare providers, according to data from 2009–10.[20] Levels of self-care and outcomes among people with type 2 diabetes improve with increasing levels of education and income.[21]

Change in New South Wales coding

National figures based on hospital admission data are strongly influenced by estimates from New South Wales (NSW), because this state accounts for around one-third of the total Australian population. Administrative changes to admission practices in NSW emergency departments occurred in July 2017: since then, only more severe cases (usually managed by emergency management units in emergency departments) have been included in hospital admission data. This resulted in an overall drop in hospital episodes (of around 3–5%), which may have an impact on trend analyses.

Reducing hospitalisations for people with diabetes

The increase in diabetes hospitalisations between 2014–15 and 2017–18 in the population overall, and in Aboriginal and Torres Strait Islander people, is concerning and should be addressed using a variety of strategies. These could be aimed at reducing rates of type 2 diabetes and improving management of all types of diabetes.

Integrated care models

Effective management of diabetes requires multidisciplinary, coordinated care.[22] The team of clinicians providing care may include general practitioners (GPs), medical specialists, nurses and allied health professionals. Although some people with diabetes are fortunate enough to receive this care, the current Australian health system does not provide the optimal supports for integrated team care.[23]

Health services are often fragmented, with poor communication between providers, and between community and hospital services.[22] For example, in some cases, the acute reason for hospitalisation may be managed without addressing the underlying suboptimal diabetes management. Partnerships between primary care providers – including Aboriginal Community Controlled Health Services (ACCHSs) – and specialists in the community, allied health professionals and hospitals are needed to provide better integrated care.

The majority of systematic reviews of integrated care for people with diabetes have shown a reduction in hospitalisations and improvements in management of blood glucose levels.[24] The term ‘integrated care’ covers a wide variety of models, and studies to clarify which models and components of care have the greatest impact would be valuable for guiding future implementation.[24] The differences between models, and in the type of outcomes measured, make it difficult to estimate the impact of the integrated care approach.

Diabetes complications

Models of care that integrate different specialties and primary care have been implemented with success in Australia – for example:

- An integrated primary and secondary care service in the community (see 'Case study' on this page)
- An outreach model for remote Aboriginal and Torres Strait Islander communities (see 'Case study: Outreach integrated care for remote Aboriginal and Torres Strait Islander communities' on page 115)[25]
- Integrated primary and tertiary care for women with diabetes in pregnancy in the Northern Territory (see page 119).[26]

Case study: Integrated primary and secondary care clinic for diabetes

A multidisciplinary, integrated primary and secondary care diabetes service has approximately halved the rate of hospitalisations due to diabetes complications in an early evaluation.[5] The success of this model is particularly encouraging, given that the users of the service had complex type 2 diabetes and were from socioeconomically disadvantaged areas.

The clinical team was made up of an endocrinologist, two or three GPs with advanced training in managing diabetes, a diabetes educator, a podiatrist, and other allied health professionals, as required. A trial of the model compared outcomes in 182 consumers who lived in the service catchment area in South Brisbane and 145 consumers who received usual care at a hospital outpatient clinic. Consumers attending the integrated service were less educated and had a significantly higher baseline HbA1c level than the control group (8.6% and 7.9%, respectively). Despite these differences, the average number of hospitalisations with a diabetes complication as the principal diagnosis was 47% lower in the intervention group than in the usual care group in the two years after the trial began. Eye and foot complications were the most common reason for hospitalisation.

The model of care has been expanded to a second site, and a randomised controlled trial found that blood glucose levels among consumers at the two sites were similar to those achieved in a hospital-based outpatient clinic.[27] Integrating primary and secondary care to develop the skills of the primary care team during consumer management is also being done in other ways – for example, through case conferences conducted by a specialist and involving the consumer, GP and practice nurse. Another recent Australian initiative based on this model has shown significant improvements in management of blood glucose levels and blood pressure.[20]

Case study: Outreach integrated care for remote Aboriginal and Torres Strait Islander communities

People living in remote Aboriginal and Torres Strait Islander communities of Australia have a critical need for accessible and culturally appropriate diabetes care, as well as the benefits of integrated specialist and primary care. Rates of diabetes and its complications are disproportionately high in these remote communities.

To address these challenges, an outreach specialist service was created in partnership with remote Aboriginal and Torres Strait Islander communities, and the local primary healthcare services in the Northern Territory.[25] The outreach team comprised diabetes nurse educators and endocrinologists. Each community clinic was visited three or four times a year by a diabetes nurse educator and twice yearly by an endocrinologist. People with suboptimal blood glucose levels and with complications were prioritised for care.

The outreach team reviewed consumers at each visit and provided management recommendations for the consumers, local doctors, Aboriginal health workers and remote area nurses. Care plans were made collaboratively between the outreach team and the local primary healthcare team, who then implemented the plans. The outreach team also strengthened the capacity of local primary healthcare providers through education sessions in diabetes management, as well as clinical support between visits.

An evaluation was conducted in three remote communities that had diabetes rates between 28% and 60% among adults.[25] By 12 months, the consumers' average HbA1c level was significantly reduced, and 63% of consumers had achieved a reduction in HbA1c.

According to the study authors, equitable partnerships between service providers and communities are crucial for ensuring that communities have the opportunity to help shape the way care is delivered, so that it is acceptable to consumers.[25]

Diabetes complications

Telehealth

A range of telehealth strategies are effective in improving management of blood glucose levels in people with type 2 diabetes, and can be significantly more effective than usual care.[6] For example, a one-year telephone self-management program for people with diabetes in the United States reduced hospitalisations by 10%.[7] Telehealth can decrease hospitalisations among adults with diabetes, but the type of intervention, and the results, vary widely.[28]

Teleconsultation (two-way communication between consumers and clinicians, or between clinicians) is the most effective type of telehealth for type 2 diabetes.[6] Supplementing outreach clinics for remote communities with telehealth consultations would reduce overall costs associated with delivery of specialist diabetes services, and reduce time away from usual activities for both consumers and clinicians.[29]

Telehealth is being used effectively in some parts of Australia.[30] Examples of telehealth for diabetes care include the Royal Flying Doctor Service in Victoria, which has provided an endocrinology telehealth program since 2013 via a customised videoconference platform, and the Diabetes Telehealth Service for Regional WA (see the 'Case study' on this page).

Telehealth has the potential for much wider use to improve access to health care in regional and remote areas, and for people with mobility problems or young children. Barriers to uptake of telehealth in regional and remote areas of Australia include[31]:

- Lack of adequate internet access in some areas
- Consumers not being aware of, or not knowing how to access, telehealth
- Cultural safety of telehealth services for Aboriginal and Torres Strait Islander people
- Lack of access to clinicians providing telehealth services
- Lack of Medicare item numbers for telehealth
- Lack of resourcing at the consumer end and the primary care end.

Case study: Diabetes Telehealth Service for Regional WA

The Diabetes Telehealth Service for Regional WA is a publicly funded, community-based, diabetes educator–led telehealth service for all types of diabetes. It promotes a hybrid, shared care approach connecting people with local face-to-face options, where possible. The service also offers access to a virtual endocrinology clinic for diabetes consumers, which their GPs or practice nurses can attend.

Kimberley Aboriginal Medical Services and Diabetes WA are currently collaborating to explore a model aiming to improve the cultural security of the Diabetes Telehealth Service for Regional WA, to increase community engagement. Diabetes WA is also collaborating with Royal Perth Hospital to enable more timely access to a multidisciplinary diabetes team via the Diabetes Telehealth Service for Regional WA for consumers on their waitlist with less complex needs.

Consumer enablement

Diabetes requires intensive self-management to prevent complications, and structured diabetes education has significant potential to improve outcomes for people with diabetes.[32–34] Structured diabetes education is evidence based, suits the needs of the person, has specific learning objectives and a structured curriculum, and is delivered by trained educators.[35] Structured education for people with type 2 diabetes addresses risk factors for complications, such as dietary habits, foot care and smoking.[34]

Reduction in hospitalisations has been reported; for example, a randomised controlled trial reported an 88% reduction in hospitalisations among people with type 2 diabetes who attended education sessions, compared with the control group.[4] The intervention consisted of a six-week program of 2.5-hour weekly classroom training sessions on diabetes self-management.[4] Structured education for people with type 1 diabetes also reduces the frequency of severe hypoglycaemic events.[36]

The Diabetes Education and Self-Management for Ongoing and Newly Diagnosed (DESMOND) program is a structured group education program based on a philosophy of consumer empowerment. A trial of the DESMOND program in 26 locations across regional Western Australia (WA) reported a significant increase in consumer activation, which is a measure of the extent of consumer involvement in their health care.[37] Consumer activation can be used as a reliable tool for improving type 2 diabetes self-management and clinical outcomes.[38] A high degree of activation may be needed to self-refer to a DESMOND program, and strategies to involve less-activated consumers are needed.[37] This might include increasing referrals from primary care providers to DESMOND programs.[37]

Advances in medical treatment

Newer medicines for lowering blood glucose, sodium–glucose cotransporter-2 (SGLT-2) inhibitors and glucagon-like peptide-1 (GLP-1) analogues can reduce the risk of cardiovascular and renal complications in people with type 2 diabetes.[39,40] SGLT-2 medicines may reduce heart failure hospitalisations by 30% in people with type 2 diabetes, compared with those taking placebo or other diabetes medicines.[41]

SGLT-2 and GLP-1 analogue medicines are now recommended by guidelines for consumers with diabetes who have, or are at high risk of, heart disease or chronic kidney disease.[42–44]

Preventing diabetic eye and kidney disease

Diabetic retinopathy is a leading cause of blindness in Australians aged 20–74 years. Early detection and management can prevent severe vision loss and blindness in almost all cases.[2] Screening for diabetic retinopathy has been shown to be effective in preventing blindness in rural and urban Australian settings, and preventive eye care is highly cost-effective.[45] Rural and remote populations have successfully been screened via telehealth.[45] National diabetic retinopathy screening programs in other countries have shown impressive reductions in blindness among people with diabetes, and the feasibility of a similar program in Australia merits examination.[45]

Earlier diagnosis of diabetes

Point-of-care testing for HbA1c has been suggested as a strategy to facilitate earlier diagnosis of diabetes – obtaining a fasting blood sugar level or undertaking an oral glucose tolerance test can present a barrier to diagnosis for many consumers.[46] Women who have had gestational diabetes are 7 times as likely to develop type 2 diabetes as other women, and follow-up of these women is often poor.[47] Among Australian women with gestational diabetes, Aboriginal and Torres Strait Islander women are 4 times as likely as other women to develop type 2 diabetes.[48] Improving detection and follow-up of diabetes in pregnancy could reduce complications in both the mother and the child.

Improving care for inpatients with diabetes

The estimated prevalence of diabetes among hospital inpatients in Australian studies is approximately 30%, and outcomes for this group are poorer than for those without diabetes.[49–51] Optimising care in hospital early in the admission could improve outcomes, and prevent or delay readmissions for future complications.[50] Aboriginal liaison officers and other Aboriginal and Torres Strait Islander hospital staff play an important role in supporting the consumer journey in hospital and at discharge.

In surgical patients, diabetes significantly increases the risk of six-month mortality, major complications, admission to intensive care and length of stay.[49] Suboptimal blood glucose levels before surgery appear to be an important contributor, and triaging consumers with diabetes (particularly those with suboptimal blood glucose levels) to pathways of care dedicated to higher-risk consumers may improve outcomes from surgery.[49]

Diabetes complications

Preventing type 2 diabetes

Preventing type 2 diabetes is key to reducing hospitalisations for diabetes complications in the future. Strategies to address the social determinants of health are needed to reduce the high rates of type 2 diabetes in areas of socioeconomic disadvantage. These determinants include education levels, employment, income levels and access to nutritious food.[52] Multifaceted approaches are needed to create environments that support healthy lifestyles, such as urban planning for active transport and policies to promote healthy eating.

Population health programs, such as lifestyle coaching services, can be effective in reducing risk factors for type 2 diabetes (see 'Case study' on this page). Type 1 diabetes is not preventable, but optimal blood glucose levels can prevent complications.

Case study: Telephone-based lifestyle coaching

The Get Healthy Information and Coaching Service is a free telephone-based intervention that aims to reduce risk factors for several chronic conditions. One component is aimed at decreasing excess weight among high-risk groups in New South Wales. The program includes a module tailored for adults at risk of developing type 2 diabetes.[53]

The program was successful in engaging high-risk groups; 42% of participants were from the two lowest socioeconomic brackets, and 43% lived outside major cities. After six months, participants had lost an average of 3.4 kg, and nearly one-third of participants lost at least 5% of their body weight.[53] Participants also significantly increased their healthy eating and physical activity behaviours.

The Get Healthy Information and Coaching Service includes a tailored service for Aboriginal and Torres Strait Islander people. Participants in the Aboriginal Program also lost an average of 4 kg, and significantly increased their physical activity and improved healthy eating behaviours.[54]

Improving care for Aboriginal and Torres Strait Islander people

Complex social determinants underlie the disparities in health, including diabetes rates and outcomes, between Aboriginal and Torres Strait Islander people and other Australians.[55,56] To address health inequities, improvements in social factors are required – for example, in education, employment and living conditions.[55]

In addition, the logistical and financial barriers to accessing timely and effective health care for Aboriginal and Torres Strait Islander people who live in remote areas need to be addressed.[55] Logistical barriers include time delays in laboratory analysis of samples for glucose testing. Glucose breakdown in samples while in transit to laboratory analysis was estimated to result in a 62% under-diagnosis of gestational diabetes in women in regional, rural and remote areas of WA.[57] ACCHS clinics in the Kimberley have implemented an alternative protocol for sample collection, using different collection tubes, to overcome this problem.

Cultural safety and culturally appropriate care

Misalignment of mainstream health services with Aboriginal and Torres Strait Islander culture is a barrier to accessing health care.[58] Culturally safe care can improve clinical diabetes outcomes and consumer satisfaction among Aboriginal and Torres Strait Islander people.[59]

Holistic, integrated and multidisciplinary models of care

Models of care that have shown early success for Aboriginal and Torres Strait Islander people with diabetes include home-based outreach case management that provides holistic, multidisciplinary care. A program for Aboriginal and Torres Strait Islander people with complex chronic conditions, including diabetes, has incorporated these principles using a participatory approach, in which consumers set their own health and wellbeing goals.[60]
This exploratory study, using home-based, outreach case management of chronic disease, was developed and implemented in an urban Aboriginal and Torres Strait Islander primary healthcare service in Brisbane. The initial in-home assessment included a discussion about social, health and economic issues that would affect the consumer's ability to achieve their goals. The case manager coordinated services and case conferences with health professionals. Having care delivered in their own homes was important to consumers, as it increased their sense of safety and receiving comprehensive care, and minimised inconvenience and cost of travel.[60] Case managers worked in a culturally appropriate manner, contributing to a mutually respectful relationship.[60] After 12 months, 73% of consumers had good, very good or excellent self-rated health status, compared with 33% at baseline.[60] Significant increases were also seen in appointments with medical specialists and allied health professionals. Significant improvements were seen in blood pressure, but not in HbA1c or excess weight levels.[60]

In the Fitzroy Valley of the Kimberley region, WA, preventive management of diabetes in Aboriginal and Torres Strait Islander people has been improved through partnerships between the Aboriginal medical service, the local hospital, the population health unit and the community health centre. This has enabled primary care services in the area to be integrated, and health services to be reoriented from predominantly acute, reactive care to more preventive activities and primary care. Activities include health promotion days for screening and education, and team outreach clinics for developing self-management plans with consumers. An increase by a factor of almost 10 in the proportion of eligible consumers having a diabetes annual cycle of care was seen after the culturally appropriate, integrated model of care was introduced, according to data from 2010.[61]

The Northern Territory Diabetes in Pregnancy Partnership includes an enhanced model of care, as well as a clinical register and longitudinal birth cohort.[26] The goals of the model of care include:

- Early testing of women
- Integration of primary and tertiary care for women with diabetes in pregnancy
- Improved communication between service providers
- Development of integrated care plans within existing IT systems
- Provision of care according to current guidelines.[26]

Diabetes complications

Health professionals involved in focus groups to evaluate the model said that it had improved contact between clinicians, resulting in more coordinated care.[26] For example, workshops and regional meetings increased understanding of roles, and engagement of clinicians in developing referral pathways resulted in increased uptake of referral pathways and care plans.[26] Increased access to specialist services through telehealth and allied health outreach visits also increased local health professionals' knowledge.[26] Persisting barriers to integration identified by the focus groups included workforce shortages and difficulties integrating the IT systems between government, non-government and ACCHS sectors.[26]

Food and nutrition

Access to traditional foods for Aboriginal and Torres Strait Islander people has been disrupted by colonisation, and improving nutrition could reduce the burden of type 2 diabetes in these populations. Positive effects on nutrition and chronic disease indicators can be achieved by incorporating nutrition and breastfeeding advice into maternal and child health services, and through multifaceted community nutrition programs.[62] The most important factor in determining the success of such programs is Aboriginal and Torres Strait Islander involvement in, or control of, the program.[62]

Eye care

Annual eye screening, clearly defined pathways of care and timely management are key to improving eye health in Aboriginal and Torres Strait Islander people with diabetes.[63] The Roadmap to Close the Gap for Vision includes a range of strategies, some of which have been implemented, to increase the accessibility and uptake of eye-care services by Aboriginal and Torres Strait Islander people.[18]

Foot care

A mobile outreach service that provides foot care and diabetes education in Perth, WA, has been well received by the Aboriginal and Torres Strait Islander community. The service addresses social issues as well as clinical care, and consumers are managed in partnership with their GPs. This model has achieved high attendance levels. Its outcomes are currently being evaluated.[64] Greater resourcing of high-risk foot services in remote Australia, including outreach services, could reduce the burden of diabetic foot complications in these areas.

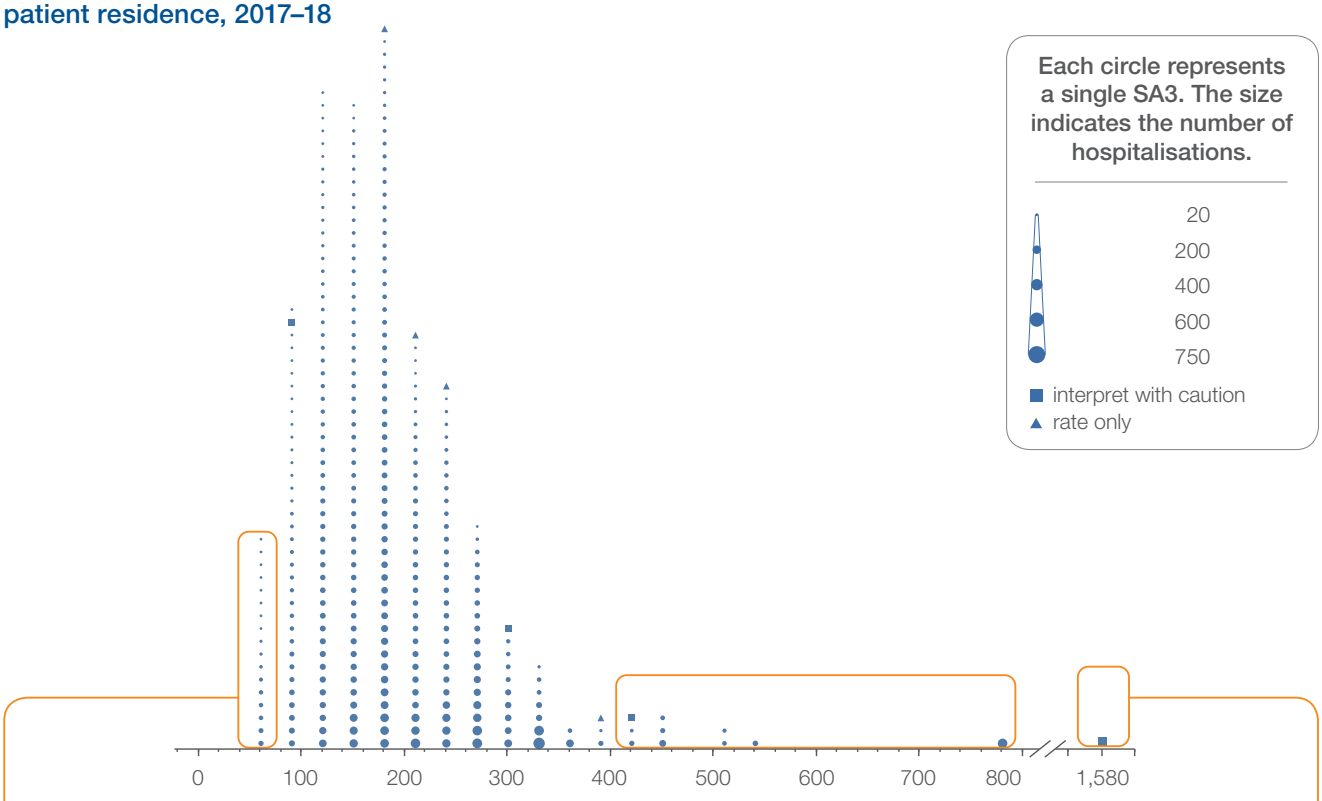
Medical-grade footwear and orthotics can help prevent diabetic foot complications, but are difficult to access for people in many rural and remote areas. Providing appropriate footwear for Aboriginal and Torres Strait Islander people with diabetes in remote areas could prevent a substantial number of foot complications.[65]

End-stage kidney disease

Diabetes is the leading cause of end-stage kidney disease in Australia. The rate of end-stage kidney disease in Aboriginal and Torres Strait Islander people is more than 6 times higher than in other Australians.[66] Targeted chronic kidney disease programs appear to be effective in improving outcomes for Aboriginal and Torres Strait Islander people with chronic kidney disease.[67] Early detection of diabetes is also key to preventing long-term kidney damage.

Rates by local area

Figure 2.18: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Mitcham	SA	64	56
Pennant Hills - Epping	NSW	66	38
Burnside	SA	68	40
North Canberra	ACT	68	39
Ryde - Hunters Hill	NSW	70	114
Stonnington - East	Vic	70	35
Ku-ring-gai	NSW	73	112
Eastern Suburbs - North	NSW	75	119
Prospect - Walkerville	SA	76	24
Manly	NSW	77	39
Pittwater	NSW	78	62
North Sydney - Mosman	NSW	79	95
Cottesloe - Claremont	WA	79	75
Dural - Wisemans Ferry	NSW	81	22
Sydney Inner City	NSW	82	155
Baulkham Hills	NSW	84	140
Unley	SA	89	41

Highest rate areas

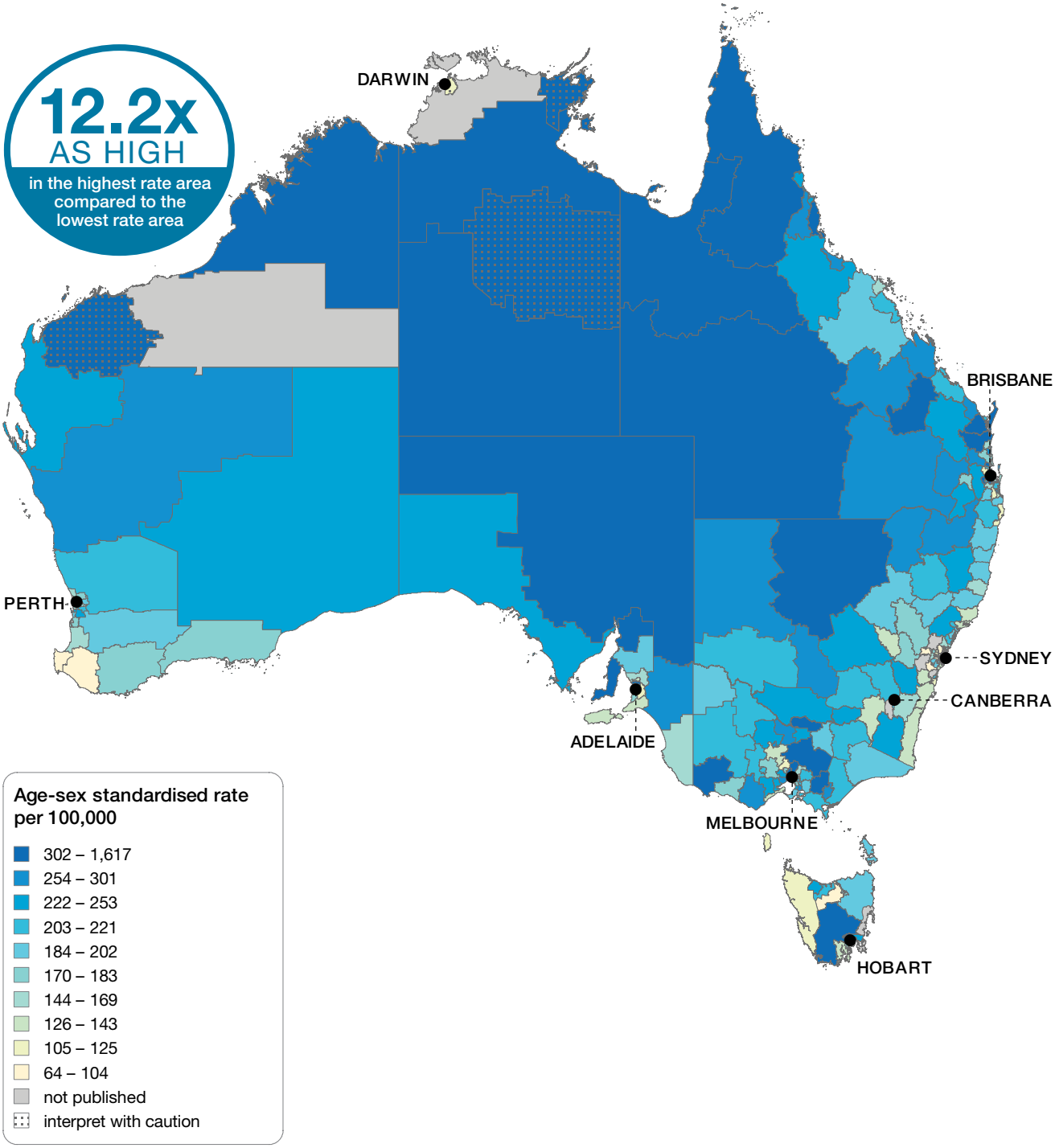
SA3	State	Rate	Hospitalisations
Barkly	NT	1,617*	83
Baw Baw	Vic	782	518
Kimberley	WA	556	175
Brighton	Tas	537	100
Outback - South	Qld	524	126
Outback - North	Qld	469	127
Maryborough	Qld	467	264
Far North	Qld	467	148
Strathpine	Qld	439	158
East Arnhem	NT	432*	51
Katherine	NT	420	78

Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Diabetes complications

Rates across Australia

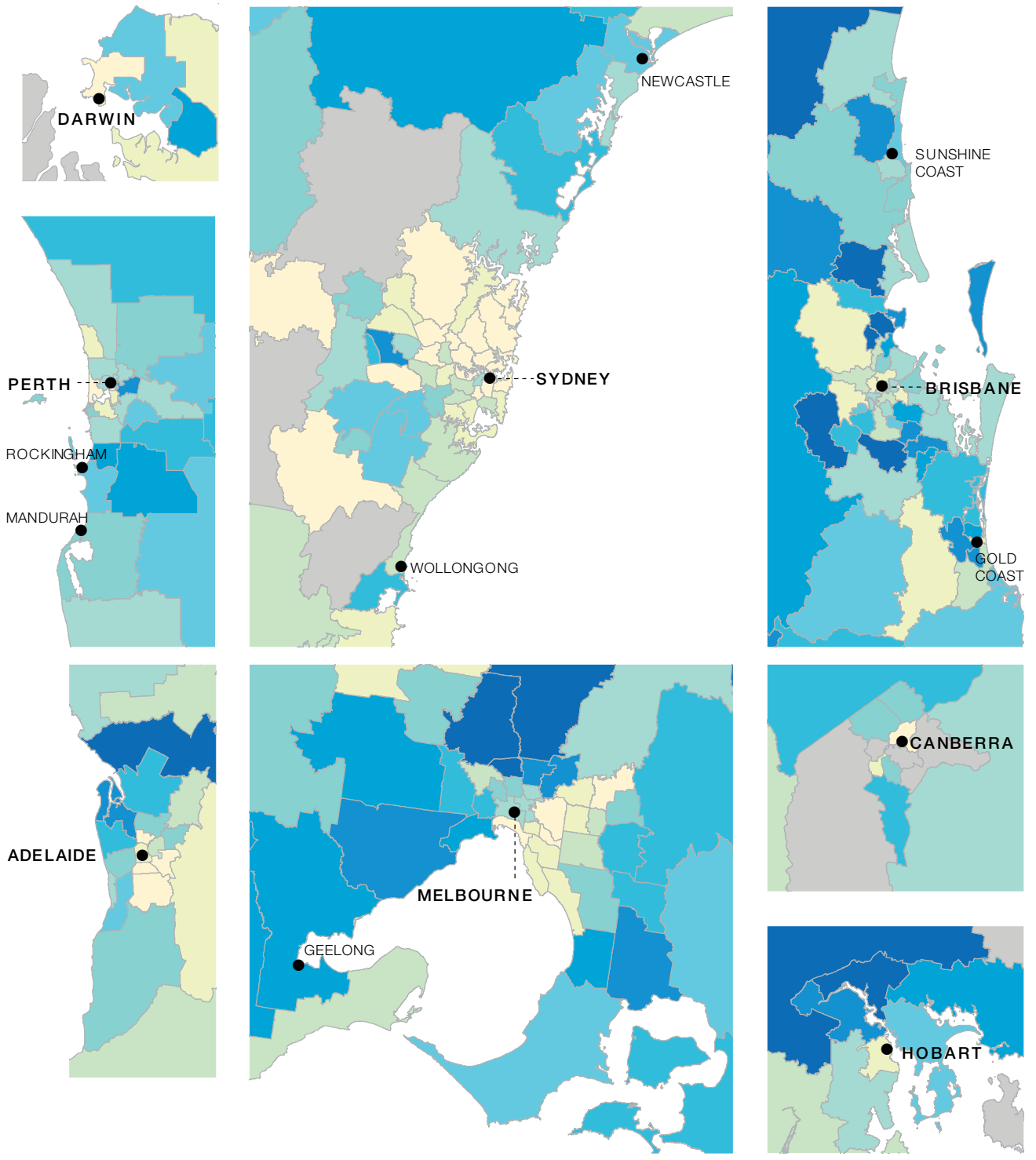
Figure 2.19: **Number of potentially preventable hospitalisations – diabetes complications per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18**



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates across capital city areas

Figure 2.20: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



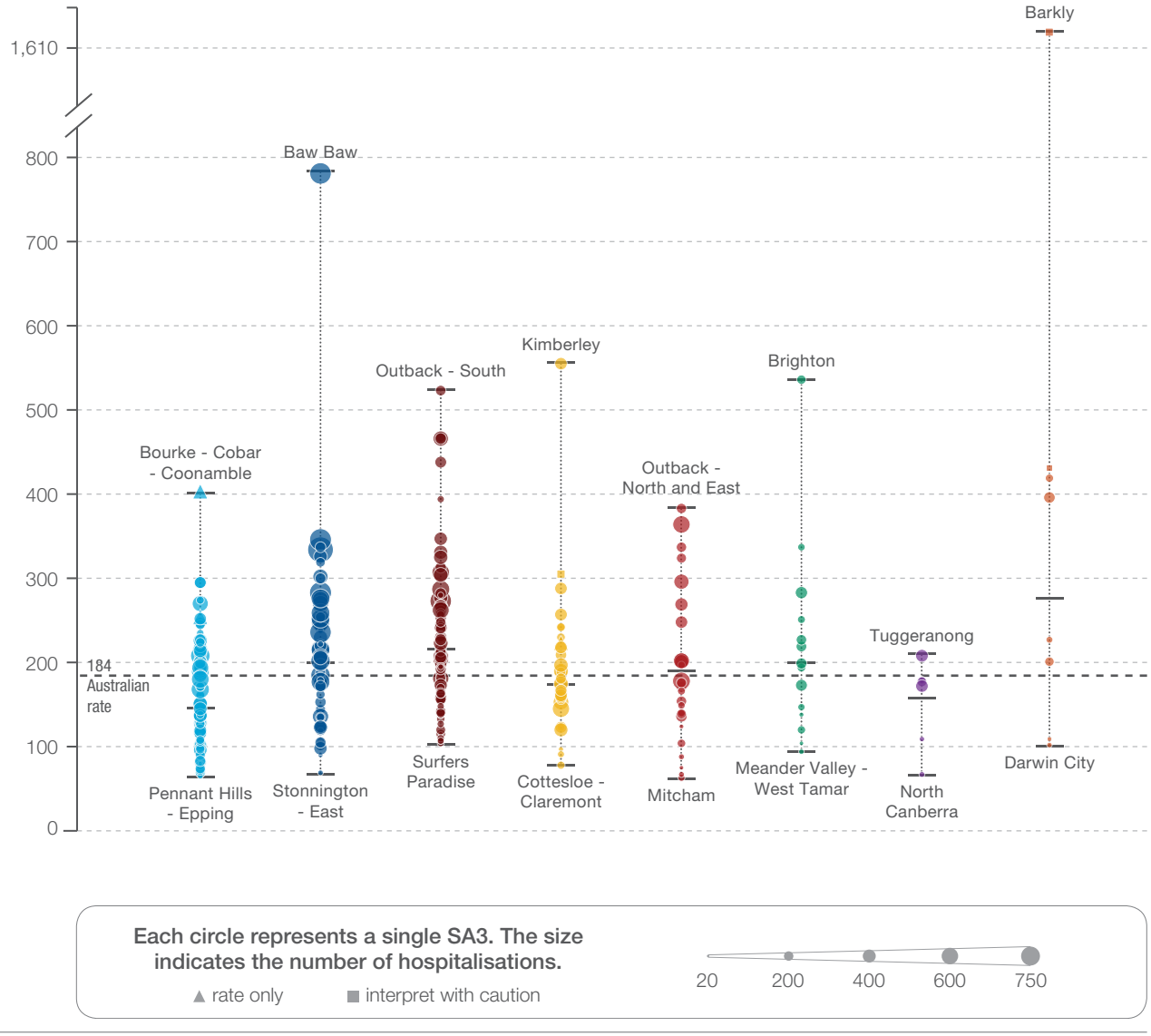
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Diabetes complications

Rates by state and territory

Figure 2.21: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

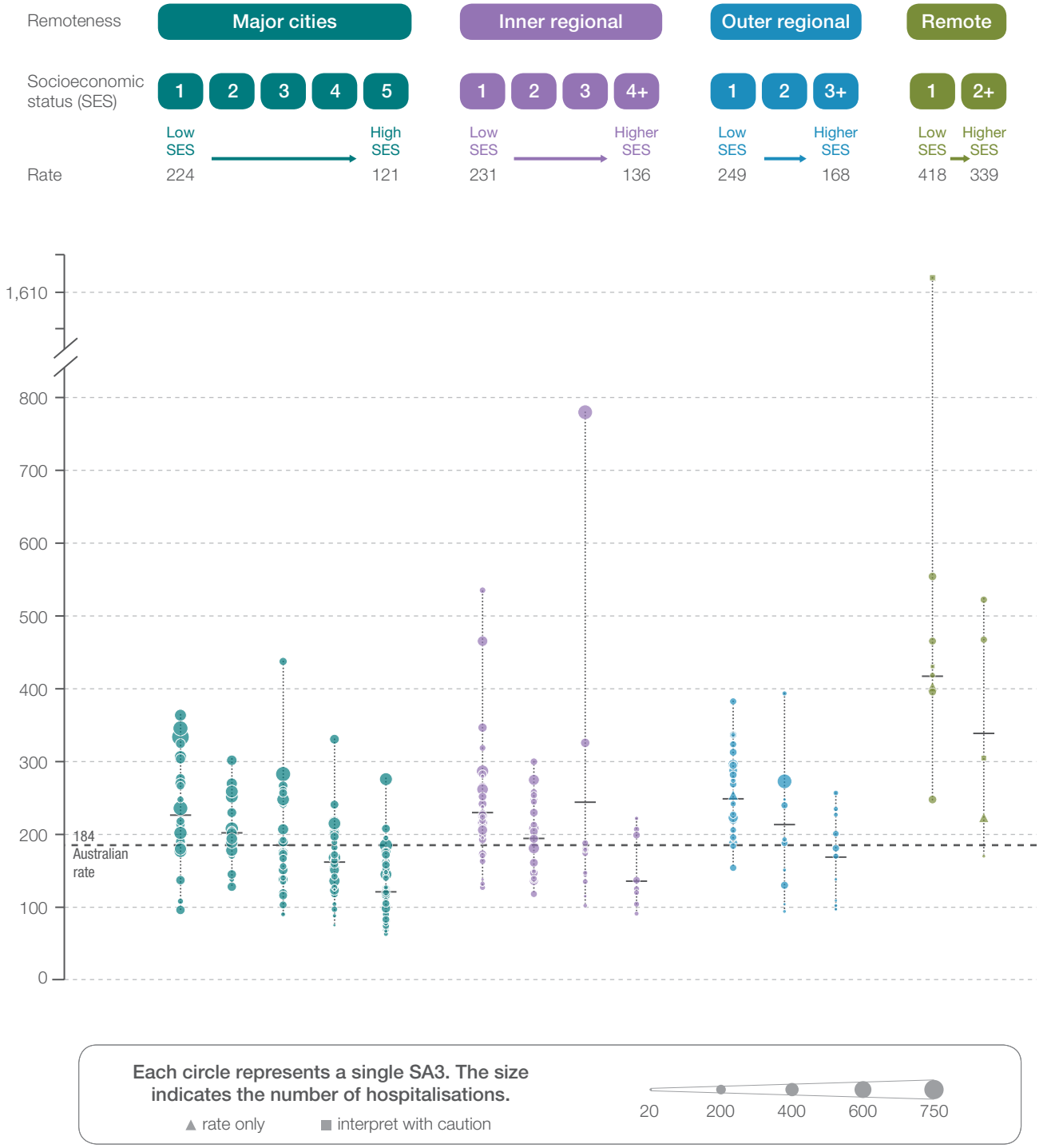
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	404	782	524	556	384	537	209	1,617*
State/territory	147	200	217	175	190	201	159	277
Lowest rate	66	70	105	79	64	95	68	103
No. hospitalisations	13,134	14,004	11,696	4,803	3,850	1,270	649	617



Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

Figure 2.22: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



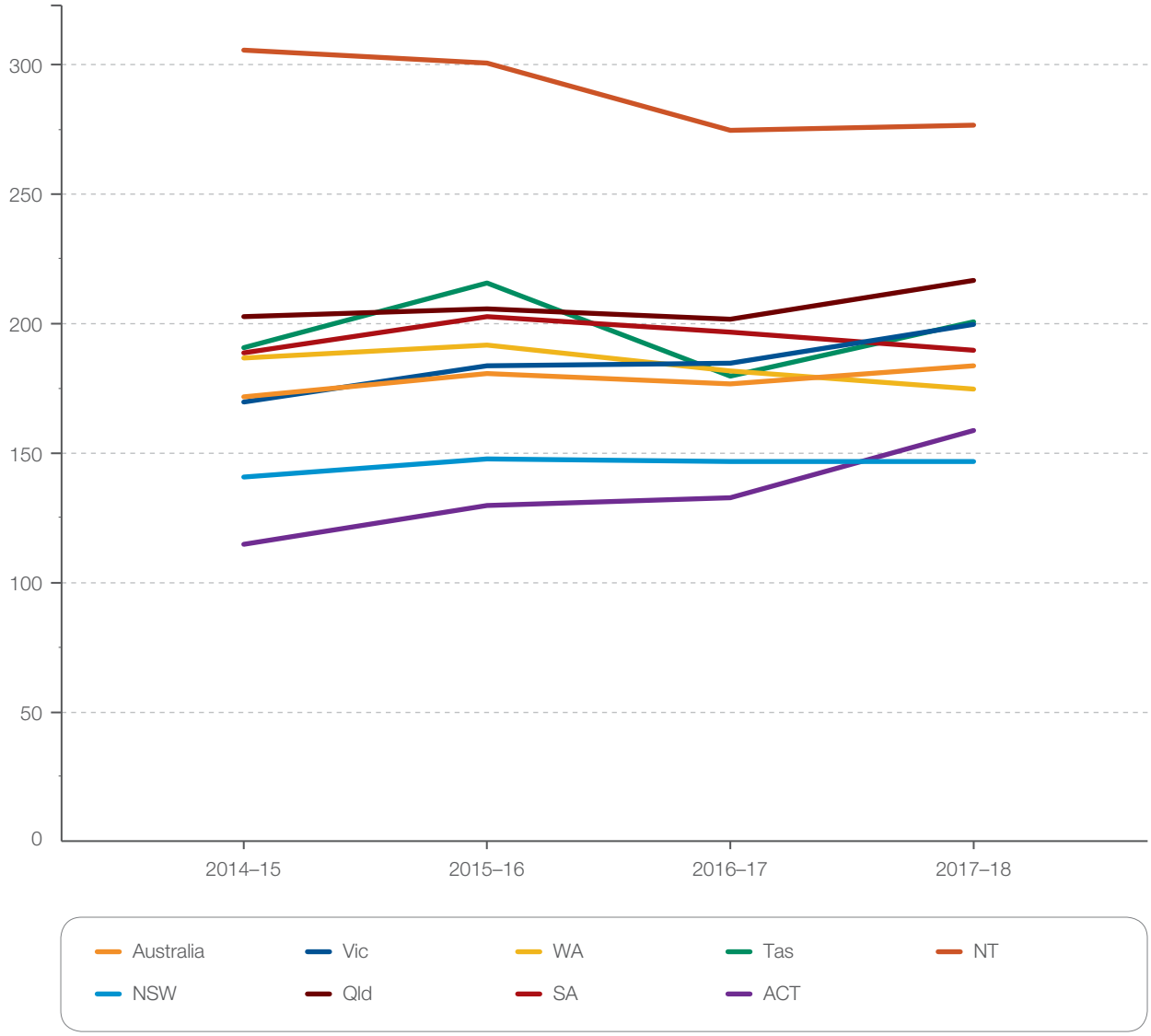
Notes:
Squares (■) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Diabetes complications

Rates across years

Figure 2.23: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, 2014–15 to 2017–18

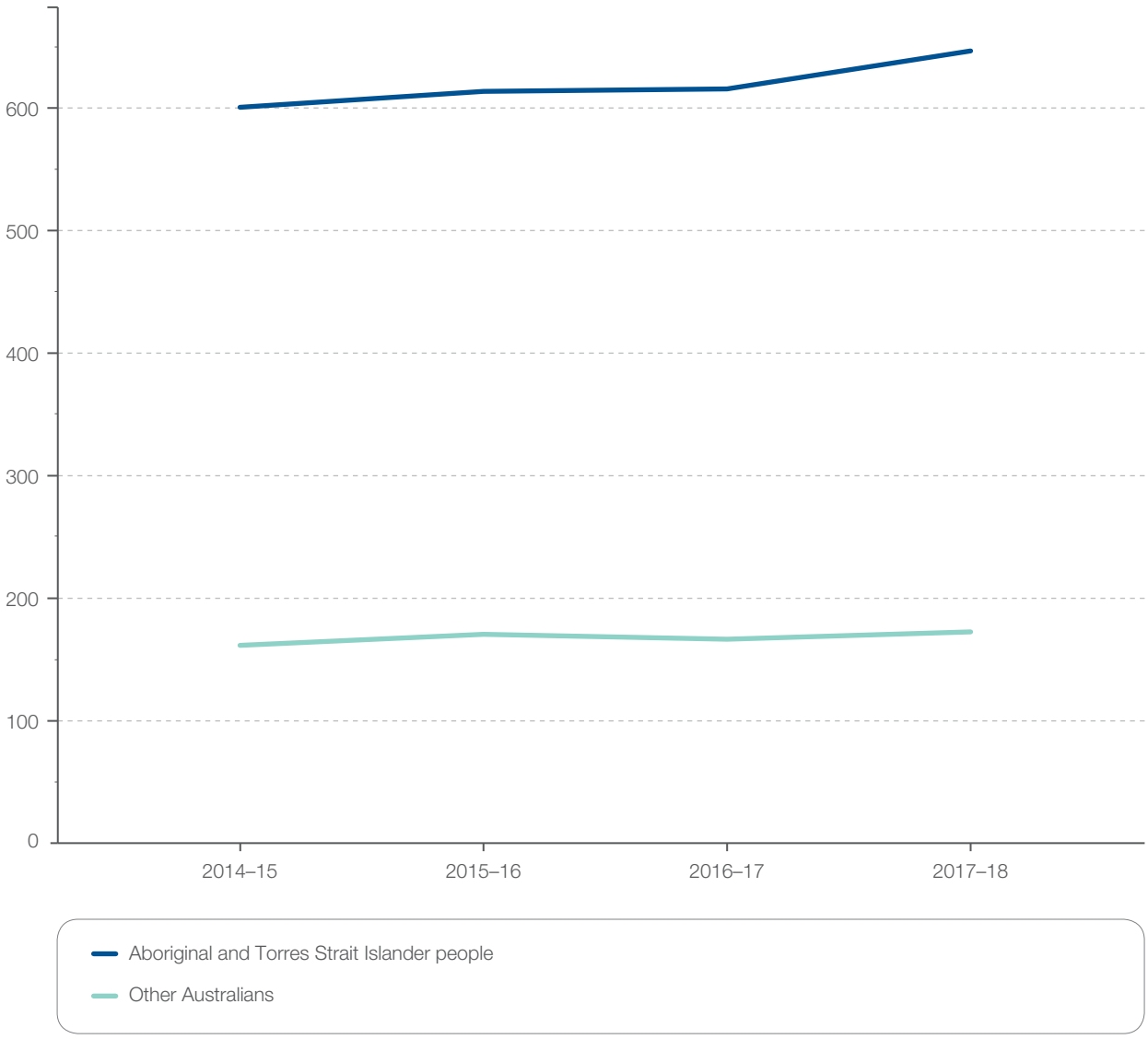
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	2,034*	1,600*	681	1,617*
Australian rate	**172**	**181**	**177**	**184**
Lowest SA3 rate	52	51	46	64
Magnitude of variation	11.8	12.7	14.8	12.2
Magnitude of variation without top & bottom 10% SA3	2.8	2.8	2.8	2.9



Notes:
The asterisks (*) indicate rates that are considered more volatile than others, and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Rates for Aboriginal and Torres Strait Islander people across years

Figure 2.24: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people of all ages, age and sex standardised, by Aboriginal and Torres Strait Islander status, 2014–15 to 2017–18



Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated, with variation among states and territories.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Diabetes complications

Resources

- American Diabetes Association. Standards of medical care in diabetes – 2020[43]
- Type 2 diabetes treatment algorithm[44]
- High risk foot: geographical inequities, importance of different diagnosis groups, forecast hospitalisations and access to services[68]
- Screening, assessment and management of type 2 diabetes mellitus in children and adolescents: Australasian Paediatric Endocrine Group guidelines[69]
- The Royal Australian College of General Practitioners. *Management of type 2 diabetes: A handbook for general practice*. East Melbourne, Vic: RACGP, 2020
- University of Melbourne, Indigenous Eye Health Unit. Check Today, See Tomorrow resource kit. Melbourne: University of Melbourne; 2015
- International Society for Pediatric and Adolescent Diabetes. *ISPAD Clinical Practice Consensus Guidelines 2014*. Berlin: ISPAD; 2014
- *Guidelines on the Prevention and Management of Diabetic Foot Disease*[70]
- UK National Institute for Health and Care Excellence (NICE) guidelines:
  - *Type 2 Diabetes in Adults: Management*, 2016
  - *Diabetes (Type 1 and Type 2) in Children and Young People: Diagnosis and management*, 2016
  - *Type 1 Diabetes in Adults: Diagnosis and management*, 2016
  - *Diabetes in Pregnancy: Management from preconception to the postnatal period*

Australian initiatives

The information in this chapter will complement work already underway to prevent diabetes and improve its management in Australia. At a national level, this work includes:

- Australian National Diabetes Audit
- National Association of Diabetes Centres (NADC) Models of Care toolkit
- NADC *Collaborative Interdisciplinary Diabetes High Risk Foot Services Standards*
- Wellbeing framework for Aboriginal and Torres Strait Islander people living with chronic disease
- KeepSight program
- Australian National Diabetes Strategy 2016–2020
- National Diabetes Services Scheme, including support programs and expansion to subsidise new technologies.

Many state and territory initiatives are also in place, including:

- Move for Diabetes, Australian Capital Territory and NSW
- Diabetes Taskforce, NSW Agency for Clinical Innovation
- Get Healthy Information and Coaching Service, NSW
- Western Sydney Diabetes project, NSW
- Hunter Alliance program, NSW
- Aunty Jean's Good Health Team program, NSW
- NSW Integrated Care trials
- Diabetes across the Lifecourse: Northern Australia Partnership
- Education services for heart disease and diabetes, Northern Territory (NT) and far north Queensland

- Improving Health Outcomes in the Tropical North (HOT North); NT, Queensland and WA
- Structured systems approach to improving health promotion practice for chronic disease prevention in Aboriginal and Torres Strait Islander communities, NT
- HealthLAB project, NT
- Diabetes in Pregnancy Partnership, NT
- Better Living Diabetes Program, Queensland
- Diabetes Queensland Aboriginal and Torres Strait Islander Online Peer Support Program, Queensland
- Improving diabetes care and management in Torres Strait remote primary healthcare settings, Queensland
- Model of Care for People with Diabetes, Darling Downs, Queensland
- Queensland Beacon clinics for integrated diabetes care
- Diabetes Service, Country Health SA, South Australia
- South Australian Aboriginal Diabetes Strategy
- South Australian Health and Medical Research Council Aboriginal and Torres Strait Islander diabetes foot complication prevention program, including the Kimberley Foot Initiative
- COACH Program, Tasmania
- Delivering Connected Care for Complex Patients with Multiple Chronic Needs, Tasmania
- LIFE! program, Victoria
- Combined renal and diabetes integrated care clinics, Victoria
- Royal Flying Doctor Service telehealth endocrinology services, Victoria
- Aboriginal Health Promotion and Chronic Care partnership initiative, Victoria
- Improving Care for Aboriginal and Torres Strait Islander Patients, Victoria
- Hospital Admission Risk Program (HARP), Victoria
- Framework for Action on Diabetes and Diabetes Service Standards, WA
- My Healthy Balance, WA
- Moorditj Djena – Strong Feet, WA
- Diabetes Telehealth Service, WA
- Let's Prevent – diabetes and cardiovascular disease prevention program, WA
- Get on Track Challenge – workplace-based physical activity and nutrition initiative, WA
- Diabetes Education and Self-Management for Ongoing and Newly Diagnosed (DESMOND) for Aboriginal and Torres Strait Islander people, WA
- *High Risk Foot: Geographical inequities, importance of different diagnosis groups, forecast hospitalisations, and access to services*, WA.[68]

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2.4 Kidney infections and urinary tract infections

Why is this important?

Kidney infections and urinary tract infections (UTIs) were the second most common cause of potentially preventable hospitalisations in 2017–18 in Australia.[1] Hospitalisation for UTI often results in the inappropriate use of broad-spectrum antimicrobials, contributing to increased antimicrobial resistance in bacteria.[2]

What did we find?

The rate of hospitalisations for kidney infections and UTIs in 2017–18:

- Varied across states and territories, from 212 per 100,000 people in Tasmania to 559 per 100,000 people in the Northern Territory
- Was higher in remote areas, and increased with socioeconomic disadvantage in inner regional and remote areas
- Was twice as high among Aboriginal and Torres Strait Islander people as among other Australians, nationally (although rates in Tasmania were similar in the two groups).

Between 2014–15 and 2017–18, the rate of hospitalisations for kidney infections and UTIs:

- Decreased in the Australian population as a whole by 1%
- Increased by 3.6% among Aboriginal and Torres Strait Islander people.

What can be done?

The ageing population, and misdiagnosis of asymptomatic bacteriuria as UTI in older people, are likely contributors to the high rates of hospitalisation. Early diagnosis and appropriate antibiotic treatment of UTIs in the community could reduce patient morbidity and the need for hospitalisation. Reducing the misdiagnosis of asymptomatic bacteriuria as UTI could reduce unnecessary hospitalisation of elderly patients, particularly from aged care homes. More accurate diagnosis could also reduce delays in treatment for the true cause of symptoms incorrectly ascribed to UTI.

Implementation of evidence-based guidelines for assessment and treatment of residents of aged care homes with suspected UTI will reduce the inappropriate exposure of these residents to antibiotics, the development of multidrug-resistant organisms and the development of UTIs with antibiotic-resistant organisms (which are more likely to require hospitalisation). Ensuring that people who need a catheter on an ongoing basis or intermittent self-catheterisation have access to community continence services, and are provided with education and resources before discharge, could reduce the incidence of UTIs in this group and the need for readmission.

Kidney infections and urinary tract infections

Context

UTIs are common in the community, accounting for 1.2% of all problems managed in Australian general practice consultations.[3] Kidney infections and UTIs were the second most common cause of potentially preventable hospitalisations in Australia in 2017–18.[4]

Few international rates of hospitalisation for kidney infection and urinary tract infection are available for comparison. Available data suggest kidney infections and UTIs also account for substantial numbers of hospitalisations in other countries. In England, kidney infections and UTIs are the second most common cause of emergency hospital admissions for ambulatory care sensitive conditions.[5] In Ireland, kidney infections and urinary tract infections accounted for 2.6% of all publicly-funded hospital bed days in 2016.[6]

People over 65 years of age had approximately six times the rate of hospitalisation for kidney infections and UTIs, compared to younger people, in Australia in 2017–18.[4] Other countries with ageing populations are also experiencing high numbers of hospitalisations for kidney infections and UTIs among older people; for example, in Ireland people aged 65 years and over accounted for 78% of hospital bed days for kidney infections and UTIs in 2016.[6]

Symptoms of uncomplicated cystitis (infection of the bladder or lower urinary tract) include dysuria, and urinary urgency and frequency.[7] Symptoms of a pyelonephritis (kidney/upper urinary tract infection) include fever, flank pain and costovertebral angle tenderness.[7] Asymptomatic bacteriuria is not considered an infection, and should only be treated in particular circumstances (see 'Asymptomatic bacteriuria' on this page).[7]

Hospital care is required to manage severe kidney infection or UTI with sepsis, persistently high fever, pain, marked physical weakness, or inability to take oral medications or fluid.[8] Hospital care is also warranted when urinary tract obstruction is suspected.[8] Among people hospitalised for UTI, diabetes significantly increases the risk of death.[9]

People with diabetes also have poorer outcomes from pyelonephritis, and have a significantly higher rate of treatment failure than people without diabetes.[10]

UTI with multidrug-resistant organisms is a growing problem, and increases the need for hospital treatment. Inappropriate use of antimicrobials for UTIs adds to the spread of antimicrobial resistance (see page 141).

Asymptomatic bacteriuria

The presence of bacteria in an appropriately collected urine specimen from a person without symptoms of UTI is termed asymptomatic bacteriuria.[11] It is common, and most patients with asymptomatic bacteriuria experience no adverse consequences and do not benefit from antimicrobial therapy.[11] Antimicrobials are often prescribed inappropriately for treatment and prophylaxis of asymptomatic bacteriuria in Australian residents of aged care homes (see 'Over-diagnosis of UTI' on page 139).[11]

Treatment for asymptomatic bacteriuria is recommended only in pregnancy and before invasive urological procedures.[11] Pregnant women should be screened and, if necessary, treated for asymptomatic bacteriuria because it may increase the risk of preterm birth, low birthweight and pyelonephritis.[12]

Risk factors for kidney infections and UTIs include:

- Female gender[7]
- Diabetes[13]
- Bladder dysfunction[7]
- Sexual activity[7]
- Use of spermicides
- Urinary catheterisation
- Decline in functional status in elderly institutionalised women.[7]

See page 141 for further discussion of risk factors.

Kidney infections and UTIs among Aboriginal and Torres Strait Islander people

Aboriginal and Torres Strait Islander people, particularly women, have much higher rates of kidney infections and UTIs than other Australians. Screening, treatment and follow-up of these infections among Aboriginal and Torres Strait Islander people is often inadequate.[14] This can have serious consequences, including poorer pregnancy outcomes, acute kidney injury and chronic kidney disease.[15-17]

Severe UTIs are highly prevalent among Aboriginal and Torres Strait Islander people living in remote communities.[18] Recent research in Aboriginal and Torres Strait Islander communities in north Queensland has shown that an extremely high background rate of community-acquired kidney infections and UTIs, and a high prevalence of type 2 diabetes, lead to excess hospitalisation for these infections.[18] UTI was the second most common cause of hospitalisation for infection, and cellulitis was the most common cause, in this study.[18]

UTI can contribute to acute kidney injury, which, if untreated, increases the risk of chronic kidney disease and end-stage renal disease.[15,16] The rate of end-stage renal disease in Aboriginal and Torres Strait Islander people is 7 times as high as that in other Australians.[1] Chronic kidney disease was responsible for 2% of the Aboriginal and Torres Strait Islander burden of disease in 2011.[19]

Factors contributing to poor health, including kidney infections and UTIs, among Aboriginal and Torres Strait Islander people are complex. They include a combination of broad historical, social, cultural and economic factors, as well as biomedical risk factors.[20] For example, traditional active lifestyles and healthy diets of Aboriginal and Torres Strait Islander people have been affected by displacement and colonisation by European settlers.[20]

Kidney infections and UTIs among older people

The rate of hospitalisations for kidney infections and UTIs is about 5 times higher for people over 65 years of age than for younger adults in Australia.[4] Frail, elderly people with functional decline leading to diminished ability to manage their hygiene needs are particularly susceptible to UTIs and the effects of these infections, and minor exacerbations can necessitate hospital admission. However, misdiagnosis of UTI is common in elderly people (see 'Over-diagnosis of UTI' on page 139).

About the data

All hospitalisations with a principal diagnoses of urinary tract infection are included.

Data are sourced from the National Hospital Morbidity Database and include admitted patients in both public and private hospitals, as well as Hospital in the Home care.

Rates are based on the number of hospitalisations for kidney infections and/or UTIs per 100,000 people of all ages in 2017–18.

Because a record is included for each hospitalisation for the conditions, rather than for each patient, patients hospitalised for the conditions more than once in the financial year will be counted more than once.

The analysis and maps are based on the usual residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

Kidney infections and urinary tract infections

What do the data show?

Magnitude of variation

In 2017–18, there were 76,854 hospitalisations for kidney infections and UTIs, representing 281 hospitalisations per 100,000 people of all ages (the Australian rate).

The number of hospitalisations for kidney infections and UTIs across 326* local areas (Statistical Area Level 3 – SA3) ranged from 141 to 893 per 100,000 people. The rate was **6.3 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 212 per 100,000 people in Tasmania to 559 in the Northern Territory (Figures 2.27–2.30).

After the highest and lowest 10% of results were excluded and 261 SA3s remained, the number of hospitalisations per 100,000 people was 2.3 times as high in the area with the highest rate compared with the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates of hospitalisations for kidney infections and UTIs were substantially higher in remote areas than in other areas. Hospitalisation rates also increased with socioeconomic disadvantage in inner regional and remote areas (Figure 2.31).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander people (581 per 100,000 people) was 2.1 times as high as the rate for other Australians (274 per 100,000 people) (Figure 2.25). However, rates in Tasmania were similar in the two groups.

Figure 2.25: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2017–18†

The data for Figure 2.25, and the data and graphs for Analysis by PHN are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, data were suppressed for 14 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

† Data for ACT (Aboriginal and Torres Strait Islander people) have been suppressed. Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated, with variation among states and territories.

Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.

For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Trends over time

Between 2014–15 and 2017–18, the rate of hospitalisations for kidney infections and UTIs per 100,000 people decreased by 1% in the population as a whole (Figure 2.32).

Since June 2017, emergency department–only episodes in New South Wales have not been counted as hospitalisations, and this will affect the time trends described above.

For Aboriginal and Torres Strait Islander people, the rate of hospitalisations for kidney infections and UTIs per 100,000 people nationally increased by 3.6% between 2014–15 and 2017–18 (Figure 2.33).

Interpretation

Potential reasons for the variation include geographical differences in

- Demographic and consumer factors
  - clustering of populations with a high risk of UTIs, such as residents of aged care homes[21], people with type 2 diabetes and people with socioeconomic disadvantage
  - populations with poor diabetes control
  - access to medicines, including affordability
  - incidence of infection with multidrug-resistant extended-spectrum β-lactamase-producing bacteria
  - rates of urological procedures, such as stent insertion
- Clinician factors
  - diagnostic error, leading to over- or under-diagnosis
  - adherence to evidence-based guidelines, including choice of antimicrobial and length of treatment
- Health system factors
  - use of emergency department short-stay units, where a patient stay is counted as a hospitalisation rather than an emergency department–only visit
  - implementation of hospital avoidance schemes
  - access to primary care, including availability, acceptability and affordability
  - access to community services
  - access to information about self-management at an appropriate health literacy level and in languages other than English
  - access to, and availability of, culturally appropriate health care for Aboriginal and Torres Strait Islander people
  - antimicrobial stewardship interventions.

Kidney infections and urinary tract infections

Variations between areas may not directly reflect the practices of the clinicians who are based in these areas. Area boundaries reflect where people live rather than where they obtain their health care. Patients who live in metropolitan, regional and rural areas may all travel outside their local areas to receive care.

Access to primary care is likely to affect hospitalisation rates for kidney infections and UTIs. Barriers to access include distance, lack of transport, cost, and a lack of health services that provide culturally appropriate care for Aboriginal and Torres Strait Islander people, and people from other culturally and linguistically diverse backgrounds.

Low health literacy is also a barrier to seeking care and managing treatment effectively. Inability of people with cognitive impairment, such as some residents of aged care homes, to communicate symptoms may contribute to delays in obtaining care.

Addressing variation

UTI treatment with broad-spectrum antimicrobial agents contributes to bacterial resistance, making the management of subsequent UTIs more difficult.[2] Antimicrobials remain the recommended treatment for UTIs, but including other prevention measures could reduce the incidence of UTIs, the use of antimicrobials and the development of resistance.[2] Prevention should follow this order:

- Counselling about reducing modifiable risk factors (see below)
- Non-antimicrobial measures
- Antimicrobial prophylaxis.[2]

Identification and management of risk factors such as vaginal infections, use of spermicides and atrophic vaginitis due to oestrogen deficiency could reduce the rate of UTIs and the need for antimicrobials.[2] Increasing access to health care for people with anatomical abnormalities of the urinary tract could also reduce the rate of UTIs among this group of patients.

Over-diagnosis of UTI

Although elderly people are at higher risk of UTIs, over-diagnosis of UTIs is also common in this group.[22] Our ageing population, and misdiagnosis of asymptomatic bacteriuria as UTI in older people, are likely contributors to the high rates of hospitalisation reported in this chapter. An incorrect diagnosis of UTI in an elderly person has several negative consequences, including not identifying or treating the actual cause of their symptoms and increasing the risk of subsequent infection with antimicrobial-resistant organisms after treatment with an unnecessary antimicrobial. Difficulties in accurate diagnosis of UTIs in older people include:

- High rates of asymptomatic bacteriuria, which can lead to a positive urine dipstick result and misinterpretation as a UTI
- Lack of a fast, accurate test that distinguishes asymptomatic bacteriuria from active infection
- Comorbidities, such as cognitive impairment, that impede assessment.[23]

Review of patient notes in a United Kingdom (UK) hospital study found that 43% of patients over 75 years of age who were given a diagnosis of UTI did not meet diagnostic criteria.[22] Of the patients incorrectly diagnosed with UTI, 37% had asymptomatic bacteruria.[22] Guidelines recommend against treating asymptomatic bacteruria, except in pregnancy and before some urological procedures.[12] Asymptomatic bacteriuria affects approximately 19% of women and 9% of men over 80 years of age[24], and can lead to a positive urine dipstick result in the absence of a UTI. A positive urinalysis result is not a reliable method for identifying UTI in elderly emergency department patients.[25]

Time pressure in hospital emergency departments may contribute to over-diagnosis of UTIs in elderly people. UK emergency department staff interviewed for a qualitative study said that quickly diagnosing UTI by urine testing was a method of securing hospital admission.[26] One staff member commented that she needed 'to find a cause to admit somebody to hospital when we think they are not right to go home, we've only got so much time to make the decision … so that's what I'm going to come up with'.[26]

Reducing over-diagnosis in elderly people

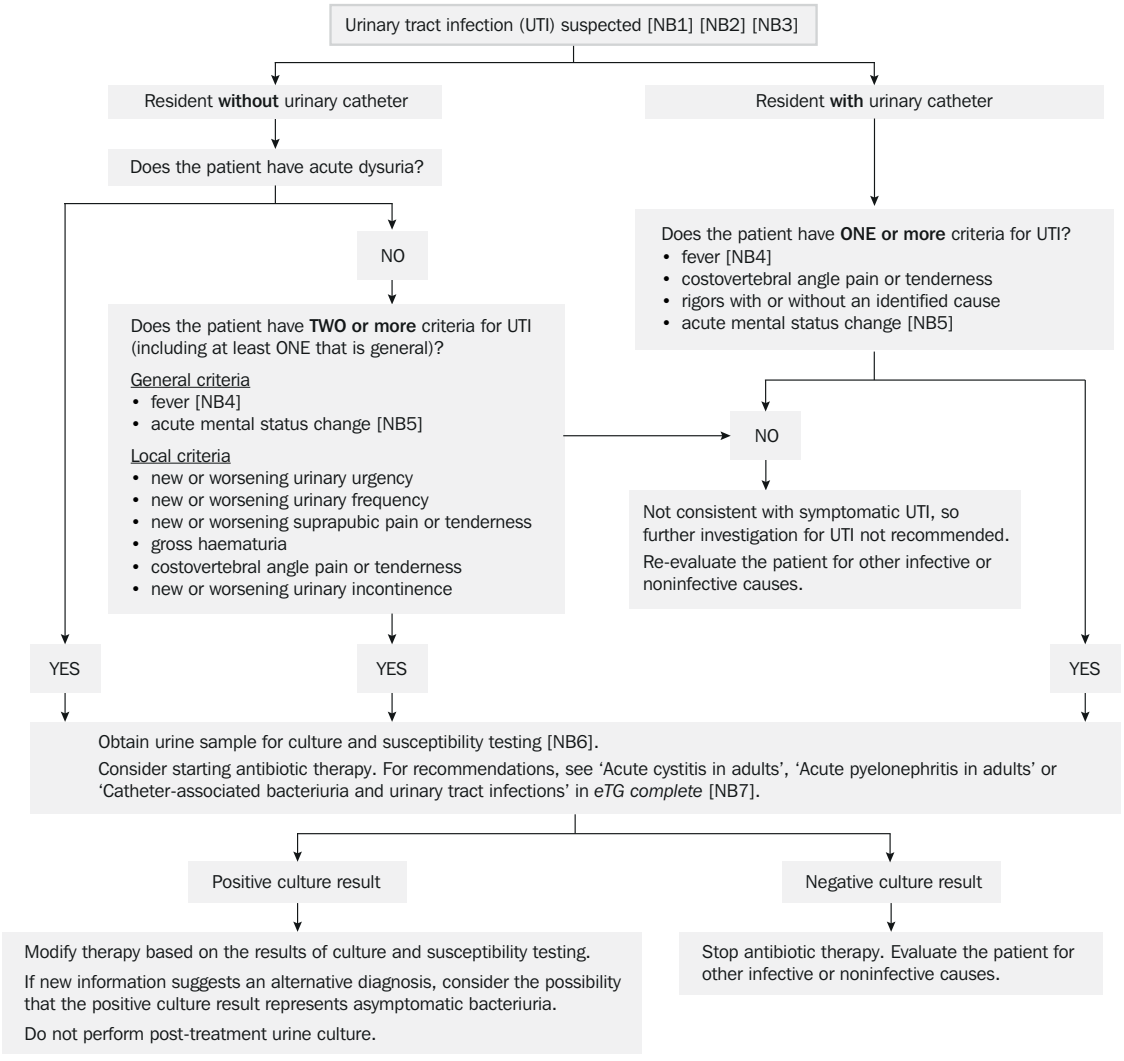
Strategies to reduce over-diagnosis of UTIs in elderly people include selective use of urine testing in emergency departments, and only after considering the probability of UTI based on history and examination.[23] Ensuring midstream clean-catch urine collection, or using an in/out catheter if necessary, will increase the accuracy of urine tests, as will removal of a long-term indwelling catheter and insertion of a fresh catheter before collecting urine samples.[23] Following Australian guidelines on assessment and treatment of residents of aged care homes with suspected UTI could also increase diagnostic accuracy in this group (see Figure 2.26 on page 140).[11,23]

Kidney infections and urinary tract infections

Figure 2.26: Flowchart on assessment and treatment of aged-care facility residents with suspected urinary tract infection[12]

Therapeutic Guidelines

Assessment and treatment of aged-care facility residents with suspected urinary tract infection



NB1: Do not investigate or treat cloudy or malodorous urine in aged-care facility residents who do not have other signs or symptoms of UTI.
NB2: Consider whether an alternative diagnosis is likely. Consider both infective (e.g. pneumonia) and non-infective (e.g. medication-related adverse events) causes.
NB3: Establish whether an advance care plan is in place as it may influence assessment and management (e.g. whether investigations are performed or antibiotics are given).
NB4: Fever is defined as a temperature higher than 38°C or an increase of more than 1.5°C above baseline temperature.
NB5: Acute mental status changes include new change in level of consciousness, periods of altered perception, disorganised speech and lethargy.
NB6: If the resident has an indwelling urinary catheter, see *eTG complete* for a guide to collecting urine samples in patients with indwelling urinary catheters.
NB7: The duration of therapy does not need to be modified for this patient group and should always be stated on the prescription.

Reproduced with permission from Urinary tract infection in aged-care facility residents [published 2019 Apr]. In: eTG complete [digital]. Melbourne: Therapeutic Guidelines Limited; 2020. tgldcdp.tg.org.au/searchAction?appendedInputButtons=Urinary%20tract%20infection%20in%20aged-care%20facility%20residents

Healthcare-associated UTIs

UTIs are a common healthcare-associated infection. Many are associated with indwelling urinary catheters.[27] Note that a UTI acquired during a hospital admission for another reason would not be counted in the data presented in this chapter, but a readmission to manage the UTI would be counted. In Australia in 2017–18, there were 5,362 unplanned readmissions for UTI within 28 days of discharge from a public hospital (excluding Western Australia).[28] This figure includes unplanned readmissions after initial admission for any reason, and includes readmissions to the same hospital only.

Approximately 1.7% of patients who were hospitalised for more than two days acquired a UTI, according to a study of eight Australian hospitals.[27] The estimated extra length of stay due to these healthcare-associated UTIs was four days.[27]

Contributing factors that must be considered include whether indwelling urethral catheterisation is necessary, duration of the indwelling catheter, and how the catheter is inserted.[7] Intermittent clean catheterisation should be considered in many people in both inpatient and outpatient settings to prevent catheter-associated UTIs. Reducing the proportion of patients with an indwelling catheter will reduce the incidence of UTIs and the likelihood of re-presentation to hospital with that UTI because of diagnostic failure or inadequate treatment before discharge.

Impact of antimicrobial-resistant bacteria

Increasing incidence of multidrug-resistant extended-spectrum β-lactamase-producing bacteria in Australia will contribute to increasing rates of hospitalisation for UTIs that do not respond to initial treatment, and longer hospital stays due to more complex treatment. Australian guidelines have been updated in light of growing antibiotic resistance.[12]

If possible, the susceptibility of organisms recently identified in patient samples should guide antimicrobial choice.[12] Trimethoprim continues to be recommended as empirical oral antimicrobial therapy for acute cystitis, but not for non-severe pyelonephritis because it is a more serious infection with a higher risk of adverse outcomes with treatment failure.[12] Amoxicillin–clavulanic acid has an unnecessarily broad spectrum of activity for empirical therapy of cystitis (that is, treatment before the responsible organism is known), and increases the risk of selecting for antimicrobial-resistant organisms.[12,29]

People with renal failure may be less likely to receive targeted antimicrobial agents because of concerns about renal function, and may receive antimicrobials that have less reliable effectiveness (for example, cefalexin, ceftriaxone). For patients in remote areas with renal failure, delays in receiving microbiology study results may add to the barriers to receiving effective treatment.

Risk factors for UTIs with multidrug-resistant bacteria include recent overseas travel, previous exposure to antimicrobials and living in an aged care home.[30] Urine culture before starting treatment is advisable for patients with any of these risk factors to guide antimicrobial choice.[30]

Kidney infections and urinary tract infections

Reducing UTIs among Aboriginal and Torres Strait Islander people

Developing culturally appropriate and accessible information in partnership with Aboriginal and Torres Strait Islander communities could reduce the impact of UTIs in these groups.[31] This should include information emphasising the importance of prompt medical attention for symptoms of UTI to minimise the risk of acute kidney injury and subsequent chronic kidney disease.[31]

Improving access to culturally safe care may increase the early detection and treatment of UTIs in Aboriginal and Torres Strait Islander people. Strengthening the capacity of the Aboriginal Community Controlled Health Service sector and improving the cultural safety of mainstream services are both important elements. Improving access for Aboriginal and Torres Strait Islander mothers to culturally safe models of maternity care may improve detection and treatment of UTIs in pregnancy in this group.[32] See page 60 for examples of successful strategies for improving antenatal care for Aboriginal and Torres Strait Islander mothers.

Reducing risk factors for diabetes could reduce the rate of UTIs among Aboriginal and Torres Strait Islander people, as diabetes increases the risk of UTI. Diabetes prevalence is strongly related to social disadvantage among Aboriginal and Torres Strait Islander people, and the underlying social determinants of health need to be considered to address the increasing rate of diabetes.[33] The logistical and financial barriers to accessing health care for Aboriginal and Torres Strait Islander people living in remote areas also need to be addressed.

Preventing recurrent UTIs

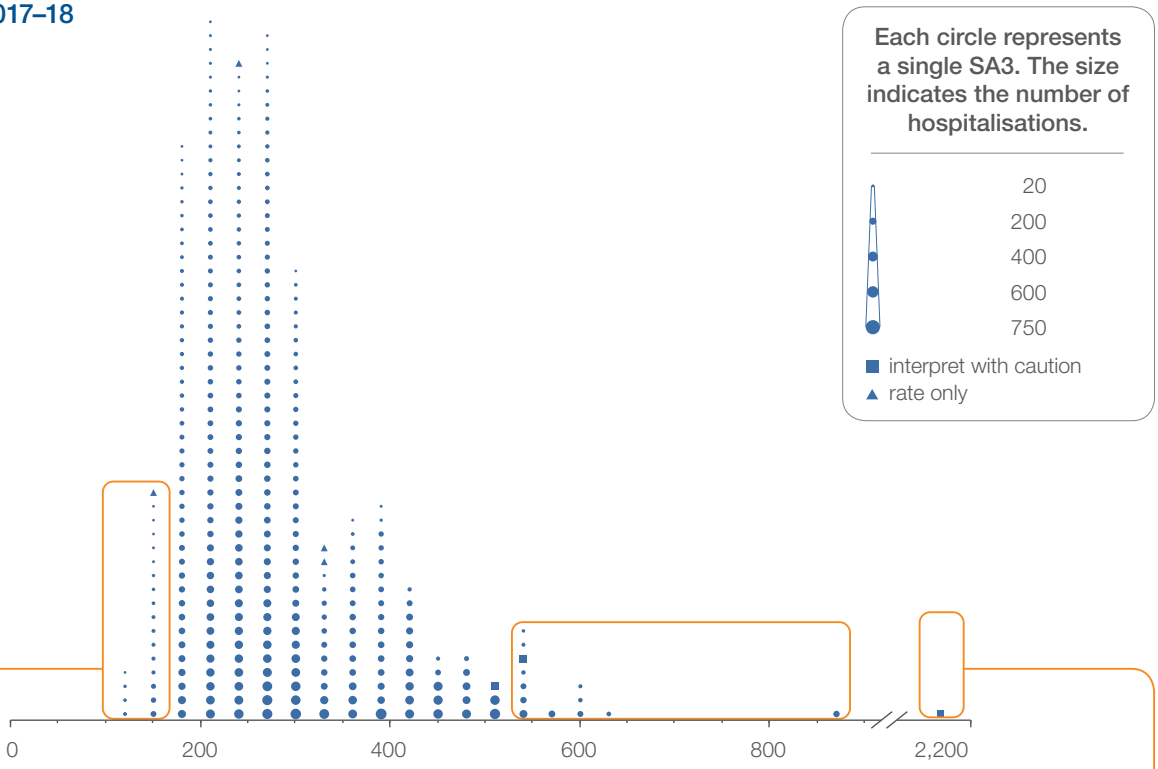
Recurrent UTIs account for a substantial number of infections, and prophylaxis may be appropriate for certain groups of patients after evaluation for contributing factors.[12] Patient-initiated treatment with antimicrobials at the onset of symptoms may also be appropriate for women who have frequent symptomatic UTIs, and this approach reduces overall antimicrobial use compared with prophylaxis.[12]

On discharging older patients from hospital with a diagnosis of UTI, communication to general practitioners emphasising recommendations to reduce the risk of recurrent UTIs may reduce the need for future hospitalisations.[23] In postmenopausal women, vaginal oestrogen may reduce recurrences of UTIs. Increasing water intake may reduce recurrences in premenopausal women.[12]

The evidence for cranberry products to prevent UTIs is conflicting. A meta-analysis published in 2017 concluded that cranberry products significantly reduce the risk of UTIs.[34] Another meta-analysis published in 2012 reported a non-significant trend to fewer UTIs; this review also commented that the high withdrawal rate in trials suggests that use of cranberry products may not be an acceptable intervention for some patients.[35] There is not enough high-quality evidence to determine whether probiotics are effective for preventing UTIs.[36]

Rates by local area

Figure 2.27: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Norwood - Payneham - St Peters	SA	141	77
Pennant Hills - Epping	NSW	142	86
Burnside	SA	148	100
Adelaide City	SA	148	38
Huon - Bruny Island	Tas	152	38
Manningham - West	Vic	158	224
Esperance	WA	158	n.p.
Port Stephens	NSW	161	165
Glenelg - Southern Grampians	Vic	164	74
Macedon Ranges	Vic	165	55
Hobart Inner	Tas	166	104
Augusta - Margaret River - Busselton	WA	168	102
Great Lakes	NSW	169	88
Kiama - Shellharbour	NSW	170	185
Queanbeyan	NSW	171	99
Hawkesbury	NSW	171	40
Heathcote - Castlemaine - Kyneton	Vic	175	109
Armidale	NSW	175	79
Taree - Gloucester	NSW	176	110
Sorell - Dodges Ferry	Tas	178	35
Dural - Wisemans Ferry	NSW	179	56

Highest rate areas

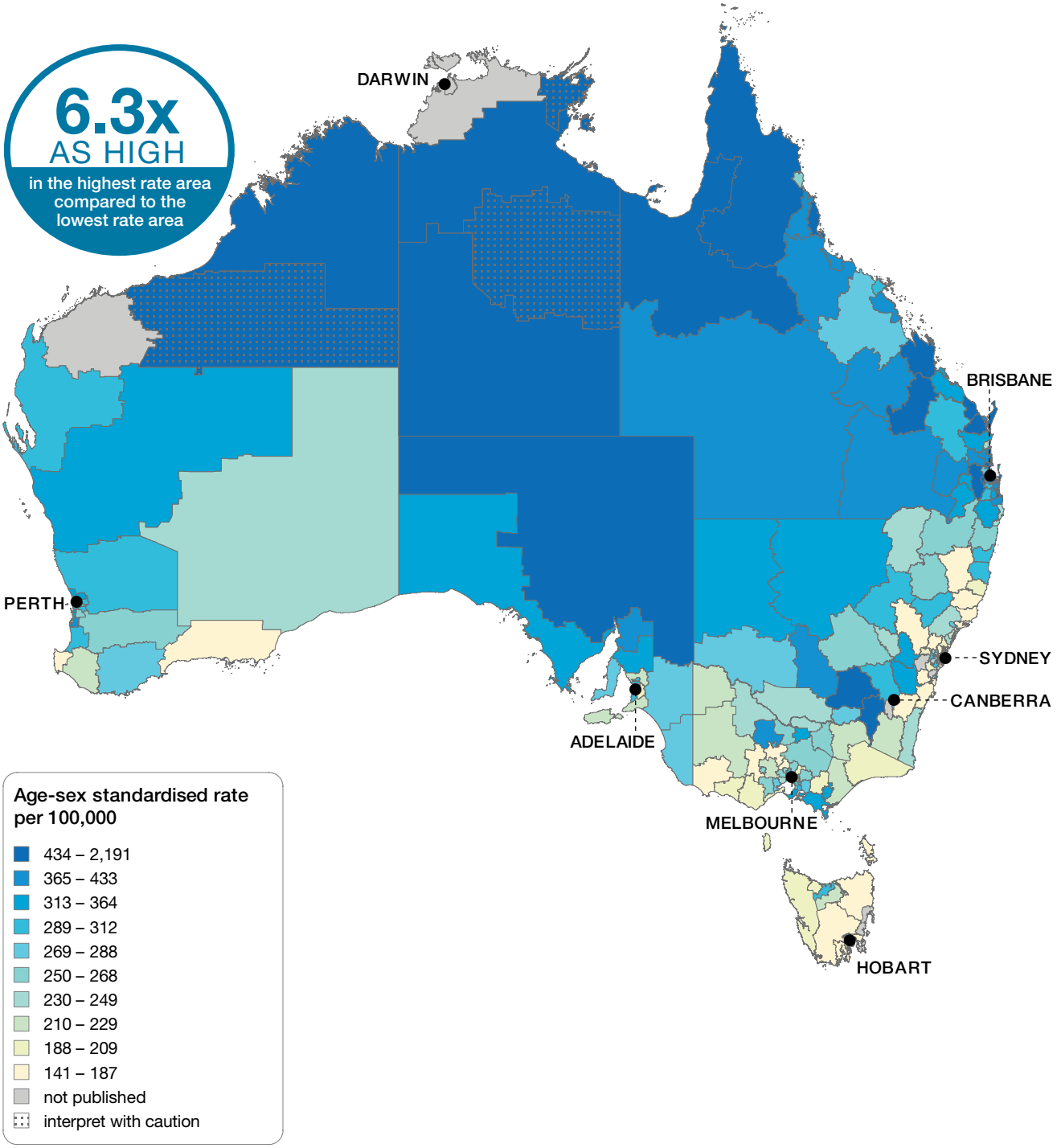
SA3	State	Rate	Hospitalisations
Barkly	NT	2,191*	65
Kimberley	WA	893	263
Palmerston	NT	655	145
Alice Springs	NT	620	232
Outback - North	Qld	606	131
Katherine	NT	604	109
Maryborough	Qld	583	301
Caboolture	Qld	565	411
Innisfail - Cassowary Coast	Qld	562	226
Darwin Suburbs	NT	561	265
East Pilbara	WA	559*	105
Biloela	Qld	552	79
Darwin City	NT	540	127
Tumut - Tumbarumba	NSW	540	104

Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published (n.p.) for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Kidney infections and urinary tract infections

Rates across Australia

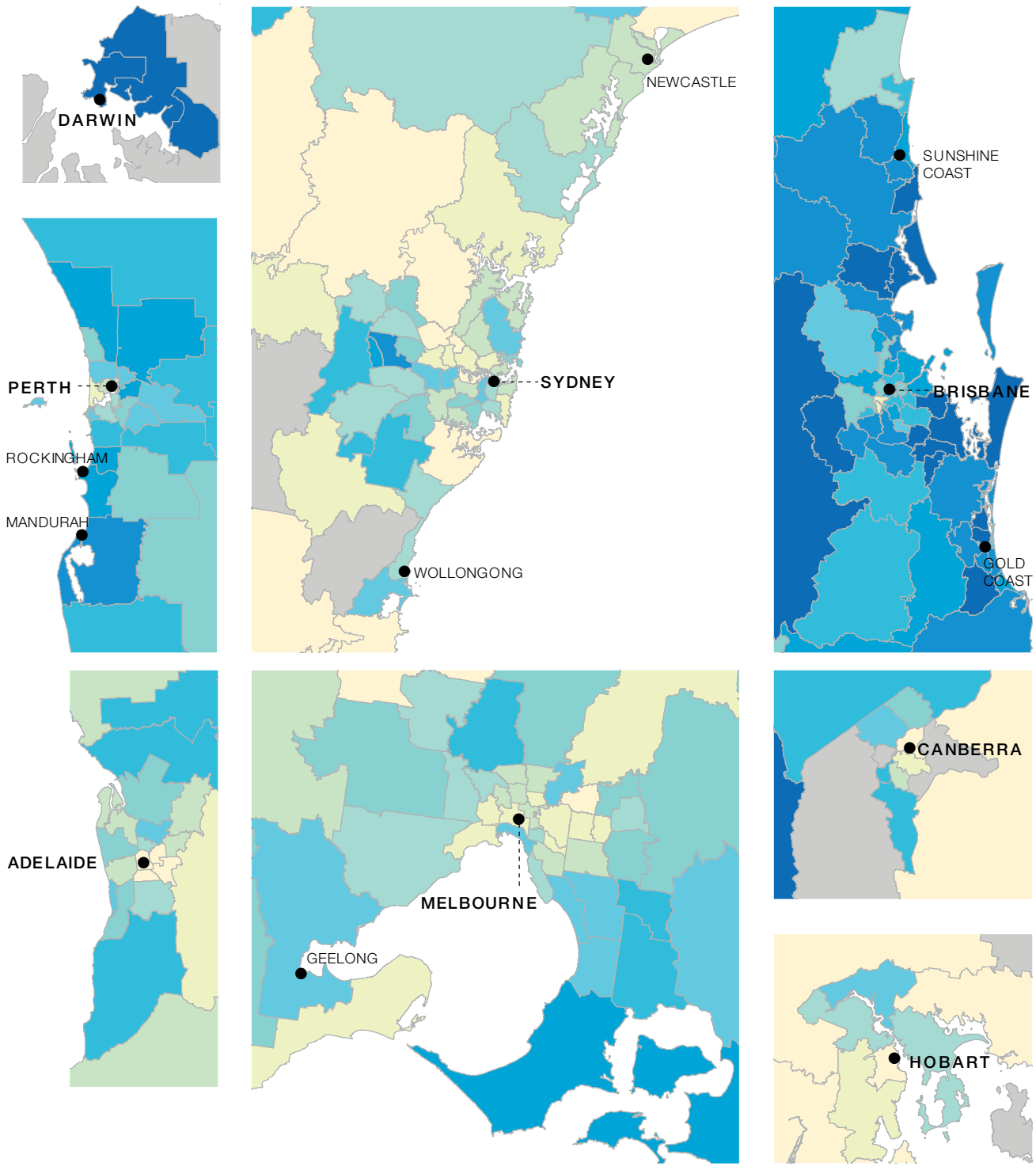
Figure 2.28: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates across capital city areas

Figure 2.29: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Notes:
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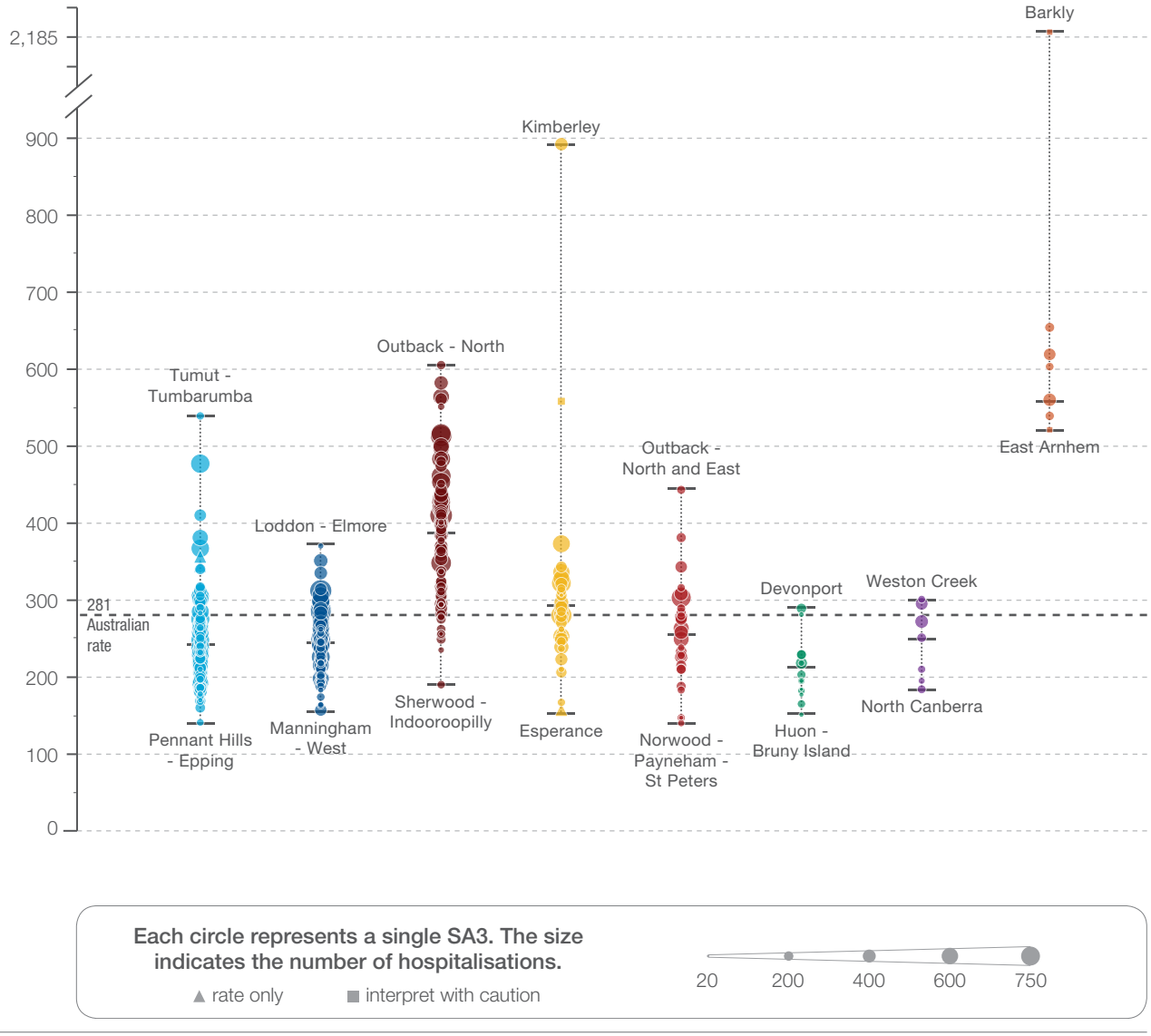
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Kidney infections and urinary tract infections

Rates by state and territory

Figure 2.30: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

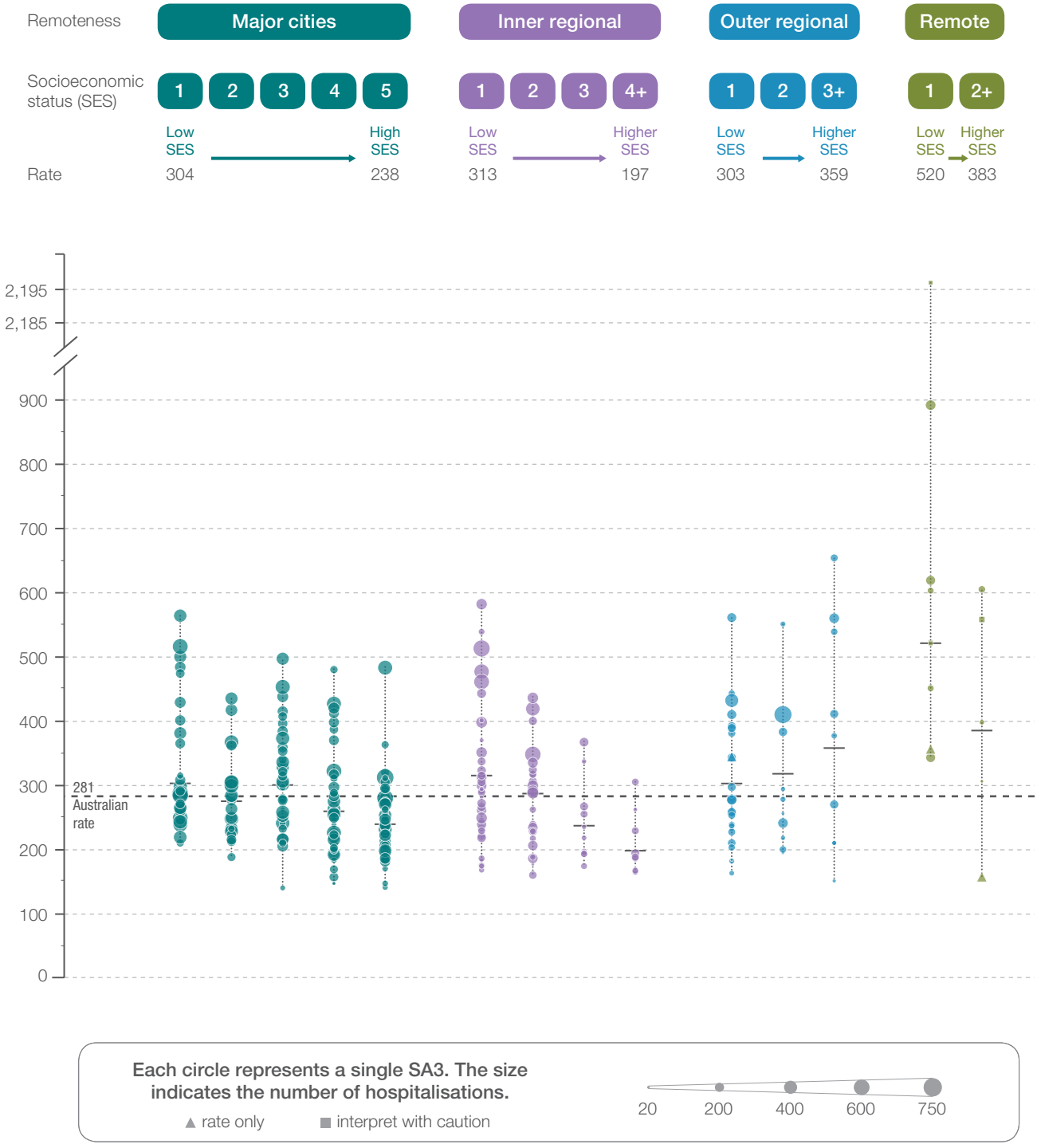
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	540	371	606	893	444	290	302	2,191*
State/territory	241	244	386	291	256	212	248	559
Lowest rate	142	158	191	158	141	152	185	522*
No. hospitalisations	21,738	17,215	20,603	7,867	5,417	1,300	1,034	1,108



Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

Figure 2.31: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



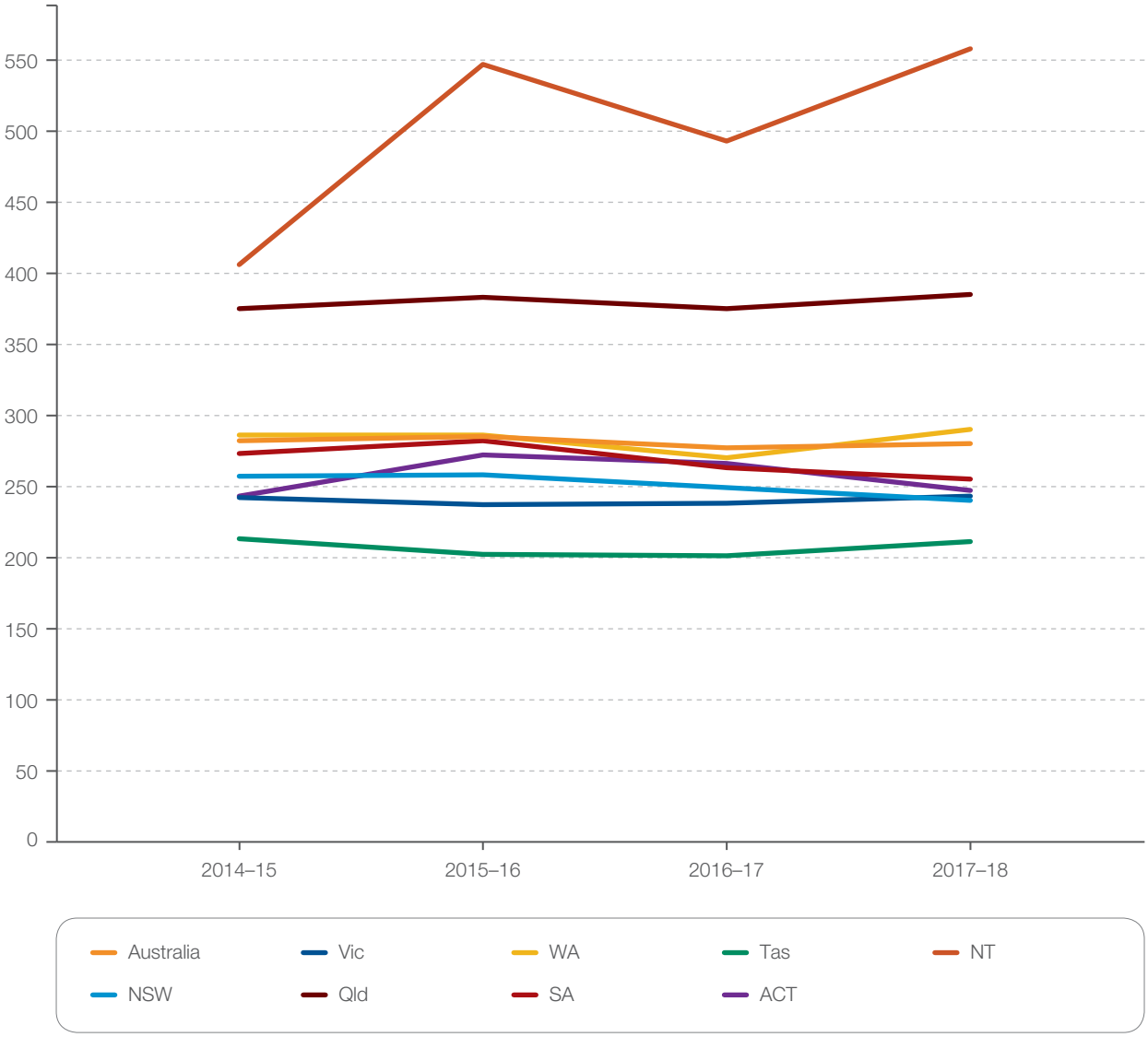
Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Kidney infections and urinary tract infections

Rates across years

Figure 2.32: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, 2014–15 to 2017–18

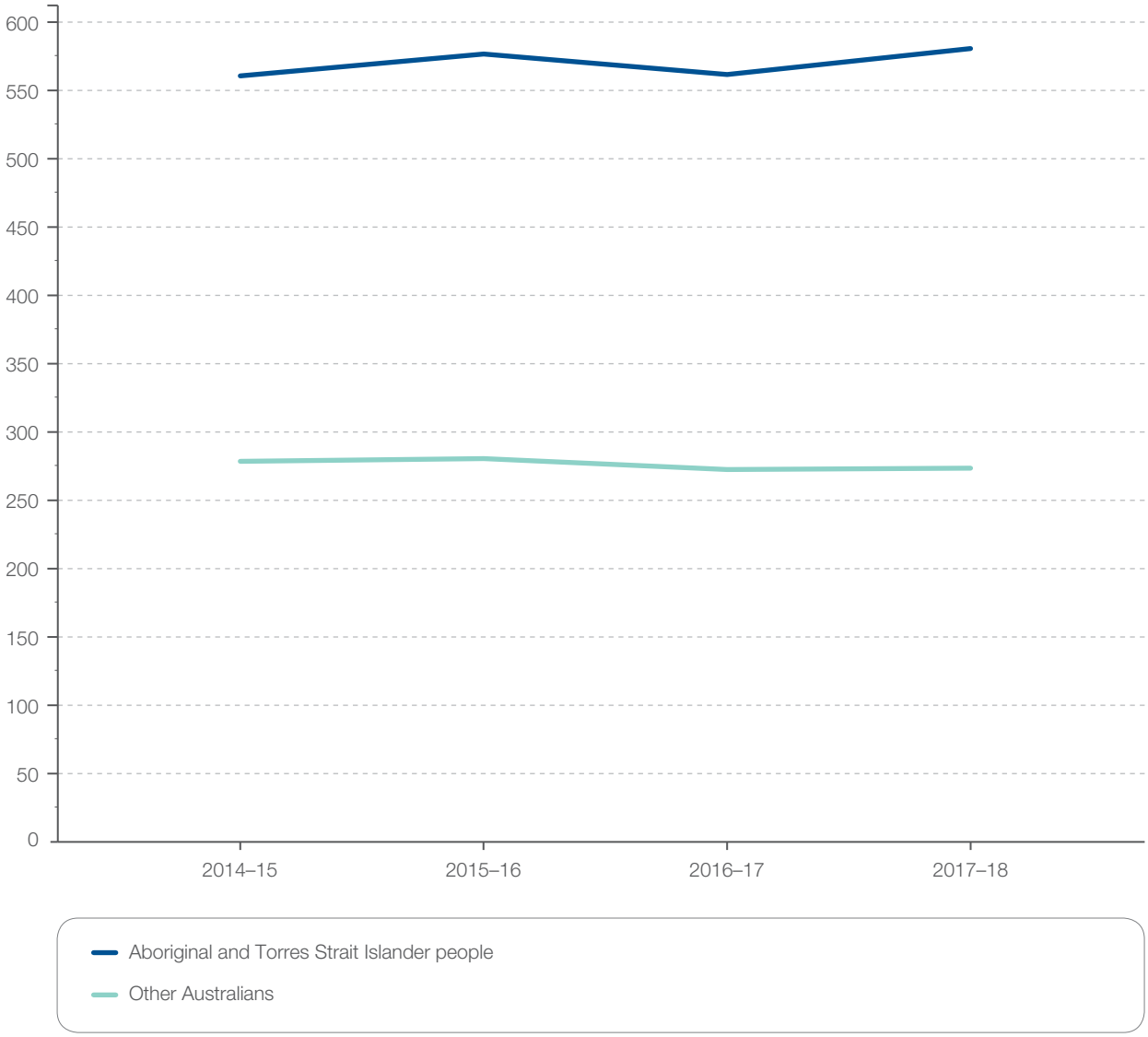
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	1,097*	1,445*	1,041*	2,191*
Australian rate	**283**	**286**	**278**	**281**
Lowest SA3 rate	135	113	104	141
Magnitude of variation	6.9	8.2	6.4	6.3
Magnitude of variation without top & bottom 10% SA3	2.2	2.2	2.2	2.3



Notes:
The asterisks (*) indicate rates that are considered more volatile than others, and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Rates for Aboriginal and Torres Strait Islander people across years

Figure 2.33: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Aboriginal and Torres Strait Islander status, 2014–15 to 2017–18



Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated, with variation among states and territories.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Kidney infections and urinary tract infections

Resources

- Antibiotic guidelines: urinary tract infections (in eTG complete)[12]
- Antibiotic guidelines: urinary tract infection in aged-care facility residents (in eTG complete)[12]
- *RACGP Aged Care Clinical Guide (Silver Book)*. Melbourne: Royal Australian College of General Practitioners
- *Asymptomatic Bacteriuria: Reducing inappropriate antimicrobial prescribing for aged care facility residents* (fact sheet)[11]
- Urinary tract infections, interactive flowchart, National Institute for Health and Care Excellence (UK), pathways.nice.org.uk/pathways/urinary-tract-infections#path=view%3A/pathways/urinary-tract-infections/urinary-tract-infections-in-people-aged-16-years-and-over.xml&content=view-index
- Non-antibiotic prevention and management of recurrent urinary tract infection[37]
- *Urinary Catheter Passport: A guide to looking after a urinary catheter for service users and healthcare workers*. Infection Prevention Control & National Health Service, UK
- Diagnosis of urinary tract infection in older persons in the emergency department: To pee or not to pee, that is the question[23]

References

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2.5 Cellulitis

Why is this important?

Cellulitis is an infection of the subcutaneous tissues. Crowded living conditions and socioeconomic disadvantage increase the risk of some bacterial causes of cellulitis.[1]

What did we find?

Between 2014–15 and 2017–18, the rate of cellulitis hospitalisations nationally increased by 9%. The rate increased by 18% among Aboriginal and Torres Strait Islander people. The rate for Aboriginal and Torres Strait Islander people was 3.0 times as high as the rate for other Australians.

Rates of hospitalisation for cellulitis were substantially higher in remote areas than in other areas. Hospital admission rates also increased with socioeconomic disadvantage, regardless of remoteness, except in outer regional areas.

What can be done?

The rates of hospitalisation for cellulitis reported in this chapter are unacceptably high, and more must be done to prevent these infections. Addressing the social determinants of skin health, such as housing conditions, is key to reducing skin infections and cellulitis among Aboriginal and Torres Strait Islander people.[2,3] More effective prevention and management of type 2 diabetes, an important risk factor for cellulitis, may also reduce rates of hospitalisation for cellulitis. Increasing availability of podiatry services that specialise in care of diabetic and ischaemic foot ulcers may help prevent infections and hospitalisations, particularly in rural and remote areas. Increasing availability of lymphoedema services and specific compression stockings may reduce rates of cellulitis in patients with chronic lymphoedema. Improving the accuracy of cellulitis diagnoses – for example, by early consultation with an infectious diseases specialist and/or a dermatologist – could reduce unnecessary hospitalisations and antibiotic use.

Cellulitis

Context

Cellulitis is an infection of the subcutaneous tissues. It occurs in a range of disparate conditions and circumstances, with different causes and management – for example, penetrating injuries, insect bites and wounds.[4] Risk factors for recurrent cellulitis include lymphoedema, obesity, diabetes and pre-existing skin infections such as tinea.[4,5] Crowded living conditions and socioeconomic disadvantage increase the risk of some infections associated with cellulitis.[1]

Cellulitis was the fourth most common cause of potentially preventable hospitalisation in Australia in 2017–18, after dental conditions, kidney infections and urinary tract infections combined, and chronic obstructive pulmonary disease.[6] Among Aboriginal and Torres Strait Islander people, cellulitis was the second most common cause of potentially preventable hospitalisation in 2017–18, after chronic obstructive pulmonary disease.[7] Hospitalisations for cellulitis accounted for 275,653 bed days in Australia in 2017–18.[6]

Older, frail people are particularly at risk of hospitalisation due to cellulitis because even minimal infection can mean that they are unable to manage at home. The rate of hospitalisation for cellulitis in Australia is 3.0 times higher among people aged 65 years and over compared with younger adults.[7]

Few international rates of hospitalisation for cellulitis are available for comparison. The rate of hospital discharge for treatment for infection of the skin or subcutaneous tissues was 359 per 100,000 in Australia, compared to 328 per 100,000 in New Zealand, in 2016.[8]

Cellulitis is caused by a variety of pathogens. Spontaneous, rapidly spreading cellulitis and non-purulent recurrent cellulitis (for example, associated with lymphoedema) are most commonly caused by *Streptococcus pyogenes* or other streptococci.[9]

Purulent cellulitis is usually caused by *Staphylococcus aureus (S. aureus)*.[9] Some community-acquired *S. aureus* infections in Australia are now due to methicillin-resistant organisms.[10] Cellulitis caused by *S. aureus* is less common than cellulitis caused by streptococci, and is often associated with an abscess, ulceration or penetrating injury.[9]

Oral antibiotics are recommended for cellulitis without systemic features of infection. Intravenous antibiotics are usually required for patients with two or more features of systemic infection.[9]

About the data

All hospitalisations with a principal diagnoses of cellulitis are included.

Data are sourced from the National Hospital Morbidity Database, and include admitted patients in both public and private hospitals, including Hospital in the Home care.

Rates are based on the number of hospitalisations for cellulitis per 100,000 people of all ages in 2017–18.

Because a record is included for each hospitalisation for cellulitis, rather than for each patient, patients hospitalised for cellulitis more than once in the financial year will be counted more than once.

The analysis and maps are based on the usual residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2017–18, there were 68,663 hospitalisations for cellulitis, representing 256 hospitalisations per 100,000 people of all ages (the Australian rate).

The number of hospitalisations for cellulitis across 330* local areas (Statistical Area Level 3 – SA3) ranged from 90 to 1,393 per 100,000 people. The rate was **15.5 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 185 per 100,000 people in the Australian Capital Territory to 679 in the Northern Territory (Figures 2.35–2.38).

After the highest and lowest 10% of results were excluded and 264 SA3s remained, the number of hospitalisations per 100,000 people was 2.9 times as high in the area with the highest rate compared with the area with the lowest rate.

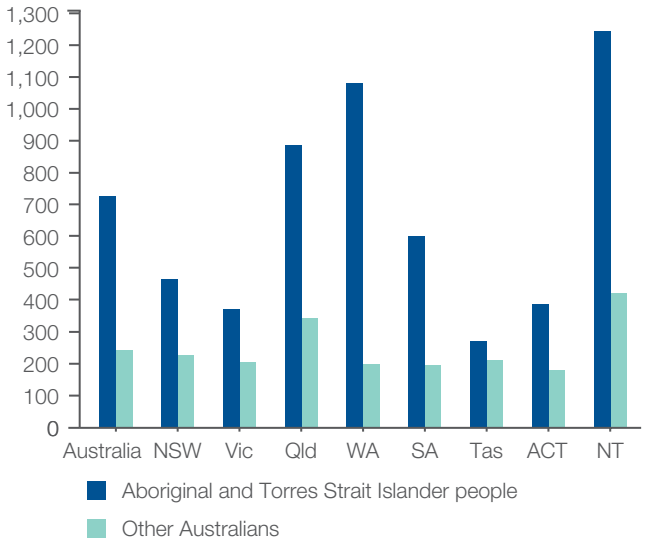
Analysis by remoteness and socioeconomic status

Rates of hospitalisation for cellulitis were substantially higher in remote areas than in other areas. Hospital admission rates also increased with socioeconomic disadvantage, regardless of remoteness category, except in outer regional areas (Figure 2.39).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander people (727 per 100,000 people) was 3.0 times as high as the rate for other Australians (242 per 100,000 people) (Figure 2.34).

Figure 2.34: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2017–18†



The data for Figure 2.34, and the data and graphs for Analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, data were suppressed for 10 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

† Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated, with variation among states and territories.

Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.

For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Cellulitis

Trends over time

Between 2014–15 and 2017–18, the rate of cellulitis hospitalisations per 100,000 people nationally increased by 9% (Figure 2.40).

For Aboriginal and Torres Strait Islander people, the rate of cellulitis hospitalisations per 100,000 people nationally increased by 18% between 2014–15 and 2017–18 (Figure 2.41).

Interpretation

Potential reasons for the variation include geographical differences in:

- Clinician factors:
  - Diagnostic error, potentially leading to both under-diagnosis and over-diagnosis of cellulitis. Several other conditions can be mistaken for cellulitis, due to its non-specific features, and reported rates of misdiagnosis range from 30% to 74% in United States (US) hospitals.[11,12] In one US study where 30% of cellulitis diagnoses were later found to be incorrect, 85% of the misdiagnosed patients were unnecessarily hospitalised and 92% received unnecessary antibiotics due to the misdiagnosis[13] (see 'Improving diagnostic accuracy' on page 157).
- Demographic and consumer factors
  - prevalence of diabetes, and poorly managed diabetes, which increase the risk of skin disease; diabetes is more prevalent among Aboriginal and Torres Strait Islander people
  - prevalence of obesity, chronic venous stasis, immobility and lymphoedema, which increase the risk of oedema and cellulitis, and prevalence of heart failure with lymphoedema
  - prevalence of community-associated methicillin-resistant *Staphylococcus aureus* (MRSA), which is high in outer regional, remote and very remote areas compared with major cities and inner regional areas of Australia[14]
  - prevalence of streptococcal infections in some Aboriginal and Torres Strait Islander communities
  - overcrowded housing
  - swimming facilities (type, cleanliness and frequency of use); use of swimming pools may reduce skin infections[15]
  - occupational risk factors for skin injury
  - density of populations with a high risk of cellulitis, such as residents of aged care homes[16]
  - temperature and humidity, and associated effects (for example, open footwear, tinea).
- Health system factors
  - delayed or inadequate access to appropriate health care; poor health literacy may contribute to delays in seeking health care, resulting in increased need for hospitalisation
  - access to dermatologists for managing serious skin conditions and preventing progression to cellulitis
  - access to culturally appropriate health care for Aboriginal and Torres Strait Islander people
  - implementation of hospital avoidance schemes
  - availability of integrated care that connects patients with social services and programs
  - use of emergency department short-stay units, where a patient stay is coded as a hospitalisation rather than an emergency department–only visit.

Variations between areas may not directly reflect the practices of the clinicians who are based in these areas. Area boundaries reflect where people live rather than where they obtain their health care. Patients who live in metropolitan, regional and rural areas may all travel outside their local areas to receive care.

Impact of MRSA

The prevalence of community-associated MRSA is higher in outer regional, remote and very remote areas than in major cities and inner regional areas of Australia.[14] In 2017, 41% of *S. aureus* infections in remote areas were methicillin resistant, compared with 20% in major cities of Australia.[14] Prevalence of MRSA increased in Australia overall between 2015 and 2017, but to a larger extent in remote and very remote areas than in major cities.[14] Higher prevalence of MRSA is likely to contribute to higher rates of hospitalisation for cellulitis for several reasons:

- Ineffectiveness of antibiotics used for empirical treatment can result in progression of the infection
- MRSA infections require surgical drainage, which is more likely to require hospital care
- Higher prevalence of MRSA may cause an increase in rates of skin abscesses, furuncles and boils, which can progress to cellulitis.

In addition, longer waiting times for the results of microbiological investigations in remote areas lead to longer periods before a change in antibiotic if there is a mismatch in susceptibility, and greater opportunity for progression of infection.

Addressing variation

The rates of hospitalisation for cellulitis reported in this chapter are unacceptably high, and more must be done to prevent these severe infections. The 9% increase in cellulitis hospitalisations overall, and the 18% increase among Aboriginal and Torres Strait Islander people, between 2014–15 and 2017–18 underscore this need. Suitable strategies to reduce potentially preventable hospitalisations for cellulitis will depend on the specific underlying causes in local areas and their accurate diagnosis.

Improving diagnostic accuracy

Several other conditions can be mistaken for cellulitis, due to its non-specific features. Reported rates of misdiagnosis range from 30% to 74% in US hospitals.[11,12] In one US study where 30% of cellulitis diagnoses were later found to be incorrect, 85% of the misdiagnosed patients were unnecessarily hospitalised, and 92% received unnecessary antibiotics as a result of the misdiagnosis.[13]

Early consultation with an infectious diseases specialist or a dermatologist can improve outcomes for patients with a presumed diagnosis of cellulitis, and so reduce antibiotic use.[11] In a US trial, patients who were assessed by a dermatologist within 24 hours of admission had significantly better clinical improvement after two weeks, and had significantly lower duration of antibiotic treatment, than patients treated by the usual medical team.[11]

Ambulatory Care

Many patients with cellulitis are treated in ambulatory settings, community health, specialist outpatient clinics, general practice and Hospital in the home. Ambulatory settings may be preferable for selected older patients, to reduce the risk of geriatric complications such as delirium.[17]

Cellulitis

Managing predisposing conditions and recurrent cellulitis

More effective prevention and management of type 2 diabetes, an important risk factor for cellulitis, may contribute to reducing rates of hospitalisation for cellulitis. Access to information about self-management at an appropriate health literacy level, and in languages other than English, is fundamental to enabling consumers to prevent future episodes of cellulitis. Improved self-management of skin diseases such as eczema, and encouraging early action to prevent worsening of infections, may reduce hospitalisations for cellulitis.

Increasing availability of podiatry services that specialise in care of diabetic and ischaemic foot ulcers may help prevent infections and hospitalisations, particularly in rural and remote areas. Similarly, increasing availability of lymphoedema services and specific compression stockings may reduce rates of cellulitis in patients with chronic oedema. In a small Australian trial, leg compression therapy halved the rate of hospitalisation for cellulitis among patients with chronic oedema of the leg and recurrent cellulitis.[18]

Other factors that increase the risk of recurrent cellulitis include tinea of the feet, lymphoedema and lymphatic malformation.[9] In addition to managing these risk factors, giving patients with recurrent cellulitis a prescription for antibiotic treatment so that they can start treatment as soon as symptoms appear may prevent rapid progression of infection.[9]

Antibiotic prophylaxis is recommended for some people with frequent recurrences.[9,19] Recommended prophylaxis is phenoxymethylpenicillin 250 mg orally, twice daily for up to six months initially, followed by regular review.[9]

Individualising treatment

Using better-tolerated treatments for impetigo (also known as school sores) in primary care may encourage earlier presentation. Delays in presentation due to the pain of treatment with penicillin G injection may contribute to treatment failure in the primary healthcare setting. Previous experience of ineffective treatment with flucloxacillin or other β-lactam antibiotics for MRSA infections may also contribute to treatment failure in the primary healthcare setting.

Treatment for patients with suspected MRSA or risk factors

For patients with purulent cellulitis (or suspected *S. aureus* infection) and risk factors for MRSA infection, intravenous vancomycin is recommended.[20] In some areas, clindamycin or lincomycin is a suitable alternative, based on local community-associated MRSA susceptibility patterns.[20]

Risk factors for infection with MRSA include:

- Living in an area with a high prevalence of MRSA (for example, the Northern Territory, remote communities in northern Queensland, regions north of metropolitan Perth in Western Australia – especially the Pilbara and Kimberley)
- Previous colonisation or infection with MRSA, particularly if recent (this also applies to neonates exposed to caregivers colonised or infected with MRSA)
- Residence in an aged care home with a high prevalence of MRSA, particularly if the patient has had several courses of antibiotics
- Frequent stays, or a current prolonged stay, in a hospital with high MRSA prevalence, particularly if the patient has had antibiotic treatment or recent surgery.[20]

Promoting skin health among Aboriginal and Torres Strait Islander people

The burden of bacterial skin infections and parasitic skin infestations among Aboriginal and Torres Strait Islander people is highest in remote communities.[21] These conditions can lead to impetigo and cellulitis.[21] The risk of skin infections is reduced by adequate housing conditions, including adequate space for the number of people living in the house.[22]

The Housing for Health Program involves repairs and maintenance of housing items required for healthy living practices. The program has significantly reduced the rate of hospitalisations for skin infections, and led to other benefits for people living in Aboriginal community housing (see 'Case study: Housing for health' on this page).[23]

Children in remote Aboriginal and Torres Strait Islander communities in northern Australian have the highest rates of impetigo in the world.[24] Prevention programs for skin infections can increase protective factors against cellulitis in these settings.[25,26] Public swimming pools have also been associated with a lower prevalence and severity of skin sores in remote Aboriginal and Torres Strait Islander communities, and may decrease the burden of infections and staphylococcal diseases in particular.[15,27]

In areas with very high rates of skin infections in children, such as the Kimberley and Pilbara, skin infections may become normalised, meaning that clinicians may not offer treatment unless asked, and patients may not seek treatment.[3] However, in settings with a high burden of skin infections, individual treatment without community-level interventions is likely to be ineffective, partly because of extensive community-level transmission of impetigo.[2] Addressing the normalisation of skin infections and the social determinants of skin health is key to increasing protective factors against skin infections among Aboriginal and Torres Strait Islander children.[2,3]

Strengthening the capacity of the Aboriginal Community Controlled Health Service sector and improving the cultural safety of mainstream services are important for improving access to care for Aboriginal and Torres Strait Islander people. Strengthening the Aboriginal and Torres Strait Islander health workforce is also fundamental to improving access to culturally safe health care.

Case study: Housing for health

The risk of skin infections is increased by poor housing conditions, including inadequate facilities for healthy living practices.[22] The Housing for Health Program involves repairs and maintenance of housing items required for healthy living practices. The program has significantly reduced the rate of hospitalisations for skin infections, and led to other benefits for people living in Aboriginal community housing.[23]

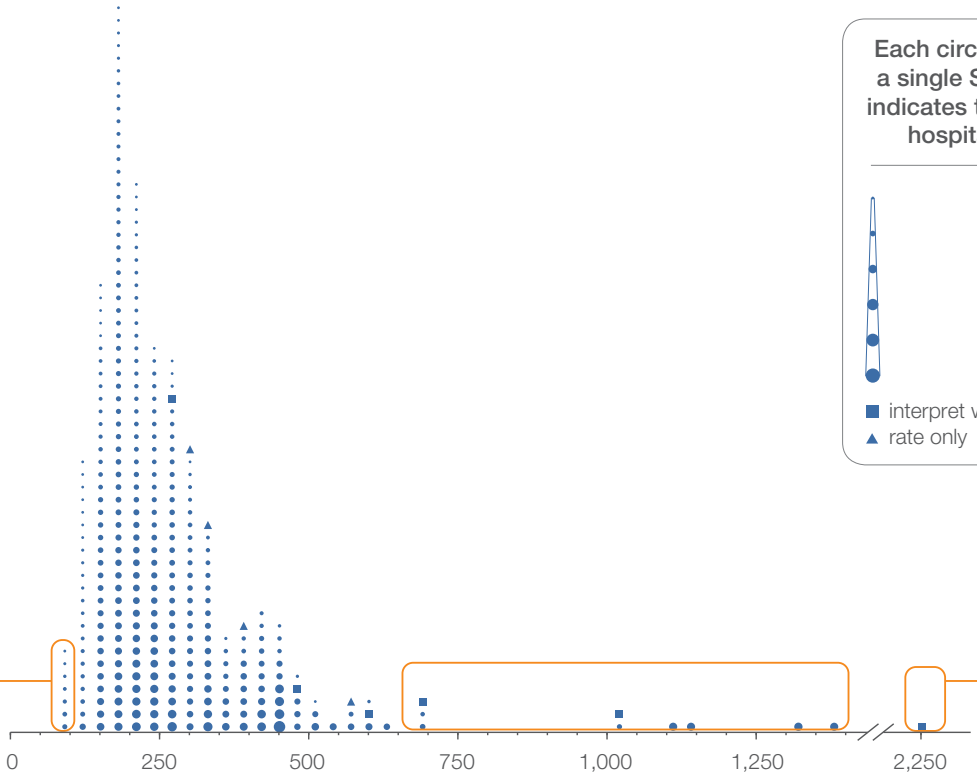
Over the 10-year evaluation period, repairs were made to 2,230 houses in 71 communities around New South Wales. Repairs included fixing hot water systems, showers, washing machines, toilets and insect screens. Repairs to improve safety, temperature control, and the ability to store and prepare food were also carried out. The proportion of houses with adequate facilities for residents to wash themselves, their clothes and their bedding doubled after the intervention.

The rate of hospitalisations for skin infections was 19% lower in the intervention group than in the non-intervention group. Hospitalisations were also reduced by 42% for respiratory conditions and by 43% for intestinal infections. The program had broader benefits in building goodwill through timely repairs (either the same day or the day after houses were surveyed), and employing local Aboriginal and Torres Strait Islander tradespeople to carry out repairs, where possible.[23]

Cellulitis

Rates by local area

Figure 2.35: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Burnside	SA	**90**	60
Southern Highlands	NSW	**96**	77
Stonnington - East	Vic	**105**	53
Cronulla - Miranda - Caringbah	NSW	**110**	168
Cottesloe - Claremont	WA	**111**	96
Sutherland - Menai - Heathcote	NSW	**113**	148
Launceston	Tas	**118**	116

Highest rate areas

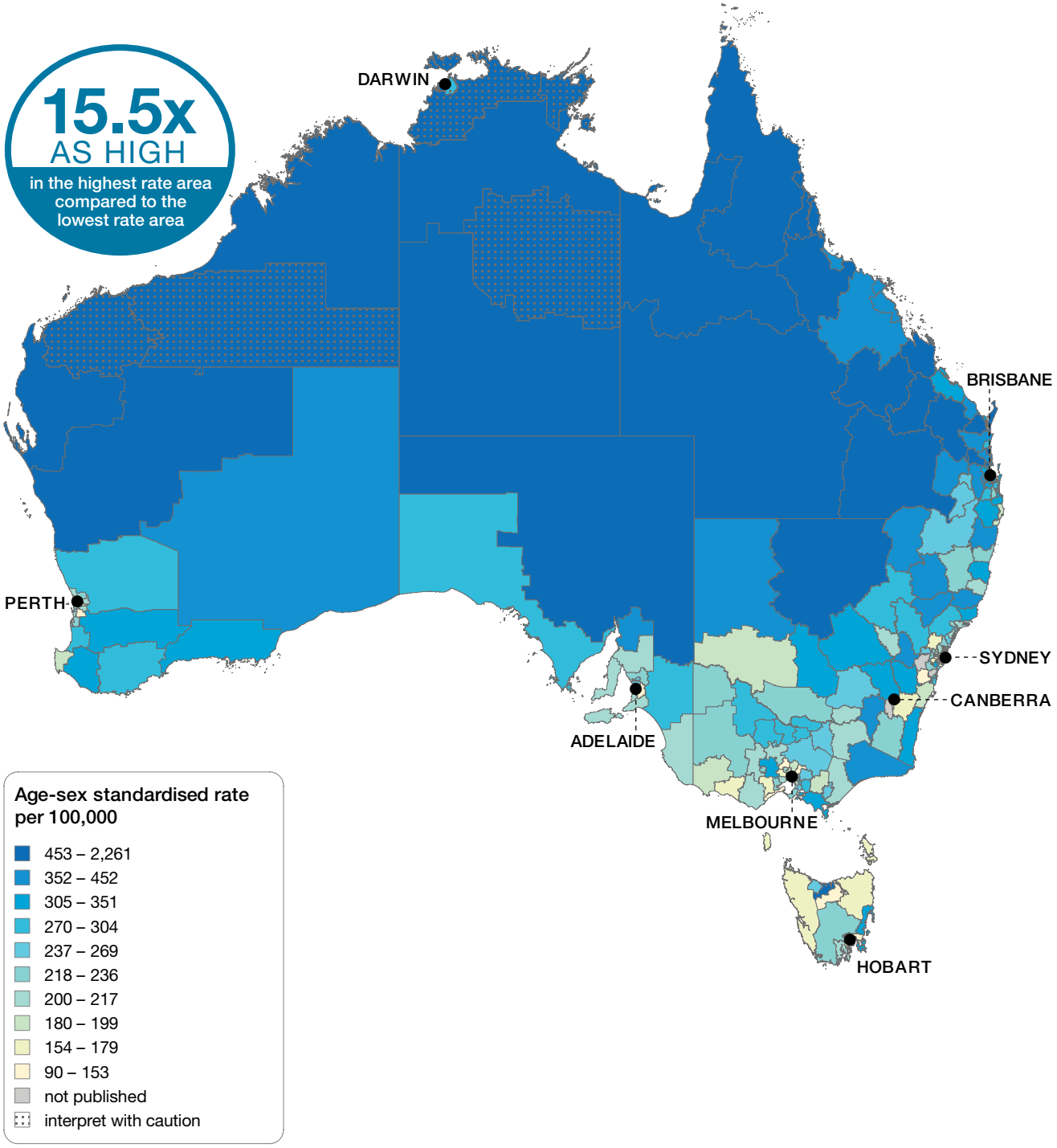
SA3	State	Rate	Hospitalisations
Barkly	NT	**2,261***	130
Far North	Qld	**1,393**	431
Kimberley	WA	**1,339**	449
Innisfail - Cassowary Coast	Qld	**1,146**	431
Alice Springs	NT	**1,123**	437
Katherine	NT	**1,028**	177
East Arnhem	NT	**1,025***	125
Outback - South	Qld	**717**	136
East Pilbara	WA	**703***	134
Outback - North	Qld	**691**	209

Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Cellulitis

Rates across Australia

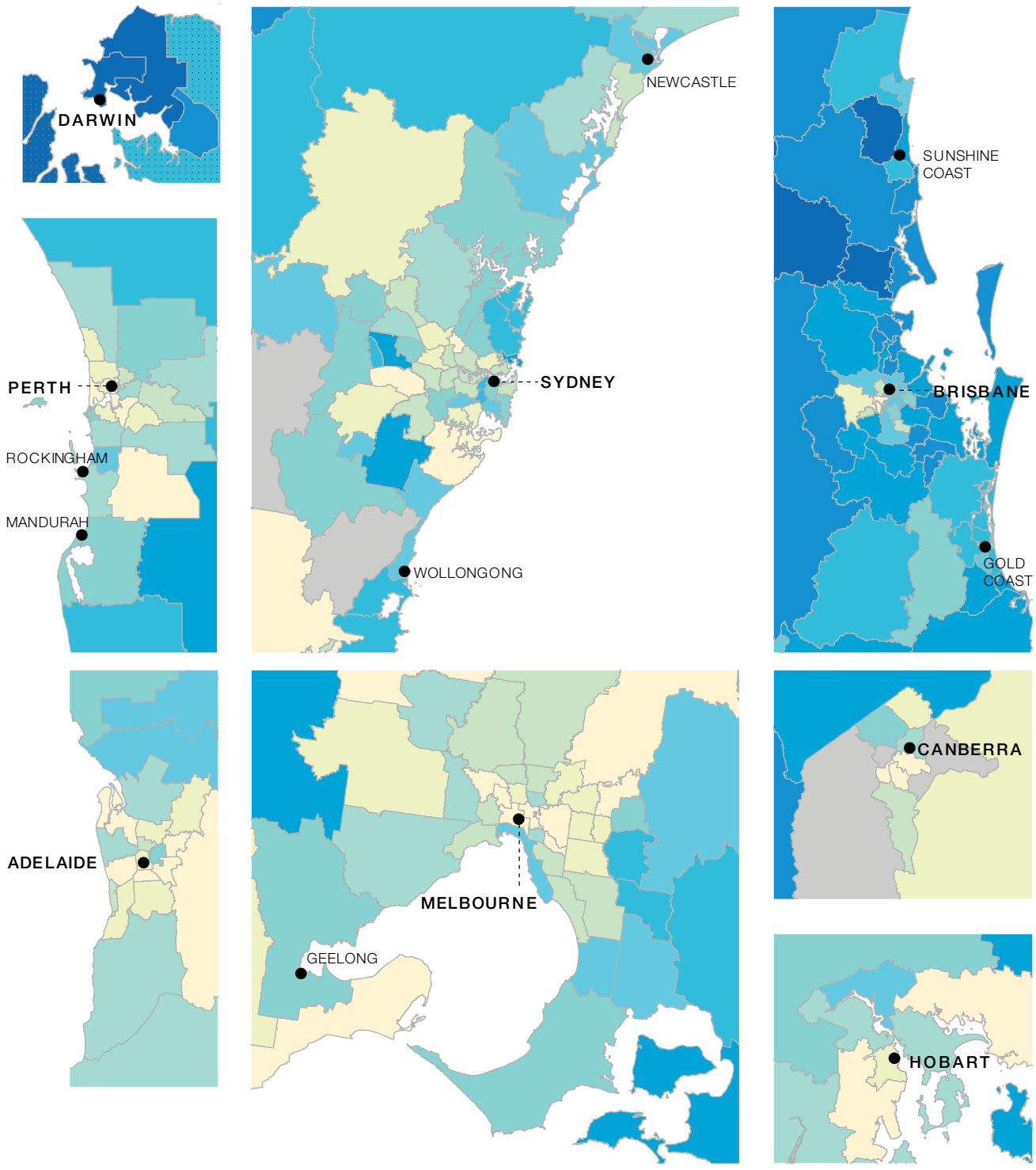
Figure 2.36: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates across capital city areas

Figure 2.37: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



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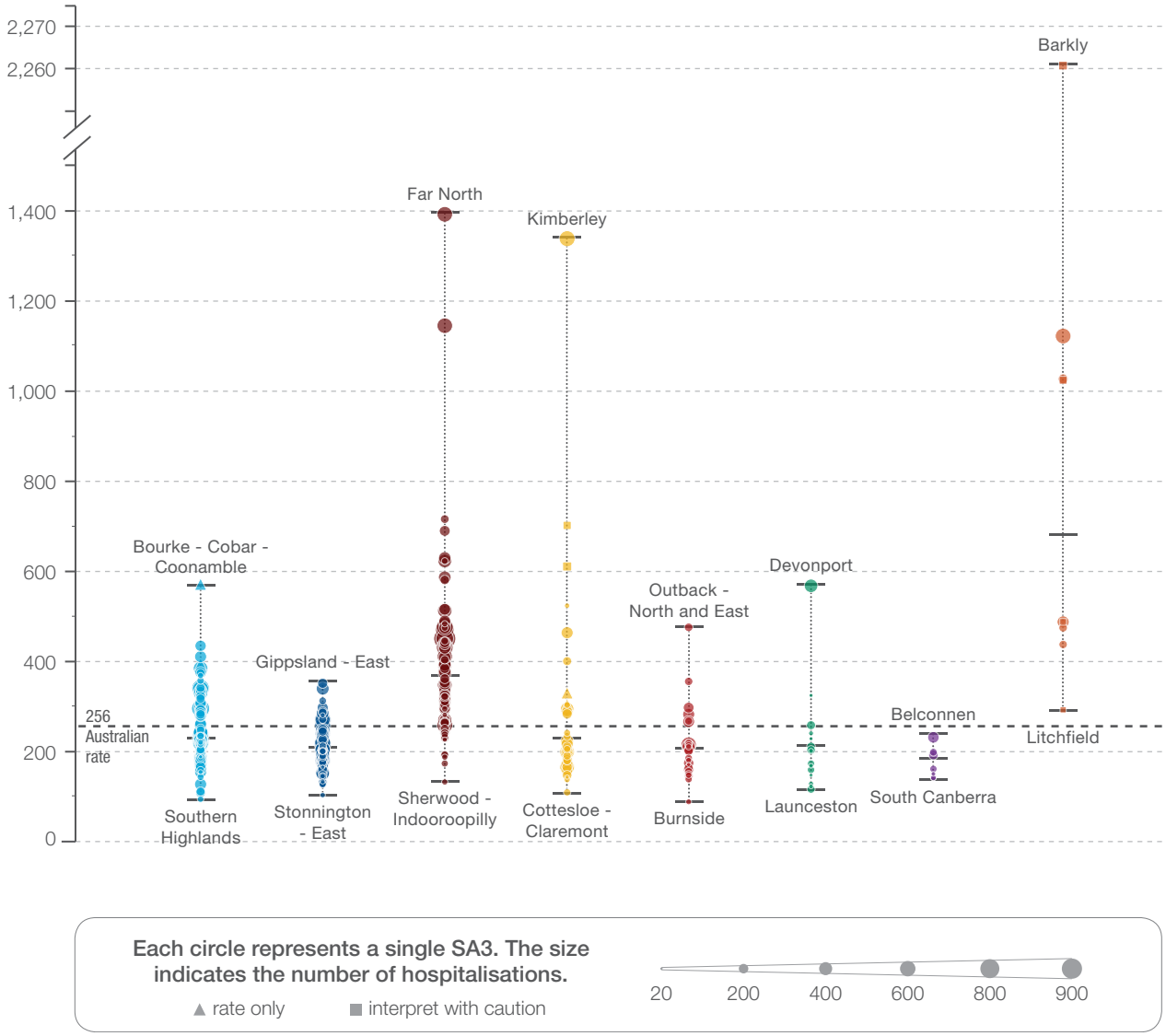
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Cellulitis

Rates by state and territory

Figure 2.38: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

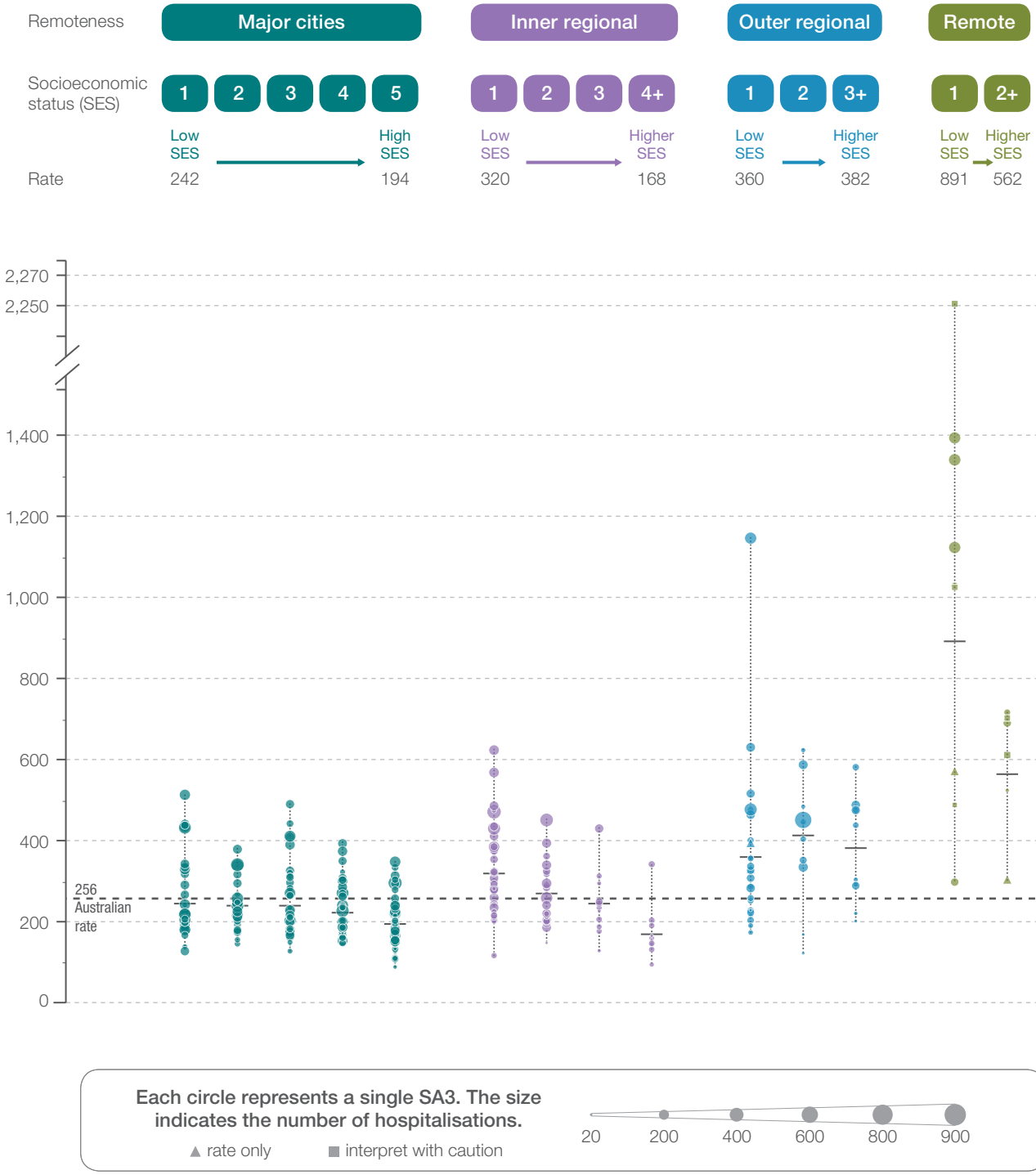
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	572	353	1,393	1,339	477	569	233	2,261*
State/territory	231	205	368	231	205	215	185	679
Lowest rate	96	105	134	111	90	118	143	294*
No. hospitalisations	20,407	14,148	19,307	6,221	4,204	1,328	770	1,570



Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

Figure 2.39: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



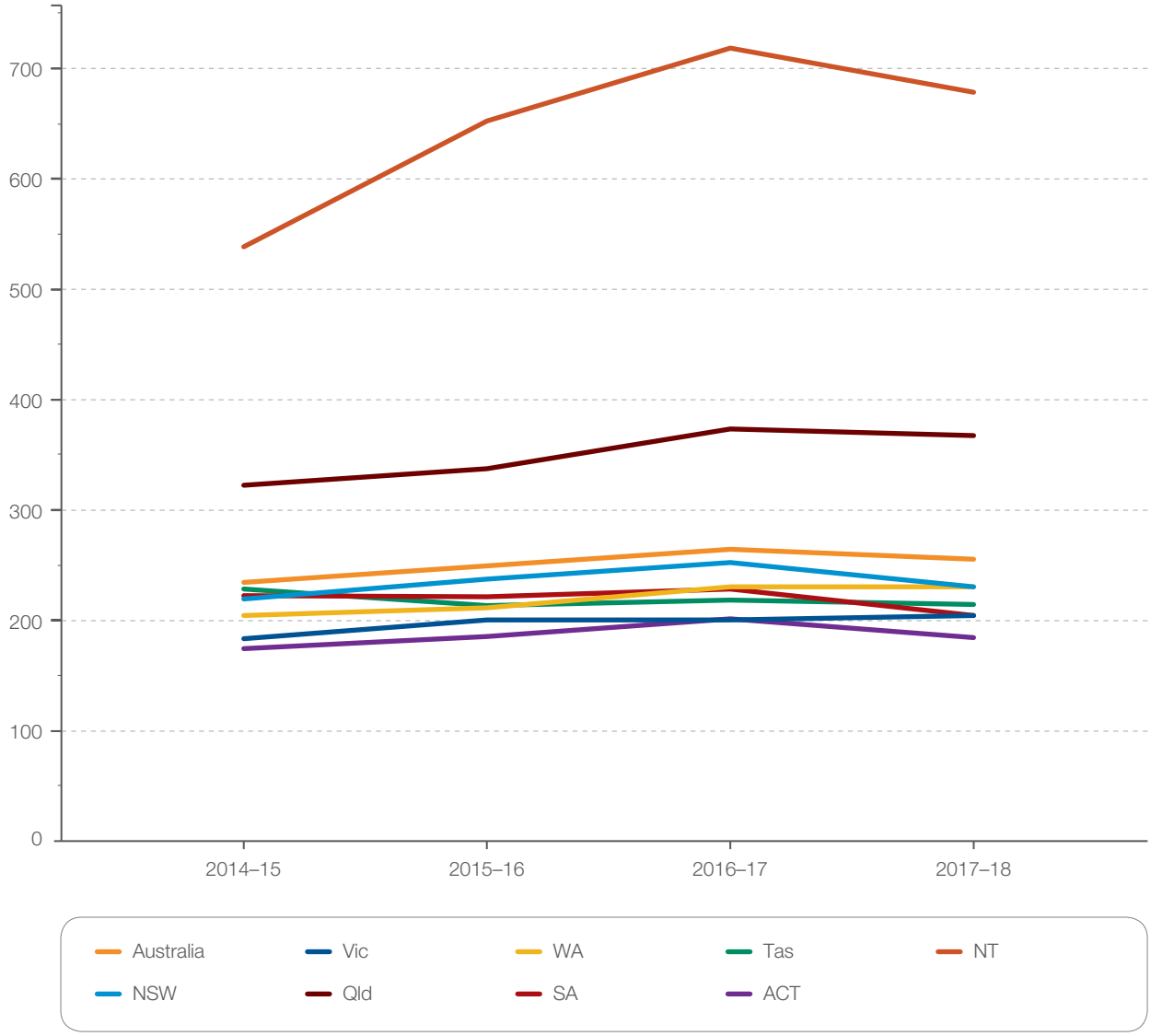
Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations of 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Cellulitis

Rates across years

Figure 2.40: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, 2014–15 to 2017–18

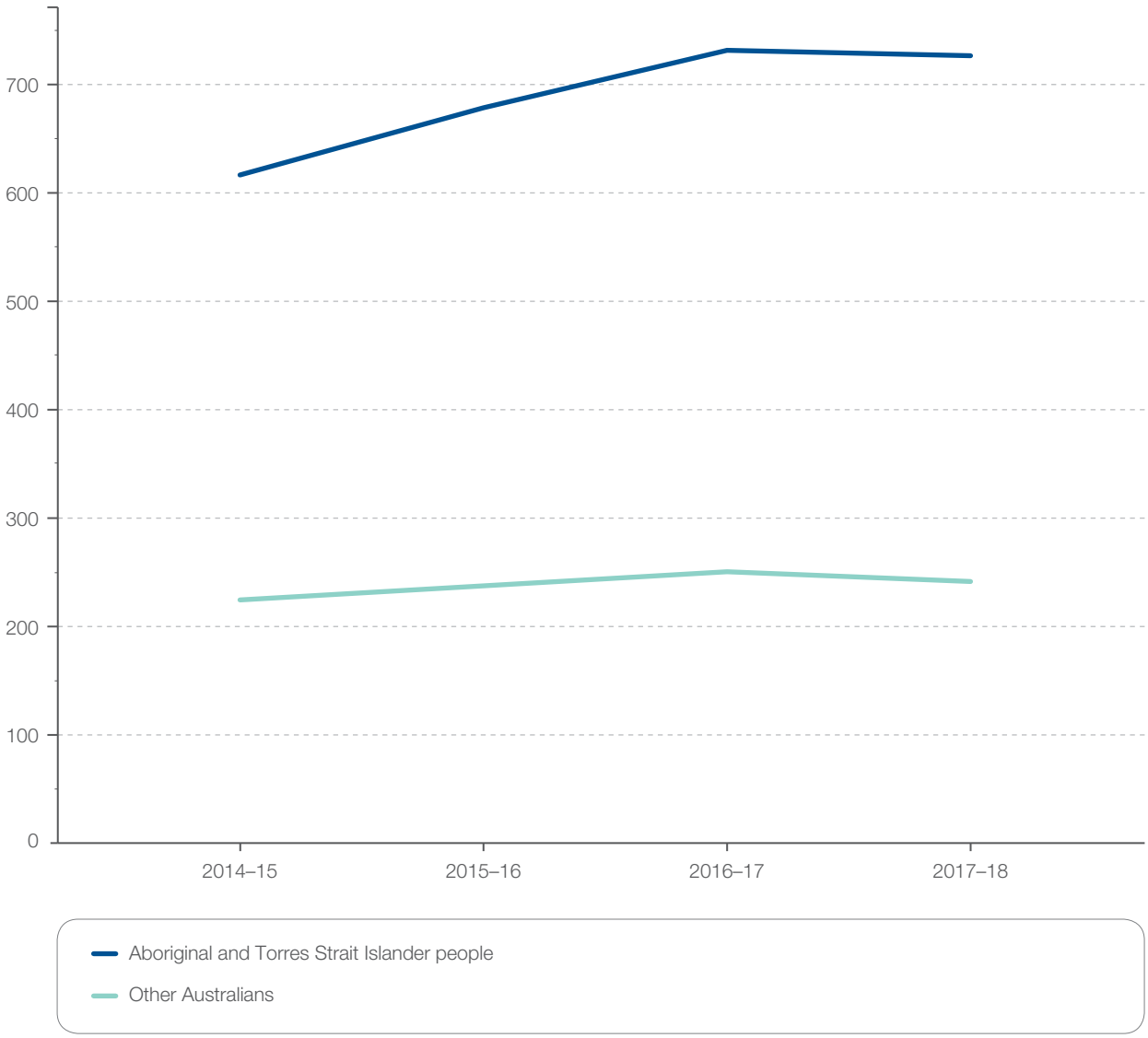
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	2,620*	3,238*	1,543	2,261*
Australian rate	**235**	**250**	**265**	**256**
Lowest SA3 rate	99	92	82	90
Magnitude of variation	13.3	13.9	18.8	15.5
Magnitude of variation without top & bottom 10% SA3	2.9	2.8	3.0	2.9



Notes:
The asterisks (*) indicate rates that are considered more volatile than others, and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Rates for Aboriginal and Torres Strait Islander people across years

Figure 2.41: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Aboriginal and Torres Strait Islander status, 2014–15 to 2017–18



Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated, with variation among states and territories.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2014 to 2018.

Cellulitis

Resources

- Cellulitis and erysipelas (Antibiotic Guidelines, in eTG complete)[9]
- Cellulitis and other bacterial skin infections, clinical practice guidelines, Royal Children's Hospital Melbourne, rch.org.au/clinicalguide/guideline_index/cellulitis_and_skin_infections
- *Healthy Skin Program: Guidelines for community control of scabies, skin sores, tinea and crusted scabies in the Northern Territory*. Darwin: Northern Territory Department of Health; 2015
- *Housing Strategies that Improve Indigenous Health Outcomes*[28]
- *CARPA Standard Treatment Manual*, 7th ed. Alice Springs: Remote Primary Health Care Manuals; 2017
- *National Healthy Skin Guideline: For the prevention, treatment and public health control of impetigo, scabies, crusted scabies and tinea for Indigenous populations and communities in Australia*[21]
- Penicillin to prevent recurrent leg cellulitis[19]
- Top 10 myths regarding the diagnosis and treatment of cellulitis[29]
- Community packages to support independence at home, available in some states and territories
- *Cellulitis* (patient fact sheet)[30]

Australian initiatives

The information in this chapter will complement work already underway to reduce the rate of hospitalisations for cellulitis in Australia. At a national level, this work includes:

- National Partnership Agreement on Remote Indigenous Housing, Council of Australian Governments
- HotNorth collaborative skin health projects, hotnorth.org.au/projects

Many states and territory initiatives are also in place, including:

- Housing for Health in the Aboriginal community, New South Wales
- Integrated Care initiatives, New South Wales
- *Cellulitis* patient fact sheet, Victoria[30]
- Delivering Connected Care for Complex Patients with Multiple Chronic Needs, Tasmania
- Aboriginal Environmental Health Program, Western Australia.

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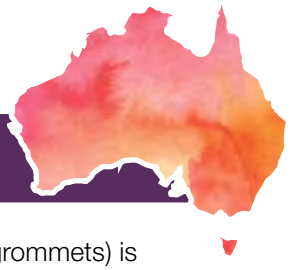
Chapter 3
Ear, nose and throat surgery for children and young people



At a glance

Tonsillectomy

Tonsillectomy is used to treat recurrent throat infections (tonsillitis) and obstructive sleep apnoea (OSA), but there are uncertainties about its benefits. It is one of the most common surgical procedures performed in children in Australia.

The Atlas found that, in 2017–18, the rate of hospitalisation for tonsillectomy in children and young people was six times higher in the local area with the highest rate than in the area with the lowest.* It also found that the rate of tonsillectomy hospitalisations increased by 3% between 2012–13 and 2017–18.

More information is needed to ensure evidence-based care for children with recurrent tonsillitis or OSA. Further developing the Australian Society of Otolaryngology Head and Neck Surgery ENT data registry could add to the knowledge base about outcomes for specific patient groups and support more effective peer review of tonsillectomy.

Myringotomy

Myringotomy is another common surgical procedure in young children. It is used to treat otitis media, a middle ear infection that can cause hearing loss.

Myringotomy (with insertion of grommets) is recommended for children who have otitis media with effusion (fluid) and documented hearing loss in both ears for more than three months.

Otitis media is the key cause of hearing loss in Aboriginal and Torres Strait Islander children, who are at risk of earlier, more severe and longer-lasting middle ear disease than other children. This chapter examined rates in Aboriginal and Torres Strait Islander children for the first time in the Atlas series.

The Atlas found that, in 2017–18, the rate of hospitalisation for myringotomy in children and young people was about eight times higher in the local area with the highest rate than in the area with the lowest.* Although the rate for Aboriginal and Torres Strait Islander children was 6% higher than the rate for other children, it was lower than would be expected if surgery rates matched the prevalence of otitis media in this group.

A comprehensive approach combining prevention, early treatment and coordinated management is urgently required to reduce rates of otitis media in Aboriginal and Torres Strait Islander children.

* After standardising to remove age and sex differences between populations.

Recommendations

The Commission consulted widely, but is solely responsible for making the recommendations; as such, the recommendations may not reflect the views of all contributors to the Atlas.

Tonsillectomy

3a. The Australian and New Zealand Society of Paediatric Otorhinolaryngology to work with relevant clinical colleges to develop clinical guidelines on tonsillectomy in children, and subsequent to this the Commission to develop a clinical care standard with safety and quality indicators.

3b. Health service organisations to:

i. Conduct audits of indications for tonsillectomy and tonsillectomy rates to monitor variation and provide the results back to clinicians to act upon in line with Action 1.28 of the National Safety and Quality Health Service (NSQHS) Standards

ii. Incorporate individual clinicians' audit data as part of re-credentialing processes.

Myringotomy

3c. State and territory health departments and health service organisations to set benchmarks for access to paediatric audiology services.

3d. The Australian Government Department of Health to develop and implement two national ear and hearing health performance indicators for Aboriginal and Torres Strait Islander children consistent with the recommendations of the National Aboriginal and Torres Strait Islander Hearing Health Advisory Panel:

i. Measure the proportion of Aboriginal and Torres Strait Islander children who received an annual ear and hearing health check and the proportion of these who were found to have ear and/or hearing health conditions

ii. Measure the proportion of Aboriginal and Torres Strait Islander children who received audiology services and the proportion of these diagnosed with hearing loss.

3e. The Australian Government Department of Health, as part of the Roadmap for Hearing Health, to publish data on progress against the integrated national approach to undertaking ear health checks of children aged 0–6, with the goal of every Aboriginal and Torres Strait Islander child having regular ear health checks.

3f. Health service organisations to:

i. Conduct audits of myringotomy and myringotomy rates to monitor variation and provide the results back to clinicians to act upon in line with Action 1.28 of the NSQHS Standards

ii. Incorporate individual clinician's audit data as part of recredentialing processes.

3.1 Tonsillectomy hospitalisations, 17 years and under

Why is this important?

Tonsillectomy is one of the most common procedures performed in children in Australia.[1] The rate of tonsillectomy in people of all ages is higher in Australia than in New Zealand or the United Kingdom.[2] Tonsillectomy is used to treat recurrent throat infections that affect the tonsils (tonsillitis) and obstructive sleep apnoea (OSA), but there are uncertainties about its benefits. There is moderate-quality evidence to support tonsillectomy over watchful waiting in children with recurrent tonsillitis.[3] There is also evidence that tonsillectomy benefits some children with OSA, but some children get better without surgery.[4] Uncertainties about benefits of tonsillectomy can make it difficult for parents to make decisions about treatment.

What did we find?

In 2017–18, the rate of hospitalisation for tonsillectomy in people aged 17 years and under was **6.0 times as high** in the area with the highest rate compared with the area with the lowest rate. Between 2012–13 and 2017–18, the rate of tonsillectomy hospitalisations increased by 3%.

What can be done?

There is an urgent need for information about the short- and long-term outcomes of tonsillectomy. Further developing the ear, nose and throat (ENT) data registry of the Australian Society of Otolaryngology Head and Neck Surgery could capture information on eligible patients, provide information for effective peer review of tonsillectomy and add to the knowledge base about outcomes for specific patient groups. All parents who decide their children should have tonsillectomy should be informed about the registry. If the child meets the registration criteria, parents should be asked if they are willing for the child to be included. Surgeons should contribute data on all consenting patients, and regularly audit and review patient outcome data with their peers.

Other actions to address variation include updating the 2008 Australian clinical practice guidelines, providing information to parents about the risks and benefits of surgery, and encouraging shared decision making.

Tonsillectomy hospitalisations, 17 years and under

Context

The first *Australian Atlas of Healthcare Variation* identified substantial variation in age-standardised hospitalisations for tonsillectomy in children and young people. This variation – 6.5 times as high in the local area (Statistical Area Level 3 – SA3) with the highest rate as in the area with the lowest rate – warrants further investigation.[5]

Tonsillectomy is a surgical procedure to remove the tonsils, which are soft tissue masses on each side at the back of the throat. Tonsils are prone to infection and inflammation that can lead to enlargement. In some children, significant enlargement of the tonsils may cause a range of breathing problems during sleep, including OSA.[6]

Tonsillectomy can be performed with or without surgical removal of the adenoids (adenoidectomy).[6] Adenoids are glands that sit in the back of the throat behind the nose. Like tonsils, adenoids help defend the body against harmful bacteria and viruses that enter the body through the mouth and nose. An adenotonsillectomy is when the tonsils and the adenoids are removed.

Tonsillectomy is one of the most common procedures performed in children in Australia.[1] The rate of tonsillectomies is higher in Australia than in many reporting Organisation for Economic Co-operation and Development (OECD) countries. In an analysis of OECD data on tonsillectomies per 100,000 people of all ages between 1993 and 2014, the rate in Australia was 1.7 times and 1.9 times as high as the rates in New Zealand and the United Kingdom, respectively.[2]

Tonsillectomy has traditionally been used to treat recurrent throat infections that affect the tonsils (tonsillitis). In the United States in the past 30 years, there has been a decline in the use of tonsillectomy to treat recurrent tonsillitis and a gradual increase in the use of tonsillectomy to treat OSA.[6]

In Australia, a multi-centre Victorian study of almost 60,000 patients showed that tonsillectomy for OSA had driven an increase in the number of tonsillectomies between 2010 and 2015.[7] An accompanying small decline in the rate of tonsillectomies for recurrent tonsillitis led to OSA overtaking throat infections as the main reason for tonsillectomy in Victoria in 2014–15.[7] The reason for the increase in tonsillectomies for OSA is unclear but could involve greater awareness of the possible links between OSA and learning and behavioural problems.[7]

Recurrent tonsillitis

Compared with no surgery, in children who have frequent tonsillitis, tonsillectomy reduces the number of throat infections, visits to the doctor and school absences in the first year after the procedure, but the benefits do not last.[8]

A Cochrane systematic review of adenotonsillectomy for recurrent tonsillitis in children found that children who had surgery had fewer episodes of sore throat in the first year than those who had non-surgical treatment. However, the effect was small, and many children improved spontaneously without surgery. The authors concluded that the potential benefit of surgery must be weighed against the risks of the procedure, particularly bleeding.[3]

There are no current Australian or United Kingdom evidence-based guidelines for the role of tonsillectomy in managing recurrent throat infections in children.

A 2018 United States guideline advises that clinicians may recommend tonsillectomy as an option for children who have frequent tonsillitis (seven or more episodes per year, five or more per year for two years, or three or more per year for three years).[6] The guideline states that patient preference should have a substantial role in the decision.

Obstructive sleep apnoea

Children with OSA have repeated episodes of partial or complete blockage of the upper airways, which can cause problems during sleep, including snoring, gasping or choking, and pauses in breathing.[6] Untreated OSA in some children may lead to impaired growth, cognitive and behavioural problems, and cardiovascular effects.[9]

OSA is thought to be usually caused by large tonsils and adenoids (adenotonsillar hypertrophy).[6] It is common in children, with peak incidence between 2 and 8 years of age, most likely due to the large size of tonsils and adenoids compared with the size of the airway.[9]

OSA is more common in obese children, and in children who have Down syndrome, abnormalities of the brain and facial bones, or neuromuscular disorders.[10]

General practitioners (GPs) use snoring and sleep-related symptoms to identify children with possible moderate to severe OSA who should be referred for consideration of adenotonsillectomy. Overnight sleep studies that measure obstructive respiratory events per hour are the gold standard for diagnosing OSA.[6,11] In Australia, sleep studies can only be ordered and assessed by a sleep specialist.[12] OSA can be categorised by this type of sleep study as mild, moderate or severe.

Adenotonsillectomy is generally considered the first-line intervention for children with moderate or severe OSA and enlarged tonsils.[9] Watchful waiting for six months may be an acceptable option for some otherwise-healthy children with mild or moderate OSA and tolerable symptoms.[9]

A Cochrane systematic review found mixed evidence about the impact of adenotonsillectomy in otherwise-healthy children aged 5–9 years with mild to moderate OSA (diagnosed by sleep study) up to 12 months after the surgery.[4] It found:

- High-quality evidence that the procedure has no benefit in terms of objective measures of attention and cognitive function compared with watchful waiting
- High-quality evidence that it improves sleep study scores compared with watchful waiting
- Moderate-quality evidence that it is beneficial in terms of symptoms, behaviour and quality of life (as rated by caregivers).

The review noted that, in one key randomised trial (the CHAT study)[13], sleep study findings returned to normal in 46% of the non-surgical group within seven months, compared with 79% of the surgical group.

Two recent randomised controlled trials examined a gap in evidence – the impact of adenotonsillectomy on young children with OSA. A Swedish study compared surgery with watchful waiting in 60 children aged 2–4 years with mild to moderate OSA. It found no statistically significant difference between the groups in changes in sleep study scores (the primary outcome of the study). However, surgery was more effective than watchful waiting in improving sleep study scores in a small group of children with moderate OSA (n = 24). The study also found a statistically significant difference in quality-of-life scores after adenotonsillectomy at six months compared with watchful waiting. The researchers concluded that otherwise-healthy children aged 2–4 years with mild OSA and mild effect on quality of life would benefit from watchful waiting, whereas children with moderate OSA should be considered for surgery.[14]

The other study, in Australia, compared outcomes in preschool children with mild to moderate OSA who had early adenotonsillectomy with children on the waiting list who had no surgery. At 12 months, no differences were seen in cognitive function between the two groups. However, children who had adenotonsillectomy had reduced obstructive respiratory events (measured by sleep study) and improved behaviour (rated by parents) compared with children who did not have surgery.[15]

Uncertainties about the benefits of tonsillectomy for children with OSA and limited access to formal diagnostic testing can make it difficult for clinicians and parents to make appropriate decisions about treatment. These uncertainties include a lack of evidence about the long-term impact of tonsillectomy[16], and how parents and clinicians can distinguish between simple snoring and OSA in the absence of sleep studies.[4] The Cochrane review summarised above found that there was inconclusive evidence that children who had been diagnosed with OSA based on clinical grounds alone benefit from tonsillectomy.[4]

Tonsillectomy hospitalisations, 17 years and under

Given the uncertainties around the procedure to treat OSA, the Cochrane review authors suggested that doctors and parents should carefully consider the benefits and risks of surgery versus watchful waiting, because children could get better without treatment.[4]

OSA and children with obesity

OSA is more common in children who are obese: prevalence is 19–61% in children with obesity, compared with 1–6% in children with a healthy weight.[17] Children with obesity are more likely to have severe OSA.[6]

With the prevalence of childhood OSA expected to increase in line with rising obesity levels in many developed countries[4], the management of obesity-related OSA is a key issue.

A systematic review found that children with OSA who are obese benefited from tonsillectomy. However, the outcome was less satisfactory than in normal-weight children, and there was a higher risk of persistent OSA after surgery (33–76% in children who are obese, compared with 15–37% in normal-weight children).[17] Children with obesity also have a higher risk of respiratory complications immediately after surgery.[18]

There is evidence that weight loss can significantly improve OSA symptoms in children and adolescents with obesity, although few studies have been conducted.[17] More research is needed into the effectiveness of weight loss as a treatment for OSA in children.[4,17] Weight loss is also recommended for children who are obese who still have OSA symptoms after adenotonsillectomy.[9]

Potential harms of tonsillectomy

Tonsillectomy has the highest rate of postoperative complications of all childhood surgical procedures.[19] Complications include respiratory compromise, pain, bleeding, dehydration, nausea and vomiting, speech disorders and, rarely, death.[6,20] Postoperative bleeding is the most common complication of tonsillectomy and can be life-threatening. Rates of readmission due to bleeding vary in studies from 2% to 5%.[1]

Rates of unplanned readmission after tonsillectomy are high in Australia[21] and internationally.[19] In Australia, in 2015–16, the rate of unplanned readmission after adenotonsillectomy (34.7 per 1,000 separations) was the highest for selected procedures in public hospitals.[22]

Why revisit variation in tonsillectomy?

The first Atlas examined age-standardised hospitalisations for tonsillectomy for children aged 17 years and under.

It found that, in 2012–13, the number of tonsillectomy hospitalisations was 6.5 times higher in the area with the highest rate compared with the area with the lowest rate. Rates were highest in inner regional areas and lowest in remote areas. There were no patterns in hospitalisation rates for tonsillectomy according to socioeconomic status.

However, since the first Atlas, there has been evidence of differences in rates of tonsillectomy according to socioeconomic advantage. In 2017–18, people living in the most socioeconomically disadvantaged areas had the lowest rate of separations for tonsillectomy (2.1 per 1,000 population), compared with rates of 2.5–2.7 per 1,000 population for areas with higher socioeconomic status.[23]

Given the wide variation seen in the first Atlas, and evidence of differences in access to tonsillectomy according to socioeconomic status, it is important to revisit the item to provide a comparison over time, particularly to see whether local variations continue.

It is also important to revisit variation in tonsillectomy because Australia continues to have a higher rate than New Zealand or the United Kingdom[2], and because of uncertainties about the benefits of tonsillectomy and the lack of current Australian guidelines.

About the data

Data are sourced from the National Hospital Morbidity Database, and include admitted patients in both public and private hospitals.

Rates are based on the number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under in 2012–13, 2015–16 and 2017–18.

Because a record is included for each hospitalisation for the procedure, rather than for each patient, patients hospitalised for the procedure more than once in the financial year will be counted more than once.

The analysis and maps are based on the usual residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

Some private hospitals in Tasmania admit public patients under a contractual arrangement. There is a small over-count of hospitalisations for the procedure in Tasmania because hospitalisations were recorded by both contracting hospital and contracted hospital.

What do the data show?

Magnitude of variation

In 2017–18, there were 42,509 hospitalisations for tonsillectomy, representing 750 hospitalisations per 100,000 people aged 17 years and under (the Australian rate). The median age for patients was 5 years, and this was similar across Australia.

The number of hospitalisations for tonsillectomy across 320* local areas (Statistical Area Level 3 – SA3) ranged from 305 to 1,836 per 100,000 people. The rate was **6.0 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 387 per 100,000 people in the Northern Territory to 850 per 100,000 people in the Australian Capital Territory (Figures 3.3–3.6).

After the highest and lowest 10% of results were excluded and 256 SA3s remained, the number of hospitalisations per 100,000 people was 2.2 times as high in the area with the highest rate compared with the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates for tonsillectomy hospitalisations were higher in inner regional areas than outer regional areas, major cities and remote areas (Figure 3.7). There was no clear pattern according to socioeconomic status in major cities and inner regional areas. In outer regional areas, rates were higher in areas of socioeconomic disadvantage. In remote areas, rates were lower in areas of socioeconomic disadvantage.

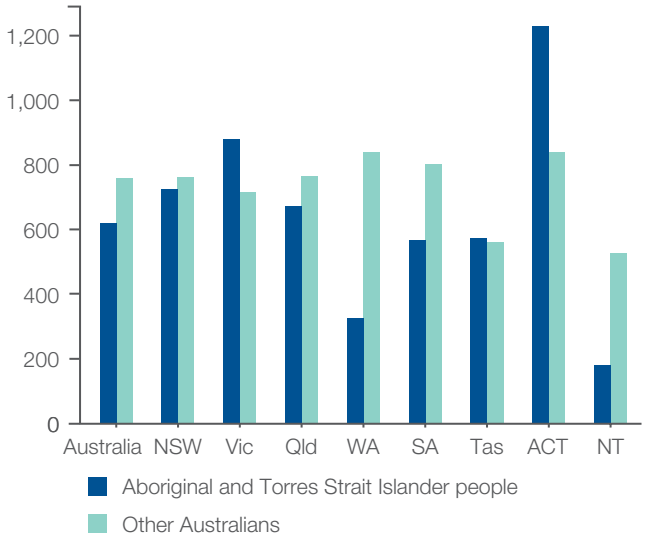
* There are 340 SA3s. For this item, data were suppressed for 20 SA3s due to a small number of hospitalisations and/or population in an area.

Tonsillectomy hospitalisations, 17 years and under

Analysis by Aboriginal and Torres Strait Islander status

In 2017–18, the rate for Aboriginal and Torres Strait Islander children (620 per 100,000 people) was 18% lower than the rate for other Australians (759 per 100,000 people) (Figure 3.1).

Figure 3.1: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2017–18

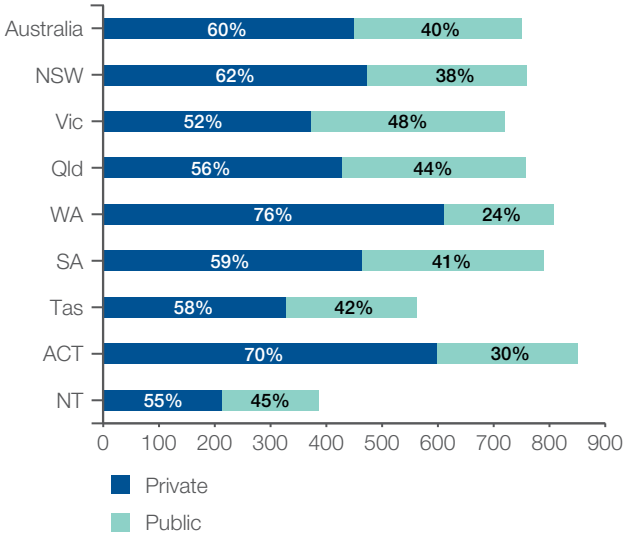


The data for Figures 3.1 and 3.2, and the data and graphs for analysis by Primary Health Networks are available at safetyandquality.gov.au/atlas

Analysis by patient funding status

Overall, 60% of hospitalisations for tonsillectomy were for privately funded patients. This proportion varied from 52% in Victoria to 76% in Western Australia (Figure 3.2).

Figure 3.2: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by state and territory of patient residence, by patient funding status, 2017–18



Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated, with variation among states and territories.
Hospitalisations for public patients do not incur a charge to the patient or a third-party payer (for example, a private health insurance fund), unlike hospitalisations for private patients.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Trends over time

Between 2012–13 and 2017–18, the rate of tonsillectomy hospitalisations per 100,000 people nationally increased by 3% (Figure 3.8).

For Aboriginal and Torres Strait Islander children, the rate of tonsillectomy hospitalisations per 100,000 people nationally increased by 58% during this period (Figure 3.9).

Interpretation

Variation in rates of tonsillectomy is likely to be due to geographical differences in the factors discussed below.

Variations between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on where people live rather than where they obtain their health care. Patients may travel outside their local area to receive care.

Rates of underlying disease

Variation is warranted and desirable when it reflects variation in the underlying need for care. However, use of tonsillectomy may not match patterns of patient need.

There are indications that rates of sore throat and rates of obstructive sleep symptoms may be higher in areas of severe socioeconomic disadvantage.[7] Indigenous children from the Torres Strait and Northern Peninsula Area had a relatively high prevalence of symptoms suggestive of obstructive sleep problems in a 2004 study[24], although research in this area is lacking.[25]

Clinical decision-making

High or low rates of tonsillectomy in some areas may be related to clinical practice that is not supported by evidence.

A recent Australian study found that around one-quarter of patients with serious recurrent episodes of tonsillitis were not referred for a tonsillectomy.[26] A similar pattern has been observed in the United Kingdom, where a study found that selection for tonsillectomy did not regularly follow evidence-based criteria.[27]

There is no current Australian evidence-based guideline for the use of tonsillectomy in managing recurrent throat infections and OSA in children. The most recent national document is a 2008 position paper on indications for tonsillectomy and adenotonsillectomy.[28]

Differences in diagnosing OSA may contribute to variation. The gold standard for diagnosing OSA before tonsillectomy is an overnight inpatient sleep study.[1,6,10] The test is expensive, and there is growing demand for use of the limited facilities that provide sleep studies for children in Australia[1,10,29], demonstrating the need for appropriate patient selection.

The referral process for sleep studies may also contribute to variation. Under the Medicare Benefits Schedule, a paediatric sleep specialist is required to review a child with OSA symptoms before and after the sleep study. These requirements may reduce appropriate access to sleep studies and increase waiting times for review of ENT symptoms – for example, in rural and remote areas.[30]

Tonsillectomy hospitalisations, 17 years and under

Access to tonsillectomy services

Ability to pay out-of-pocket costs for tonsillectomy is likely to be lower in areas of socioeconomic disadvantage.

Research has identified increasing rates of adenotonsillectomy in children who live in areas of socioeconomic advantage, suggesting increasing demand for tonsillectomy in more advantaged areas and lack of access to surgery in disadvantaged groups.[7]

This pattern was not reflected across all Atlas data, apart from remote areas, where the rate was lower in areas of socioeconomic disadvantage.

Distance to travel to see ENT surgeons may affect clinical decision-making. Remote and rural patients often have to travel a long way to see a specialist. This may influence a surgeon to recommend surgery earlier, because of difficulties for the patient in returning for follow-up visits.

For metropolitan patients, healthcare access may depend on cost as well as health literacy (which may be influenced by cultural and language barriers).

Parents of Aboriginal and Torres Strait Islander children may not seek care for OSA because of lack of awareness of potential implications for the child's health. Support from family and friends is an important factor in influencing the uptake of therapy.[31] Improved access to ENT surgeons through government programs may have contributed to the increase in tonsillectomy rates for Aboriginal and Torres Strait Islander children between 2012–13 and 2017–18.

Rates of private health insurance and waiting times

Access to a hospital bed is likely to be one of the largest influences on variation in care.

Having private health insurance allows affordable access to the procedure in private hospitals. Atlas data found that, overall, 60% of hospitalisations for tonsillectomy were for privately funded patients.

This aligns with other admitted patient data that showed that, in 2017–18, 50% more tonsillectomies were performed in private hospitals than in public hospitals (1.5 operations per 1,000 population in private hospitals, compared with 1.0 per 1,000 population in public hospitals).[23]

In 2017–18, the median waiting time for elective tonsillectomy in a public hospital was 121 days, ranging from 23 days in the Northern Territory to 293 days in New South Wales and 326 days in the Australian Capital Territory.[32] Having private health insurance significantly reduces waiting time for a tonsillectomy in a public hospital. In 2015–16, public patients waited almost three times longer than privately insured patients to have a tonsillectomy in a public hospital (median waiting times 138 days and 49 days, respectively).[33] However, shorter waiting times for private patients may reflect severe OSA or other medical problems.

Long waits for surgery in public hospitals may mean that some parents choose to pay for their child's operation in the private system rather than having the child continue to have OSA or tonsillitis.

Lower rates of tonsillectomy among Aboriginal and Torres Strait Islander children may reflect lower rates of private health insurance cover in this population.

Parents' preference

Consumers' understanding of the options, and risks and benefits of tonsillectomy may affect variation. Parents may not understand that symptoms might resolve without treatment. They may also have unrealistic beliefs that tonsillectomy will always cure OSA.[6] (Tonsillectomy does not resolve around 17–40% of uncomplicated cases of OSA.[21])

The first Atlas recommended that the Australian Commission on Safety and Quality in Health Care review patient information about tonsillectomy in Australia.[5] The review found that most (37 out of 50) resources examined did not include a description of what would occur if recurrent tonsillitis and OSA were not treated.[34]

Similarly, an Australian study found that most online consumer health information about adenotonsillectomy for children with OSA was highly favourable about the potential benefits of surgery and downplayed potential complications or non-surgical options.[35] Since this study, Safer Care Victoria has published a fact sheet to help GPs and families discuss the risks and benefits of tonsillectomy.[36]

Addressing variation

More information is needed to ensure that evidence-based care is provided to children with recurrent tonsillitis or OSA. There is an urgent need for information about the short- and long-term outcomes of tonsillectomy for different indications.

Further developing the ENT data registry of the Australian Society of Otolaryngology Head and Neck Surgery could capture information on eligible patients, provide comparative feedback to ENT surgeons on their rates of tonsillectomy and add to the knowledge base about outcomes for specific groups of patients. All parents who decide that their children should have tonsillectomy should be informed about the ENT data registry and, if their child meets the registration criteria, should be asked if they are willing for them to be included. Surgeons undertaking this procedure should contribute data on eligible patients to the ENT data registry and participate in routine peer review.

Other options to address variation include the following:

Improve evidence base, and access to diagnosis and appropriate treatment

- Improve the evidence behind the indications for surgery and non-surgical options to inform clinical practice
- Update Australian clinical practice guidelines, although in the United Kingdom variation in rates of tonsillectomy increased despite publication of guidelines[36]
- Disseminate the guidelines and promote uptake, including through parent-focused education and an awareness strategy using fact sheets, social media and other channels
- Ensure that the updated guidelines include specific and targeted recommendations to increase access to tonsillectomy among Aboriginal and Torres Strait Islander children who need the procedure
- Prioritise public health, clinical research and intervention programs that aim to address disparity and improve Aboriginal and Torres Strait Islander children's access to surgery and other treatments
- Ensure that culturally capable and publicly funded ENT services are embedded in the Aboriginal and Torres Strait Islander community care sector, and that there are processes to ensure appropriate selection and triage for remote Aboriginal and Torres Strait Islander children to have ENT surgery in public hospitals.

Improve data about access

- Improve data about access to tonsillectomy, such as ENT surgeon distribution, rates of private health insurance by SA3 and waiting lists.

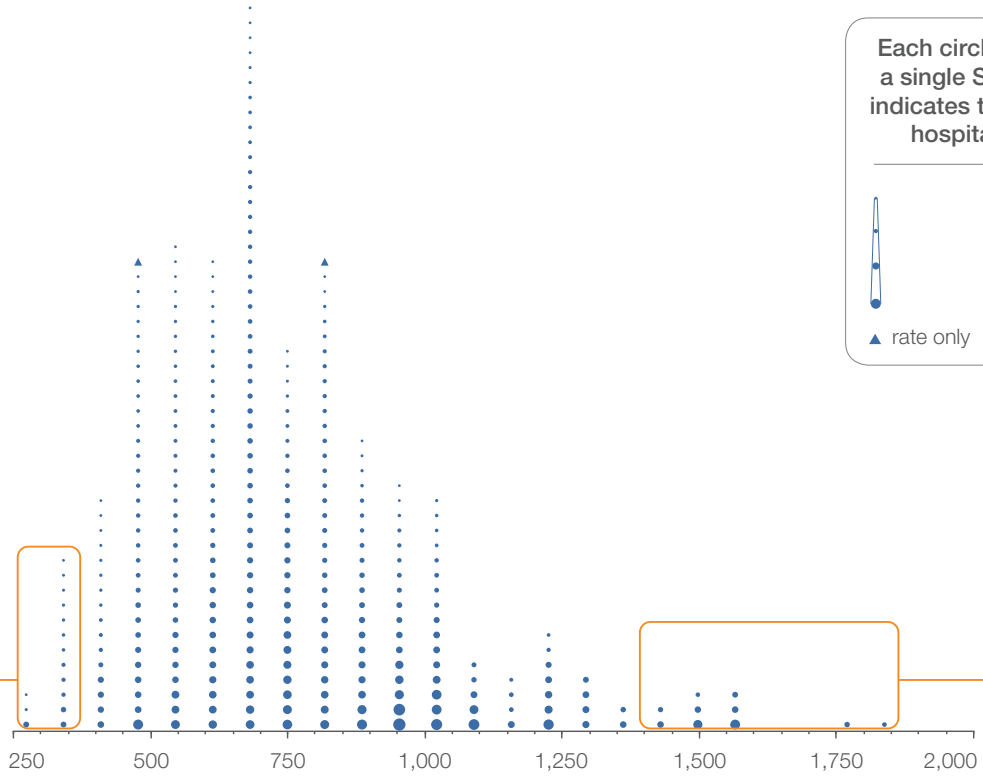
Improve shared decision making

- Encourage shared decision making so that rates of the procedure are based on patients' needs and assessment of benefits and risks[37]
- Support shared decision making by giving patients accurate information, and informing GPs to avoid over- or underestimating the risks and benefits of tonsillectomy, which could drive variation in referral to an ENT surgeon; Safer Care Victoria's decision-making tools for GPs and parents for tonsillectomy (see 'Australian initiatives' on page 190) provide this opportunity for shared decision making and could be disseminated nationally
- Raise awareness of the health risks of untreated OSA and the benefits of treatment as an important first step for Aboriginal and Torres Strait Islander people to seek treatment.[31]

Tonsillectomy hospitalisations, 17 years and under

Rates by local area

Figure 3.3: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Melbourne City	Vic	**305**	41
Far North	Qld	**334**	34
Dandenong	Vic	**335**	145
Monash	Vic	**346**	125
Brisbane Inner	Qld	**346**	27
Augusta - Margaret River - Busselton	WA	**357**	48
Auburn	NSW	**360**	74
Whitehorse - East	Vic	**365**	53
Sunnybank	Qld	**373**	44
Whitehorse - West	Vic	**378**	80
Devonport	Tas	**385**	37
Alice Springs	NT	**390**	40
Blacktown	NSW	**398**	144
Manningham - West	Vic	**398**	76
Yarra	Vic	**400**	54

Highest rate areas

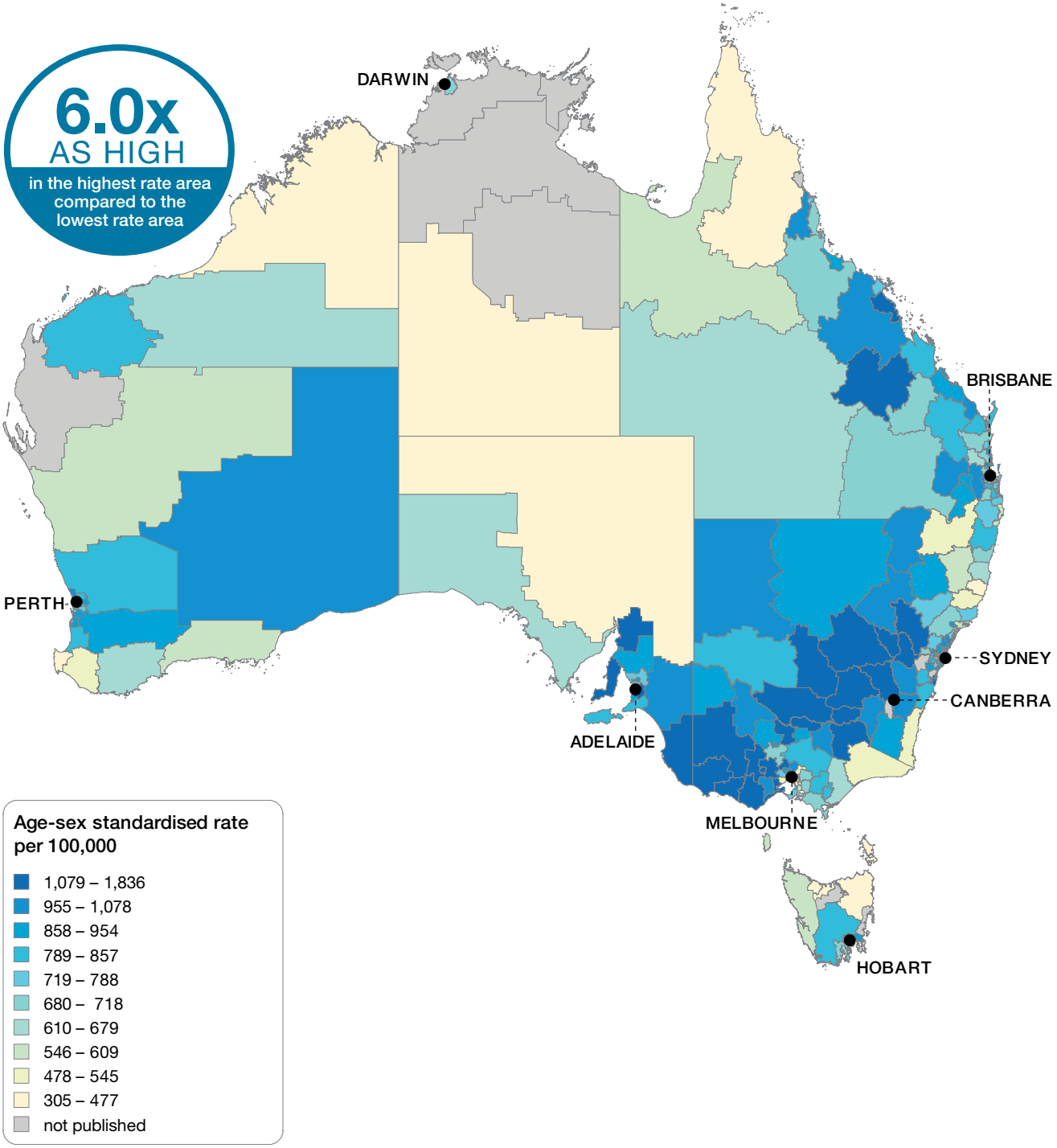
SA3	State	Rate	Hospitalisations
Maryborough - Pyrenees	Vic	**1,836**	94
Glenelg - Southern Grampians	Vic	**1,777**	127
Ballarat	Vic	**1,602**	413
Bathurst	NSW	**1,602**	183
Young - Yass	NSW	**1,597**	145
Wagga Wagga	NSW	**1,532**	359
Warrnambool	Vic	**1,504**	176
Creswick - Daylesford - Ballan	Vic	**1,503**	89
Griffith - Murrumbidgee (West)	NSW	**1,463**	186
Campaspe	Vic	**1,428**	118

Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations as at 30 June of 2017 and 2018.

Tonsillectomy hospitalisations, 17 years and under

Rates across Australia

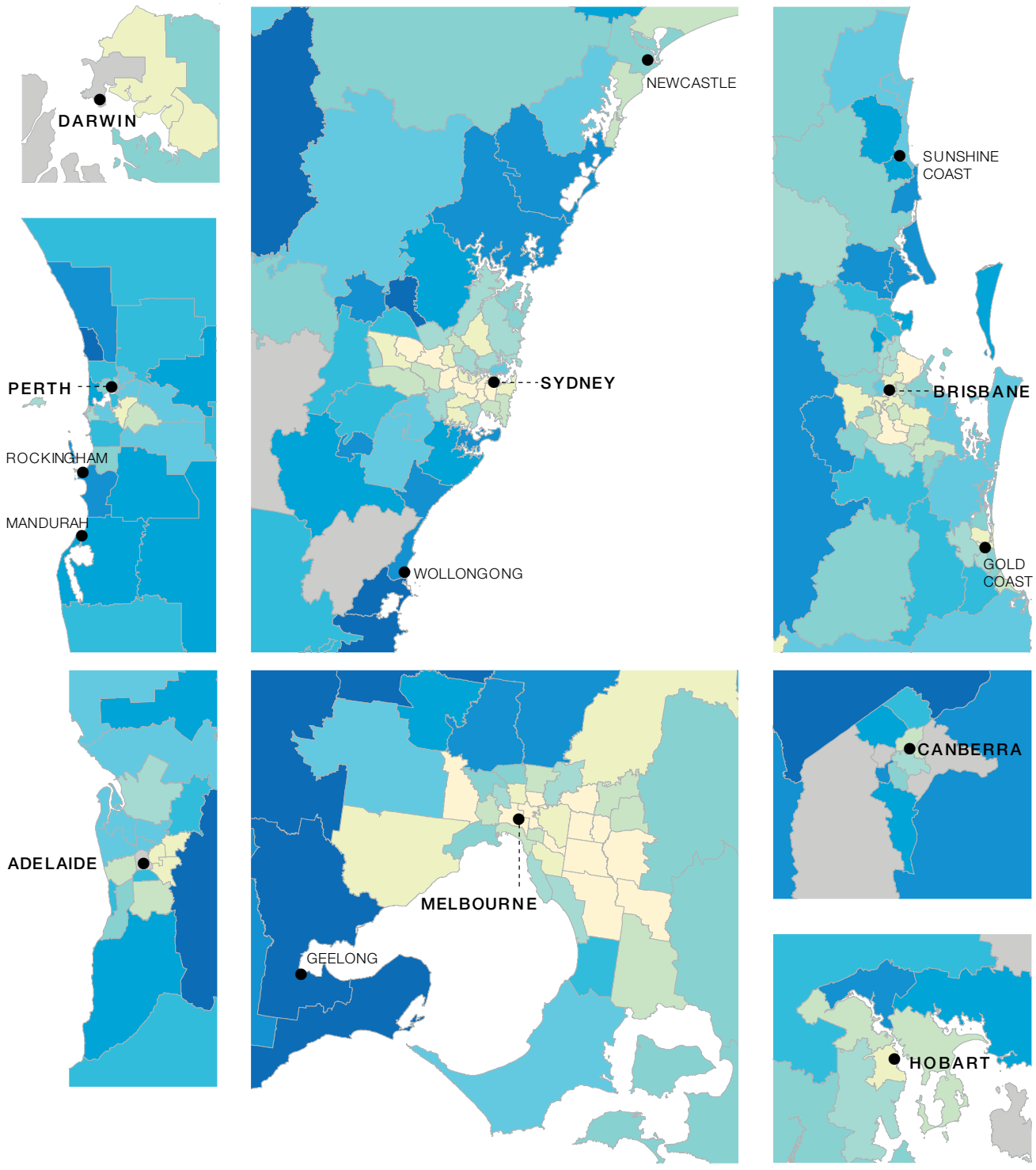
Figure 3.4: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Notes:
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates across capital city areas

Figure 3.5: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



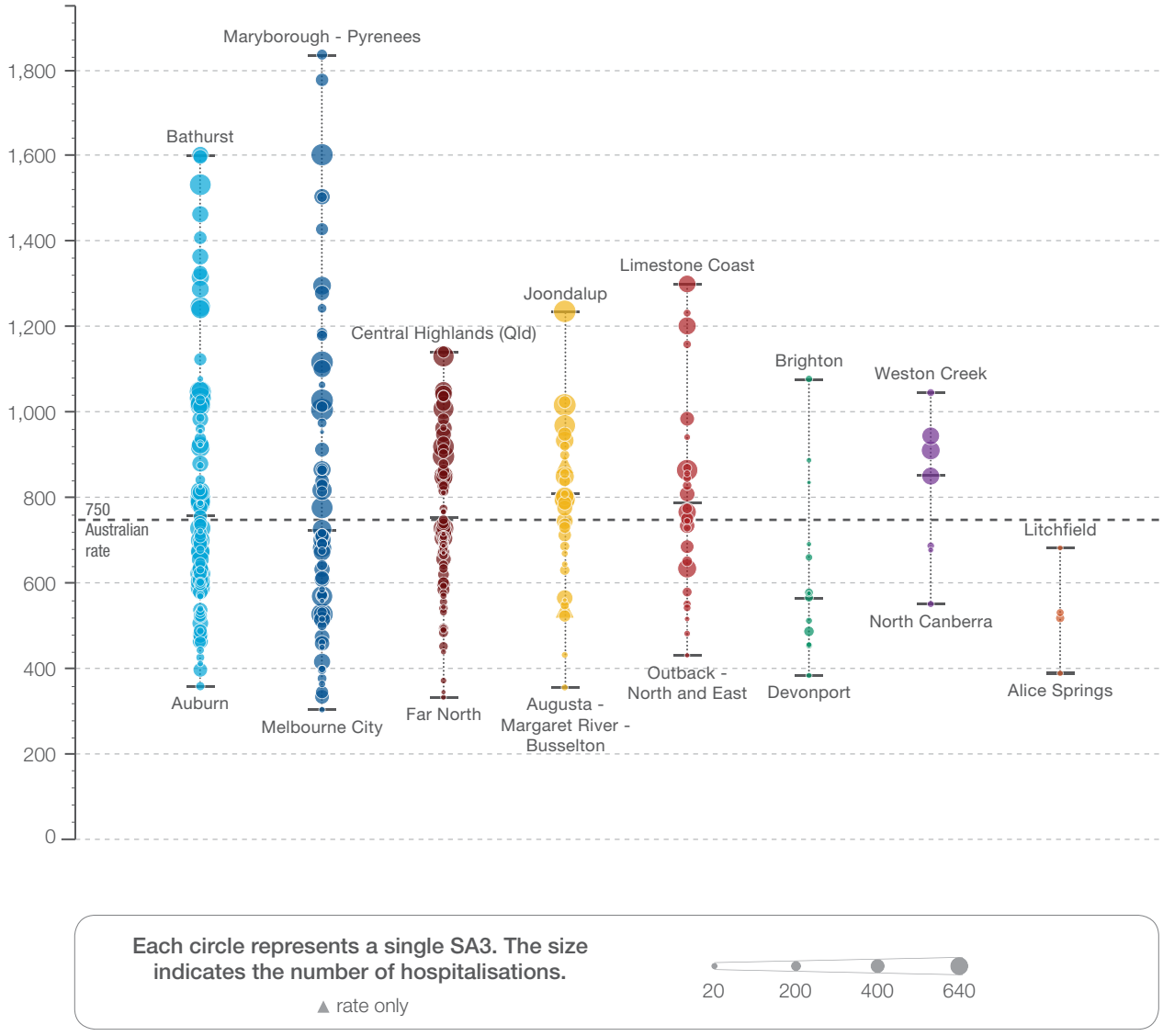
Notes:
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Tonsillectomy hospitalisations, 17 years and under

Rates by state and territory

Figure 3.6: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

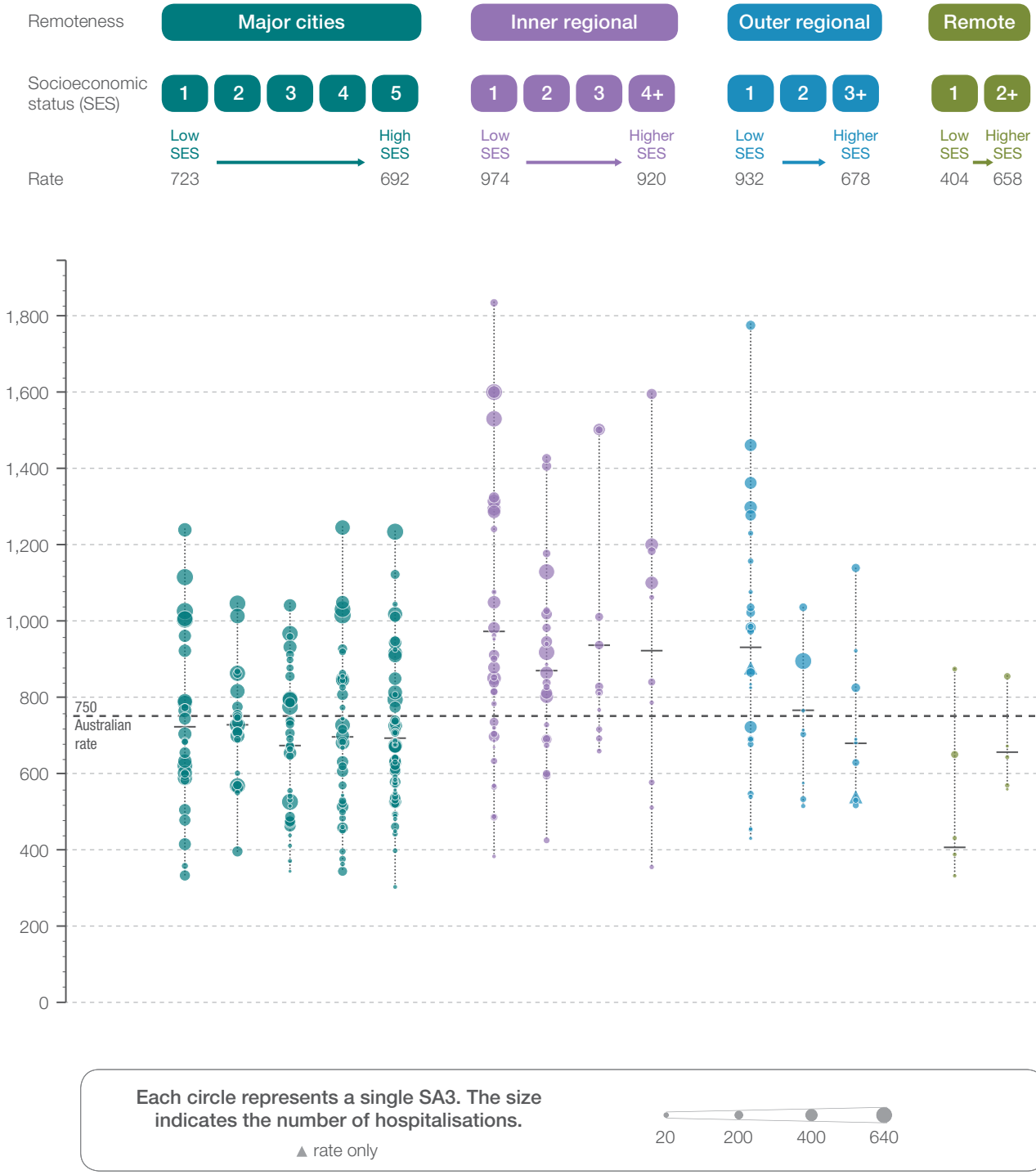
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	1,602	1,836	1,141	1,236	1,300	1,078	1,046	683
State/territory	760	721	757	807	789	562	850	387
Lowest rate	360	305	334	357	432	385	552	390
No. hospitalisations	13,666	10,296	8,892	4,971	2,932	631	838	251



Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
For the NT, the territory rate is lower than the minimum SA3 rate as it includes SA3 rates that are not published for reliability reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

Figure 3.7: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



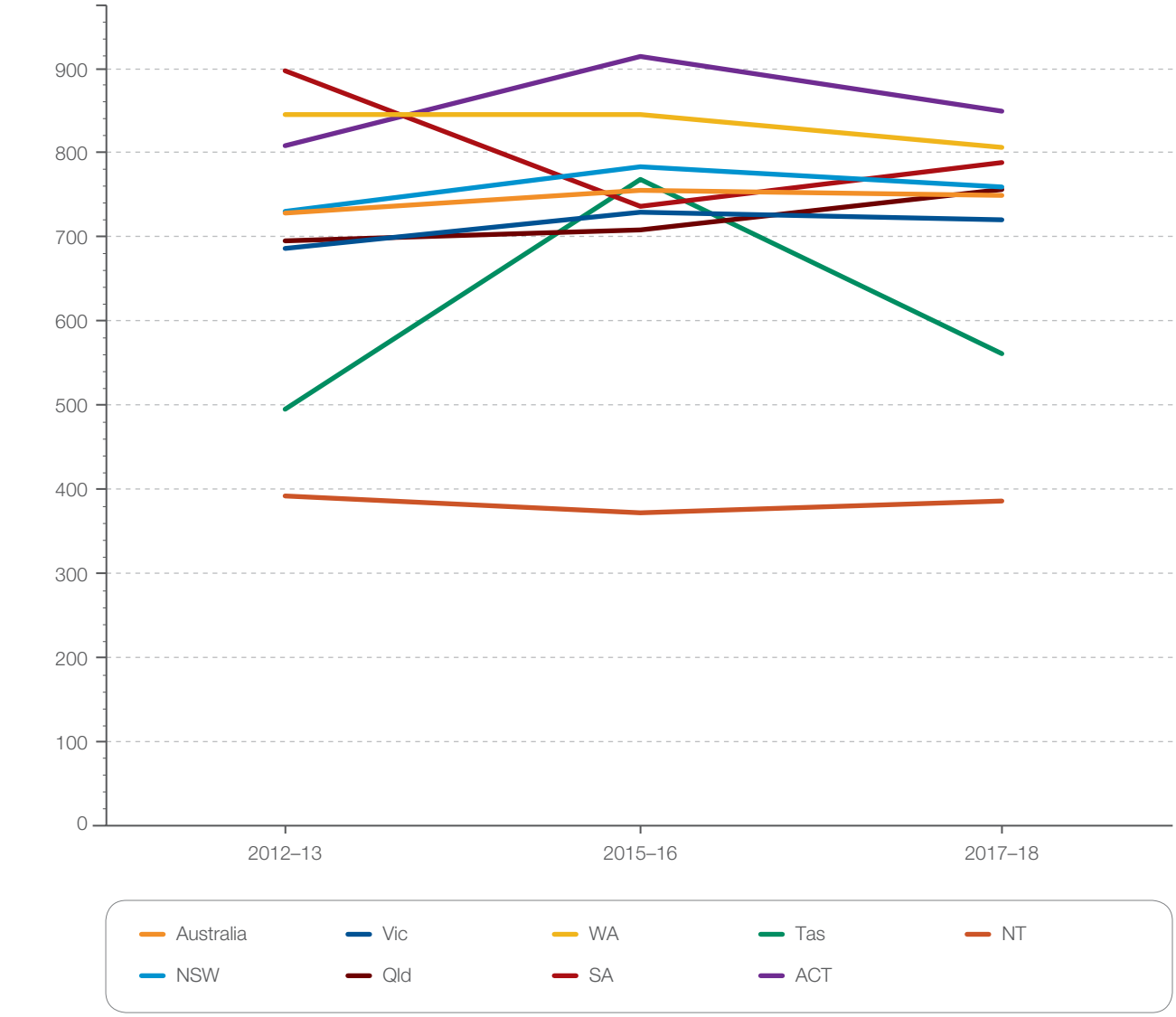
Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Tonsillectomy hospitalisations, 17 years and under

Rates across years

Figure 3.8: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by state and territory of patient residence, 2012–13, 2015–16 and 2017–18

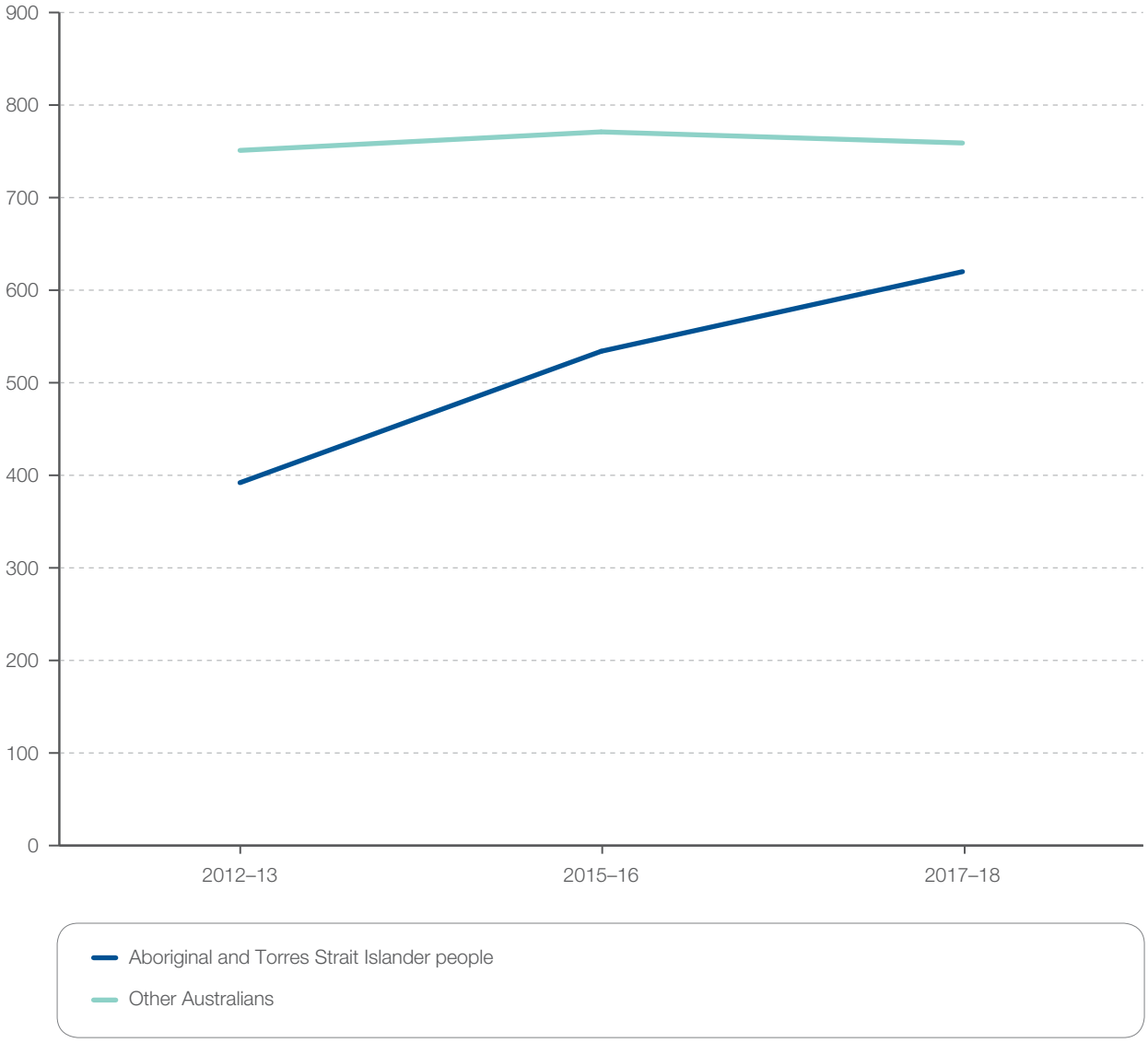
	2012–13	2015–16	2017–18
Highest SA3 rate	2,414	1,753	1,836
Australian rate	**729**	**756**	**750**
Lowest SA3 rate	218	258	305
Magnitude of variation	11.1	6.8	6.0
Magnitude of variation without top & bottom 10% SA3	2.3	2.3	2.2



Notes:
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2012, 2013 and 2015 to 2018.

Rates for Aboriginal and Torres Strait Islander people across years

Figure 3.9: Number of hospitalisations for tonsillectomy per 100,000 people aged 17 years and under, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2012–13, 2015–16 and 2017–18



Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated among states and territories, with variation among states and territories.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2012, 2013 and 2015 to 2018.

Tonsillectomy hospitalisations, 17 years and under

Resources

- Clinical practice guideline: tonsillectomy in children (update), American Academy of Otolaryngology – Head and Neck Surgery[6]
- Plain language summary for patients: tonsillectomy in children, American Academy of Otolaryngology – Head and Neck Surgery[38]
- Tonsillectomy for obstructive sleep-disordered breathing or recurrent throat infection in children, Agency for Healthcare Research and Quality[8]

Resources for GPs

Resources to support GPs in shared decision making with families were introduced in November 2018, as part of the Statewide Paediatric HealthPathways Project, under the Victorian and Tasmanian Primary Health Network Alliance partnership (vtphna.org.au/our-work/best-practice-prevention-management-and-support/statewide-paediatric-healthpathways-project). The clinical pathways and associated referral pages cover:

- Snoring and obstructive sleep apnoea in children
- Sore throat in children.

Australian initiatives

ENT surgical registry

The Australian Society of Otolaryngology Head and Neck Surgery operates a surgical registry that collects data on ENT surgical procedures. The registry, which has been operating for two years, collects data on tonsillectomy, insertion of grommets and septoplasty.

Shared decision-making resources

Safer Care Victoria has developed a suite of consumer resources to support patient decision-making for tonsillectomy (bettersafercare.vic.gov.au/resources/tools/making-a-decision-about-tonsillectomy), including a fact sheet.[35]

HealthPathways

HealthPathways is a free online health information portal with evidence-based guidance on the assessment, management and referral of common clinical conditions.[39] These resources, which have been developed locally across Australia, have the potential to improve the standardisation of treatment.[40]

Paediatric sleep unit in Darwin

A paediatric sleep service was established as part of the local Darwin adult sleep clinic in 2016. The service, which provides telehealth consultations by paediatric sleep physicians, and diagnostic and treatment services, has improved the management of sleep issues, including OSA, in Aboriginal and Torres Strait Islander children.[41]

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3.2 Myringotomy hospitalisations, 17 years and under

Why is this important?

Myringotomy is one of the most common surgeries performed in young children. It is used to treat otitis media, an infection of the middle ear that can cause hearing loss.

Myringotomy (with insertion of grommets) is recommended for children who have otitis media with effusion (fluid) and documented hearing loss in both ears for more than three months.[1,2] The likelihood of benefit of myringotomy increases with the severity of the hearing loss.[2]

The first Atlas found wide variation in the rates of myringotomy, and a correlation between higher rates of myringotomy and higher socioeconomic status in some areas.

There is continuing concern about variation in myringotomy rates that might not align with the expected prevalence of the conditions being treated. Otitis media is the key cause of hearing loss in Aboriginal and Torres Strait Islander children, who are at risk of earlier, more severe and longer-lasting middle ear disease than other children.[3] This is the first Atlas to examine rates in Aboriginal and Torres Strait Islander children.

What did we find?

In 2017–18, the number of hospitalisations for myringotomy across 314 local areas (Statistical Area Level 3 – SA3) ranged from 198 to 1,607 per 100,000 people aged 17 years and under. The rate was **8.1 times as high** in the area with the highest rate compared with the area with the lowest rate.

The rate for Aboriginal and Torres Strait Islander children was 6% higher than the rate for other children. It is less than what would be expected if surgery rates matched the prevalence of otitis media in Aboriginal and Torres Strait Islander children.

What can be done?

A comprehensive approach combining prevention, early treatment and coordinated management is urgently required to reduce rates of otitis media in Aboriginal and Torres Strait Islander children. Prevention strategies in Aboriginal and Torres Strait Islander communities must take a wide-ranging, whole-of-community approach driven by primary health care.[4] Strategies to ensure that children who need myringotomy surgery receive it include improving the collection and monitoring of data on ear health and hearing, obtaining better data on access to myringotomy and surgery outcomes, improving training of general practitioners (GPs) and other health professionals in diagnostic techniques, and updating Australian clinical guidelines.

Myringotomy hospitalisations, 17 years and under

Context

The first *Australian Atlas of Healthcare Variation* identified substantial variation in hospitalisations for myringotomy in children and young people in 2012–13. This variation – up to 6.8 times as high in the area with the highest rate compared with the area with the lowest – warrants further investigation.[5]

Myringotomy is a procedure to make a small cut in the eardrum (tympanic membrane) to drain fluid from the middle ear. It usually involves inserting grommets (tympanostomy tubes) to keep the cut open, and to allow ventilation and drainage of the middle ear.[6]

It is most commonly used to treat otitis media, an infection of the middle ear that is common in young children. Otitis media is a spectrum of diseases, ranging from otitis media with effusion (OME; where fluid builds up behind the eardrum) to acute otitis media (AOM; painful infection of the middle ear) and chronic suppurative otitis media (CSOM; perforated eardrum with chronic discharge).[7]

Myringotomy with insertion of grommets is one of the most common surgical procedures performed in children in Australia.[7] It is most often performed in children aged 0–4 years.[8]

This Atlas again maps hospitalisation rates for myringotomy in children and young people (aged 17 years and under), and also examines rates in Aboriginal and Torres Strait Islander children and young people.

In 2016, the Medicare Benefits Schedule Review Taskforce recommended further work to examine the reasons for geographic variation in rates of myringotomy, particularly the low rates in the Northern Territory, where lack of service provision could have serious implications for hearing problems in Aboriginal and Torres Strait Islander communities.[9]

Otitis media in Aboriginal and Torres Strait Islander children

Aboriginal and Torres Strait Islander children experience the highest rate of middle ear disease in the world.[7] Otitis media is the key cause of hearing loss in Aboriginal and Torres Strait Islander children, who are at risk of earlier, more severe and longer-lasting middle ear disease than other children.[3]

Recurrent episodes of acute otitis media (AOM) can lead to chronic suppurative otitis media (CSOM; 'runny ear'), which causes chronic discharge through a perforation in the eardrum. CSOM is the most disabling form of otitis media and is most likely to persist without treatment.[10] The discharge from CSOM can last for years and can cause permanent hearing loss.
The prevalence of CSOM in Aboriginal and Torres Strait Islander children declined from 24% in 2001 to 14% in 2012.[11] This is still higher than the World Health Organization's measure of 4% prevalence that indicates a 'massive public health problem'.[12]

Hearing loss in the critical first 1,000 days of life can have a devastating impact on Aboriginal and Torres Strait Islander children that can continue into adulthood. It can affect speech and language development, leading to problems in education, including language development, inattention, truancy and early school leaving.[13]

There are national guidelines on the management of otitis media in Aboriginal and Torres Strait Islander populations.[2] The priority for primary care programs for Aboriginal and Torres Strait Islander people is to improve identification of children with otitis media, hearing loss, or speech and language problems, and to offer early and effective guideline-recommended care.

Place of myringotomy in therapy

Myringotomy with grommets is an effective procedure for some children who have had OME for more than three months.[14] It may decrease episodes in some children who have recurrent AOM, although evidence is limited.[15] Guidelines do not recommend the procedure as a first-line treatment for either condition in most cases[16], nor myringotomy without insertion of grommets.[2]

Otitis media with effusion

OME, also known as glue ear, causes a build-up of fluid (effusion) in the middle ear. It has been described as an insidious disease that may be overlooked because it usually has no symptoms apart from hearing loss.[16] OME is often found in children after an episode of AOM.[17]

In most cases, OME resolves without treatment within three months.[1] However, OME persists in at least 25% of children, and can cause ongoing hearing loss, and problems with language, education and behaviour.[16]

Clinical practice guidelines note there is strong evidence to support watchful waiting for three months for children who do not have other risk factors (such as speech delays) to see if OME resolves without surgery. The guidelines recommend myringotomy (with insertion of grommets) for children who have OME in both ears for more than three months and documented hearing loss.[1,2,16,18]

Myringotomy with grommets achieves a modest improvement in hearing for the first 6–9 months compared with watchful waiting.[14] The likelihood of benefit increases with the severity of the hearing loss.[2] The procedure has also been found to prevent fluid build-up in the middle ear (while the grommets are in place).[1]

Acute otitis media

AOM is one of the most common reasons for severe pain in babies and children. It is an infection of the middle ear that comes on suddenly and causes pain, fever, a red and bulging eardrum, and fluid in the middle ear.[2]

United States clinical practice guidelines advise that clinicians may offer myringotomy with insertion of grommets as an option for a child who has had three episodes of AOM in six months or four in a year.[19] The American Academy of Otolaryngology recommends (on the basis of strong evidence) that grommets should not be inserted for recurrent AOM unless middle ear effusion is also present at the time of assesssment.[19]

A Cochrane systematic review found that children who received grommets were less likely to have recurrences of AOM than those who had active monitoring and placebo medication (low to very low-quality evidence). The effect was modest, with only one fewer episode of AOM at six months in children who received grommets.[15]

The review also found that it was uncertain whether grommets were more effective than antibiotics in preventing recurrent AOM. It pointed out that none of the studies had looked at how grommets affected the severity of AOM recurrences or antibiotic use. This was important because grommets could reduce the severity of AOM recurrences and allow the use of antibiotic eardrops, reducing the risk of side effects and antimicrobial resistance associated with oral antibiotics.[15]

The reviewers concluded that the modest potential benefits of grommets need to be balanced against the risks of both the procedure and any surgical intervention in young children, and called for new and high-quality randomised controlled trials.[15]

Myringotomy hospitalisations, 17 years and under

What are the potential harms?

The most common postoperative complication of grommet insertion is discharge through the grommets (otorrhoea), which occurs in about one-quarter of children while the grommet is in place.[20] Eardrum perforations, which may require repair, occur in about 2% of children who have short-term grommets.[20]

Preventing otitis media

Otitis media may be prevented to some extent through improved living standards, maternal education, breastfeeding, a smoke-free environment and pneumococcal vaccination.[2] The pneumococcal conjugate vaccine reduces the risk of AOM and recurrent AOM in children.[2]

Prevention should have a whole-of-community approach driven by primary health care.[2]

Why revisit variation in myringotomy?

The first *Australian Atlas of Healthcare Variation* examined hospitalisations for myringotomy for people aged 17 years and under.[5] It found that, in 2012–13, the number of myringotomy hospitalisations across 308 local areas (SA3s) ranged from 205 to 1,398 per 100,000 people aged 17 years and under.

The first Atlas found a correlation between higher rates of myringotomy and higher socioeconomic status in metropolitan, inner regional and remote areas. This correlation was reversed in outer regional areas, which had lower rates of surgery than other remote categories.

Given the wide variation seen in the first Atlas, it is important to revisit the item to provide a comparison over time, particularly to see whether variations between local areas (relatively high or low rates compared with others) continue. Examining rates over time improves the rigour of data.

There is also continuing concern about variation in myringotomy rates that might not align with the expected prevalence of the conditions being treated.

In 2016, the Medicare Benefits Schedule Review Taskforce highlighted the need for further work to explore the finding in the first Atlas of geographical variation in rates of myringotomy, including higher rates on the North Shore of Sydney, and in Adelaide and Perth.[9]

This Atlas also examines rates in Aboriginal and Torres Strait Islander children and young people, given the high burden of disease and low rates of myringotomy in this group.

About the data

Data are sourced from the National Hospital Morbidity Database, and include admitted patients in both public and private hospitals.

Rates are based on the number of hospitalisations for myringotomy per 100,000 people aged 17 years and under in 2012–13, 2015–16 and 2017–18.

Because a record is included for each hospitalisation for the procedure, rather than for each patient, patients hospitalised for the procedure more than once in the financial year will be counted more than once.

The analysis and maps are based on the usual residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence variations seen.

Some private hospitals in Tasmania admit public patients under a contractual arrangement. There is a small over-count of hospitalisations for the procedure in Tasmania because hospitalisations are recorded by both contracting hospital and contracted hospital.

What do the data show?

Magnitude of variation

In 2017–18, there were 34,755 hospitalisations for myringotomy, representing 600 hospitalisations per 100,000 people aged 17 years and under (the Australian rate). The median age for patients was 3 years, and this was similar across Australia.

The number of hospitalisations for myringotomy across 314* local areas (Statistical Area Level 3 – SA3) ranged from 198 to 1,607 per 100,000 people aged 17 years and under. The rate was **8.1 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 458 per 100,000 people in the Northern Territory to 895 in South Australia (Figures 3.12–3.15).

After the highest and lowest 10% of results were excluded and 252 SA3s remained, the number of hospitalisations per 100,000 people was 2.3 times as high in the area with the highest rate compared with the area with the lowest rate.

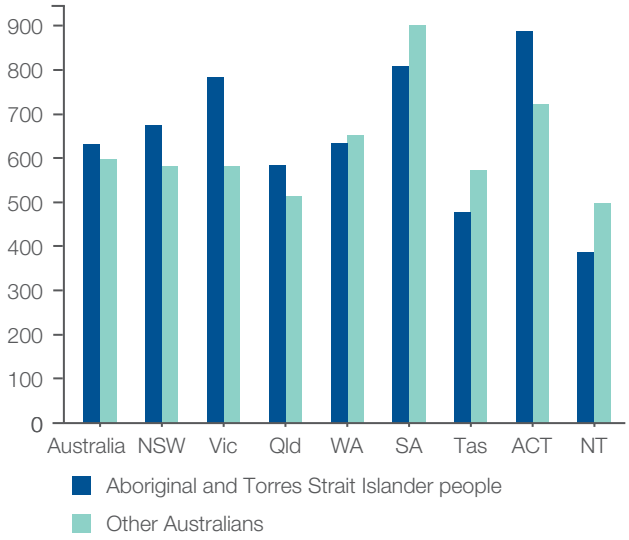
Analysis by remoteness and socioeconomic status

Rates for myringotomy hospitalisations were higher in inner regional areas than elsewhere. There was a pattern of higher rates with higher socioeconomic status in major cities and inner regional areas; the reverse pattern was seen in outer regional areas. No socioeconomic pattern was seen in remote areas (Figure 3.16).

Analysis by Aboriginal and Torres Strait Islander status

In 2017–18, the rate for Aboriginal and Torres Strait Islander people aged 17 years and under (632 per 100,000 people) was 6% higher than the rate for other people of the same age (598 per 100,000 people) (Figure 3.10).

Figure 3.10: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2017–18



The data for Figure 3.10 are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, data were suppressed for 26 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated, with variation among states and territories.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.

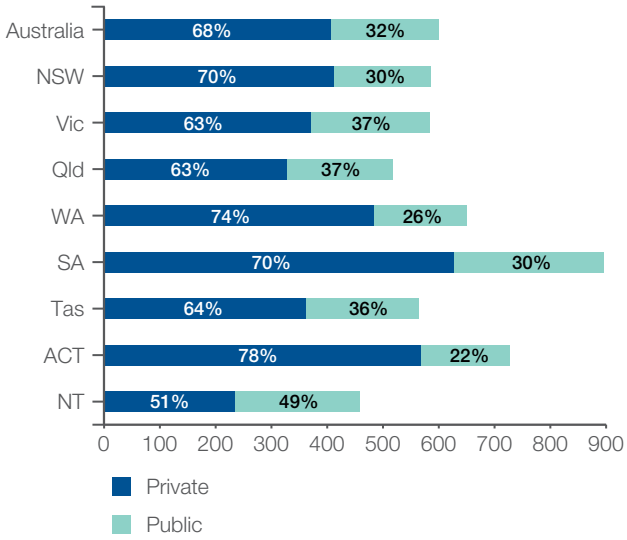
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Myringotomy hospitalisations, 17 years and under

Analysis by patient funding status

In 2017–18, overall, 68% of hospitalisations for myringotomy were for privately funded patients. This proportion varied from 51% in the Northern Territory to 78% in the Australian Capital Territory (Figure 3.11).

Figure 3.11: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by state and territory of patient residence, by patient funding status, 2017–18



The data for Figure 3.11, and the data and graphs for analysis by Primary Health Networks are available at safetyandquality.gov.au/atlas

Trends over time

Between 2012–13 and 2017–18, the rate of myringotomy hospitalisations per 100,000 people aged 17 years and under, nationally, decreased by 4%. The rate increased from 625 per 100,000 people aged 17 years and under in 2012–13 to 628 in 2015–16, before falling to 600 in 2017–18 (Figure 3.17).

For Aboriginal and Torres Strait Islander people, the rate of myringotomy hospitalisations per 100,000 people aged 17 years and under, nationally, increased by 30% between 2012–13 and 2017–18. The rate increased from 488 in 2012–13 to 550 in 2015–16, and rose again to 632 in 2017–18 (Figure 3.18).

Interpretation

Variation in rates of myringotomy is likely to be due to geographical differences in the factors discussed below.

Variation between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on the usual residential address of the patient and not the location of the hospital. Patients may travel outside their local area to receive care.

Rates of underlying disease

Variation is warranted and desirable when it reflects variation in the underlying need for care.

Australia's Health 2018 reported that, between July 2014 and June 2016, the overall rate of myringotomy and tympanoplasty procedures for children aged 0–14 years was similar for Aboriginal and Torres Strait Islander children (5.6 per 1,000) and other children (5.7 per 1,000).[21] However, ear disease is more common in Aboriginal and Torres Strait Islander children; if not treated, it can have devastating educational and social consequences. The burden

Notes:
Hospitalisations for public patients do not incur a charge to the patient or a third-party payer (for example, a private health insurance fund), unlike hospitalisations for private patients.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

of disease from otitis media in Aboriginal and Torres Strait Islander children is 8.5 times as high as in other children.[21] Also, there is substantial under-reporting of hearing impairment in the Aboriginal and Torres Strait Islander population.[22]

A Western Australian study examining Aboriginal and Torres Strait Islander children's access to surgery for otitis media found that children from disadvantaged backgrounds (Aboriginal and other children) had higher rates of hospitalisation for otitis media but lower rates of grommet insertion than children from advantaged backgrounds. It found that the rates of grommet surgery increased with greater socioeconomic advantage and were higher for children living in major cities than in remote areas, even though the disease burden was greater in socioeconomically disadvantaged families.[23]

This is consistent with a New South Wales study that found that the rates of grommet surgery in Aboriginal and Torres Strait Islander children aged under 4 years were around two-thirds of the rates in other children. This 'significant inequality' in grommet surgery between Aboriginal and Torres Strait Islander and other children was due to differences in socioeconomic status and geographical remoteness.[24]

The findings of this Atlas have shown a 30% increase in the national myringotomy rates in Aboriginal and Torres Strait Islander children between 2012–13 and 2017–18.

Although the 2017–18 Atlas data show that the myringotomy rate for Aboriginal and Torres Strait Islander children is 6% higher than the rate for other children, it does not match the rate that would be expected if surgery rates matched the prevalence of otitis media in Aboriginal and Torres Strait Islander children.

Clinical decision-making

High or low rates of myringotomy in some areas may be related to clinical practice that is not supported by evidence-based guidelines.

The only current national Australian guidelines on the management of otitis media in children are clinical care guidelines on the management of otitis media in Aboriginal and Torres Strait Islander populations[2], which were developed in 2010 and updated in 2017.

Guidelines developed in the United States[19] and the United Kingdom[16] also guide practice in Australia.

Despite the availability of guidelines, it can be challenging for clinicians to advise parents about treatment because recommendations vary depending on the child's age, the condition, the risk of complications and parents' preferences.[7]

There is also concern that clinicians may interpret and apply guidelines from the United States and the United Kingdom differently, and this may lead to inconsistency in care.[25]

Parents' preferences

Consumers' understanding of the options, and risks and benefits, of myringotomy may affect variation.

Clinicians may recommend watchful waiting in line with clinical guidelines, but ultimately parents make treatment decisions and may push for surgical intervention, often after months of experiencing the social, financial and emotional impacts of caring for a child with recurrent otitis media.[25]

A qualitative study of Australian parents who had a child booked to have grommet surgery found that parents had been frustrated with watchful waiting and the requirement for a minimum number of episodes of otitis media a year before referral to an ear, nose and throat (ENT) surgeon. Some parents who were unhappy with their GP's response had pushed for a referral or had shopped around for another GP who would refer for surgery. All parents in the study expected that surgery would improve their child's symptoms and quality of life; some parents believed that surgery would cure their child.[25]

Myringotomy hospitalisations, 17 years and under

Parents of Aboriginal and Torres Strait Islander children may feel less empowered to push for their child to have a myringotomy because of a lack of culturally safe services.[26]

Diagnostic skills and training

Early detection of chronic otitis media is vital to prevent hearing loss in children.[3] Otitis media is often diagnosed and managed in general practice.[27] There are concerns that GPs may over- or under-diagnose OME, partly as a result of challenges in accurate diagnosis.[27]

Clinical guidelines recommend the use of two diagnostic tools – pneumatic otoscopy and tympanometry – to accurately detect fluid in the middle ear.[1] A small qualitative Australian study reported that some GPs believe that pneumatic otoscopy and tympanometry may not be practical in general practice and that the techniques were not essential to diagnosing otitis media. It also found that there was a lack of training for GPs in these techniques and that GPs might need to be convinced of the benefits of using these techniques to detect otitis media in general practice.[27]

Access to audiology services

The availability of audiology services may affect the timely detection of otitis media and rates of myringotomy. Audiology services can be used to triage children and select those requiring specialist review.[28]

Access to myringotomy services

Access to myringotomy surgery may be affected by the availability of ENT specialists, which varies across states and territories. Australian Government Department of Health figures show that, in 2016, there were 460 ENT specialists (also known as otolaryngologists) in Australia, of whom 85% worked in a major city and 0.2% worked in the most remote areas.[29] South Australia had the highest ratio of otolaryngologists to population (2.3 per 100,000 people), compared with the Northern Territory, which had the lowest ratio (0.8 per 100,000 people).[29] These figures largely reflect surgeons' primary places of practice.

Atlas data show that South Australia had the highest number of myringotomy hospitalisations (895 per 100,000 people aged 17 years and under) of any state or territory, and the Northern Territory had the lowest (458).

Distance to travel to see ENT surgeons may affect clinical decision-making. Remote and rural patients often have to travel a long way to see a specialist. These factors may influence a surgeon to recommend surgery earlier, due to difficulties in their patient returning for follow-up visits. Health literacy, cultural and language barriers may affect access in some areas.

Rates of private health insurance and waiting times

Having private health insurance allows affordable access to the procedure in private hospitals. Atlas data found that, overall, 68% of hospitalisations for myringotomy were for privately funded patients.

This aligns with other admitted patient data showing that, in 2017–18, the rate of myringotomy performed in private hospitals was almost double the rate performed in public hospitals (1.1 operations per 1,000 people in private hospitals, compared with 0.6 in public hospitals).[30]

Having private health insurance significantly reduces the waiting time for a myringotomy in a public hospital. In 2015–16, public patients waited 3 times longer than privately insured patients to have a myringotomy in a public hospital (median waiting time 63 days versus 21 days).[31]

In areas of socioeconomic disadvantage, the burden on the public system is higher, and public patients may have no other option but to access the private system as self-funded patients rather than wait for surgery in the public system and risk hearing loss, and speech and language delays.

Addressing variation

Aboriginal and Torres Strait Islander children

Interventions to improve prevention, diagnosis and treatment of otitis media in Aboriginal and Torres Strait Islander children are a priority.

A comprehensive approach combining prevention, early treatment and coordinated management is required to address the disparity in rates of otitis media between Aboriginal and Torres Strait Islander children and other children.[4]

Primary prevention includes working with families to encourage breastfeeding, encourage healthy eating, reduce exposure to second-hand smoke, clear nasal passages, seek early medical assessment and encourage vaccination.[2]

Otitis media prevention must include a wide-ranging, whole-of-community approach driven by primary health care. A central part of community messaging must be awareness of the devastating implications of hearing loss at an early age.[2]

Once otitis media develops, medical management should be in line with the *Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations*.[2]

Specific interventions could include the following:

Improved monitoring of ear health

- Improve data collection to monitor the national prevalence of ear disease, geographic distribution, wait times between referrals, and whether timely and appropriate treatments are being delivered
- Undertake annual national reporting of readily available data on hospital treatment and interventions for Aboriginal and Torres Strait Islander children with middle ear disease and hearing loss
- Develop national ear and hearing health performance indicators.

Training and workforce innovations

- Train GPs at registrar level to use pneumatic otoscopy
- Primary care networks to train all staff in appropriate otoscopy use, including encouraging and supporting development of Aboriginal and Torres Strait Islander staff in ear health
- Increase the use of alternative health professionals for ear examination, such as speech pathologists and audiologists, who could perform pneumatic otoscopy and tympanometry screening in at-risk populations. Audiologists can provide an initial assessment before a child is referred to an ENT specialist and may be more available than ENT specialists, particularly outside major urban centres[3]
- Use innovation in training Aboriginal and Torres Strait Islander health workers on country to be knowledge bearers and health guides to ENT access
- Focus on recruiting ENT surgeons to work in remote areas of Australia where there is reduced access to surgery.

Clinical guidelines

- Update Australian clinical practice guidelines, stratified for at-risk groups, with efforts to disseminate the guidelines and promote uptake, including parent-focused education and awareness through use of fact sheets, social media and other channels
- Ensure that guidelines are practical and appropriate for rural and remote practice, and match availability of equipment.

Myringotomy hospitalisations, 17 years and under

Improved healthcare pathways

- Develop accelerated ENT pathways specifically for Aboriginal and Torres Strait Islander people
- Develop culturally safe care pathways, such as the Australian Government's Eye and Ear Surgical Support Program, which provides wraparound care for the patient and their carer when accessing ear surgery
- Improve coordination of ENT outreach services to better accommodate patient needs.

Support for shared decision making

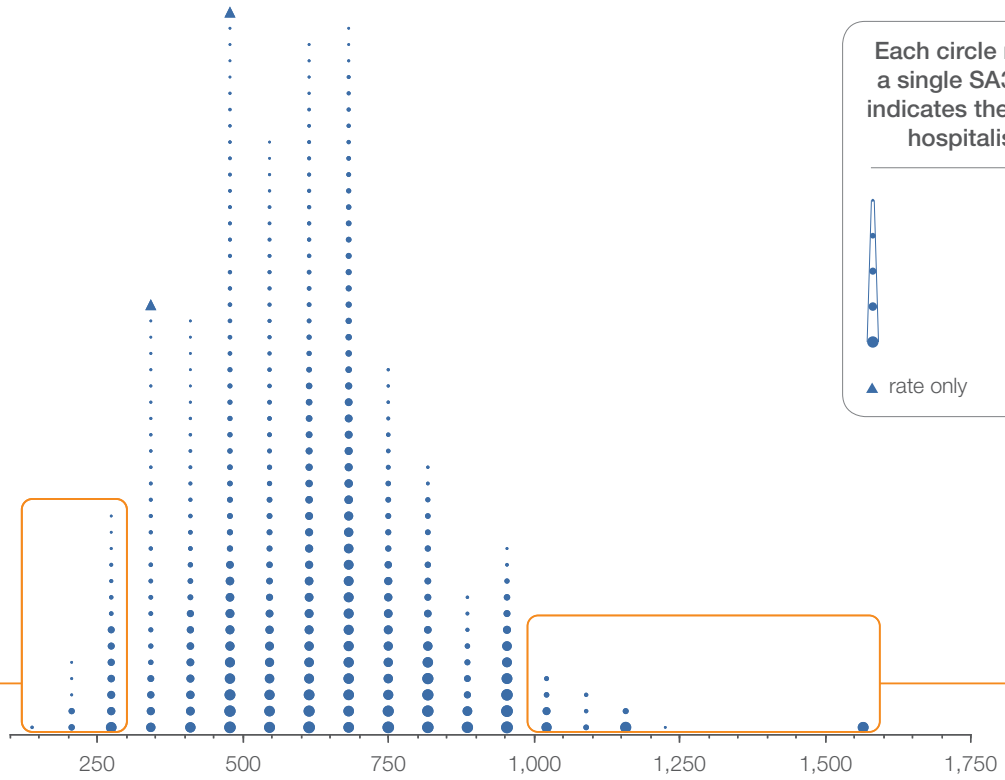
- Support shared decision making to establish what level of variation is appropriate based on patients' needs and assessment of risk.[32] Supporting shared decision making means giving patients accurate information, as well as informing GPs to avoid over- or underestimating the risks and benefits of myringotomy, which is likely to drive variation in referral to an ENT surgeon.

Improved data collection

- Improve data about access to myringotomy, such as the distribution of ENT surgeons and length of waiting lists. This would focus efforts on improving access in areas with the lowest rates of myringotomy. Some of these efforts could include financial incentives to improve access to surgery in areas that have low rates
- Further develop the Australian Society of Otolaryngology Head and Neck Surgery data registry to record patient outcomes after surgery (see 'Australian initiatives' on page 210).

Rates by local area

Figure 3.12: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Auburn	NSW	198	44
Brimbank	Vic	214	102
Fairfield	NSW	228	100
Alice Springs	NT	249	27
Sunnybank	Qld	258	32
Beenleigh	Qld	271	32
Hervey Bay	Qld	278	33
Dandenong	Vic	293	136
Manningham - West	Vic	294	56
Blacktown	NSW	295	113
Wyndham	Vic	299	251
Parramatta	NSW	299	125
Maryborough	Qld	299	27
Springwood - Kingston	Qld	301	68
Canterbury	NSW	302	114
Canning	WA	308	64
Merrylands - Guildford	NSW	320	145
Mount Druitt	NSW	324	117
Brisbane Inner	Qld	335	27
Albury	NSW	337	53

Highest rate areas

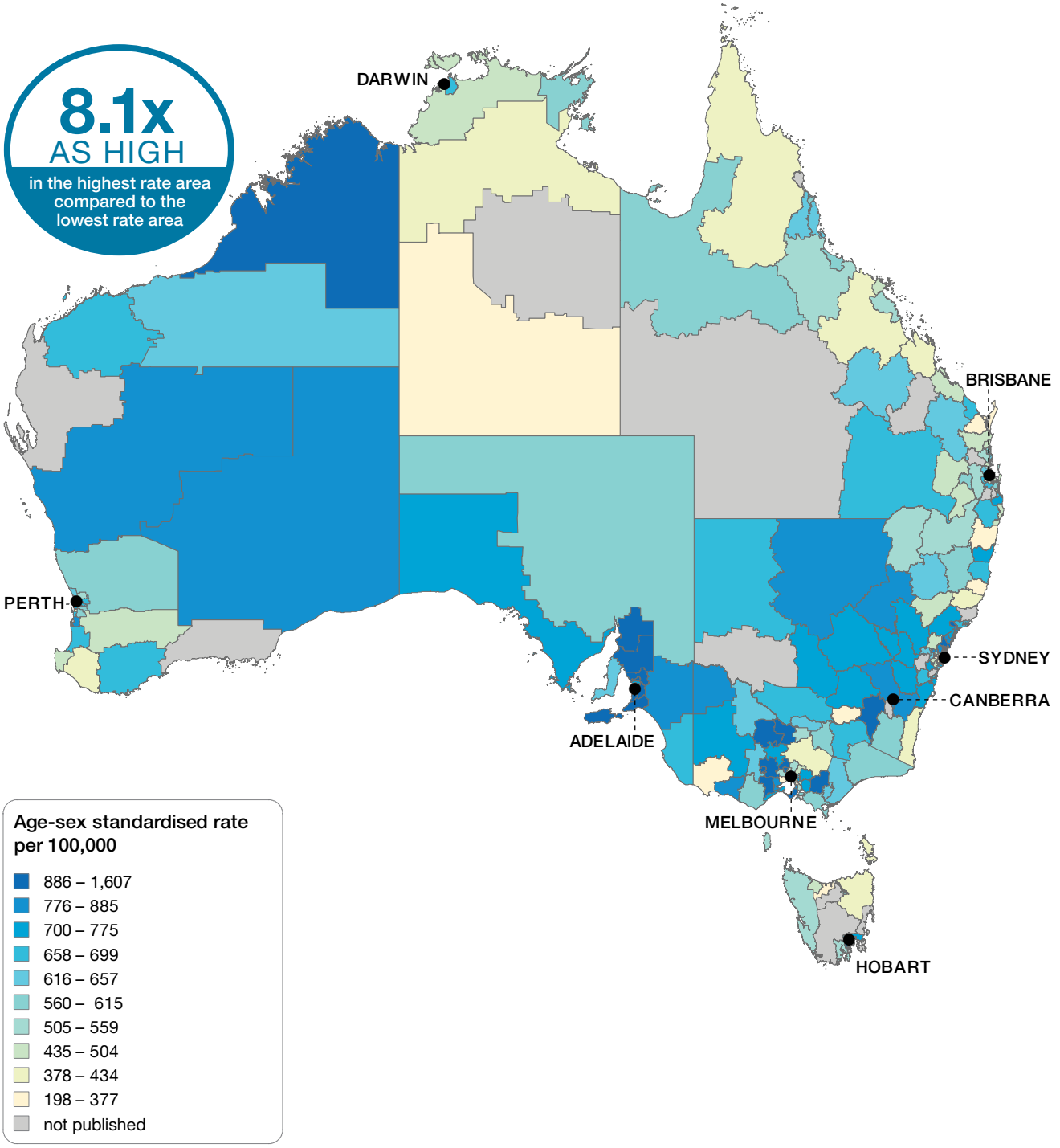
SA3	State	Rate	Hospitalisations
Adelaide Hills	SA	1,607	267
Loddon - Elmore	Vic	1,260	29
Gawler - Two Wells	SA	1,190	95
Bendigo	Vic	1,164	278
Holdfast Bay	SA	1,130	62
Campaspe	Vic	1,106	90
Creswick - Daylesford - Ballan	Vic	1,100	63
Macedon Ranges	Vic	1,059	87
Tea Tree Gully	SA	1,050	213
Unley	SA	1,040	75
Mitcham	SA	1,020	138

Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Myringotomy hospitalisations, 17 years and under

Rates across Australia

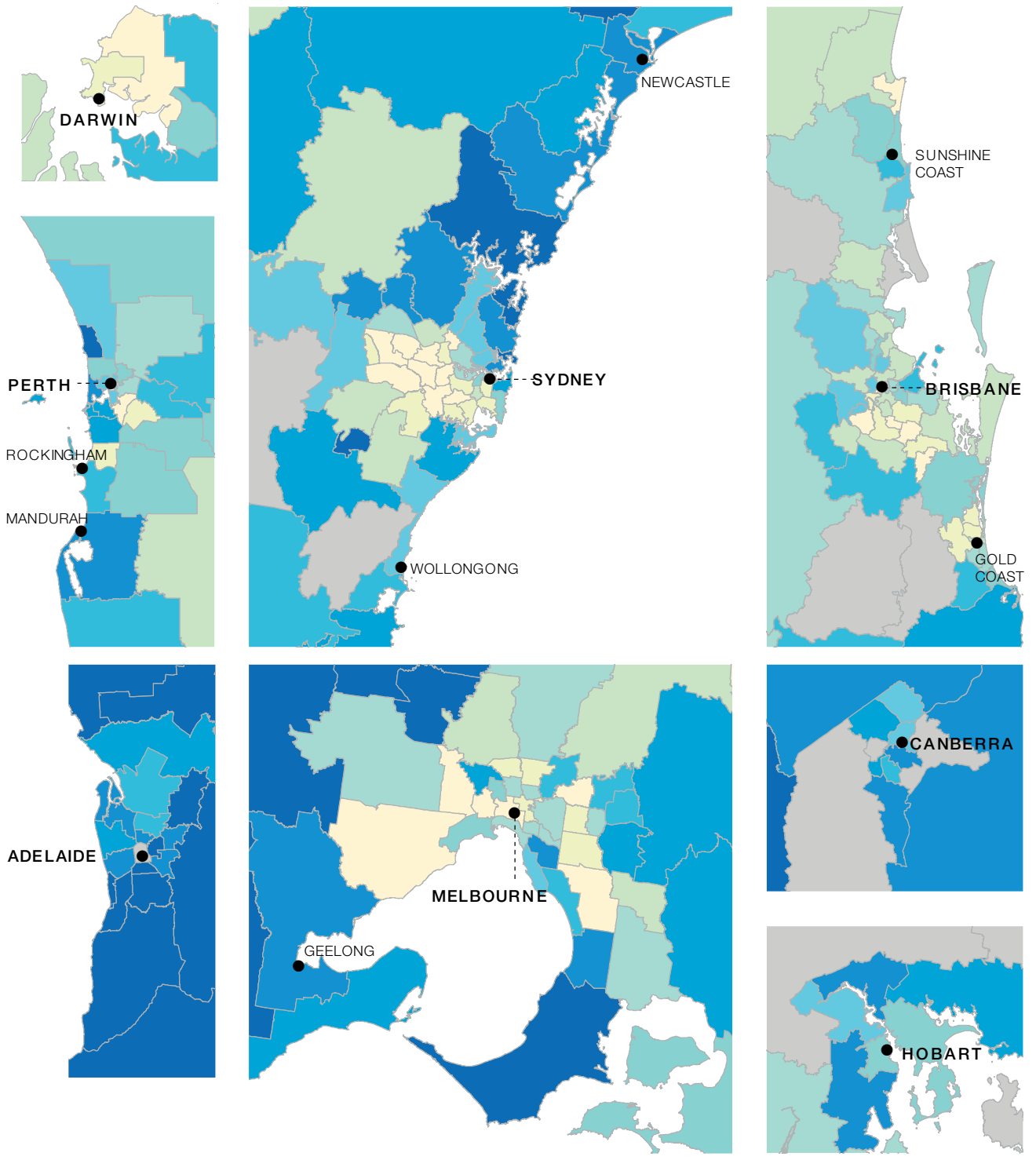
Figure 3.13: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Notes:
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates across capital city areas

Figure 3.14: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



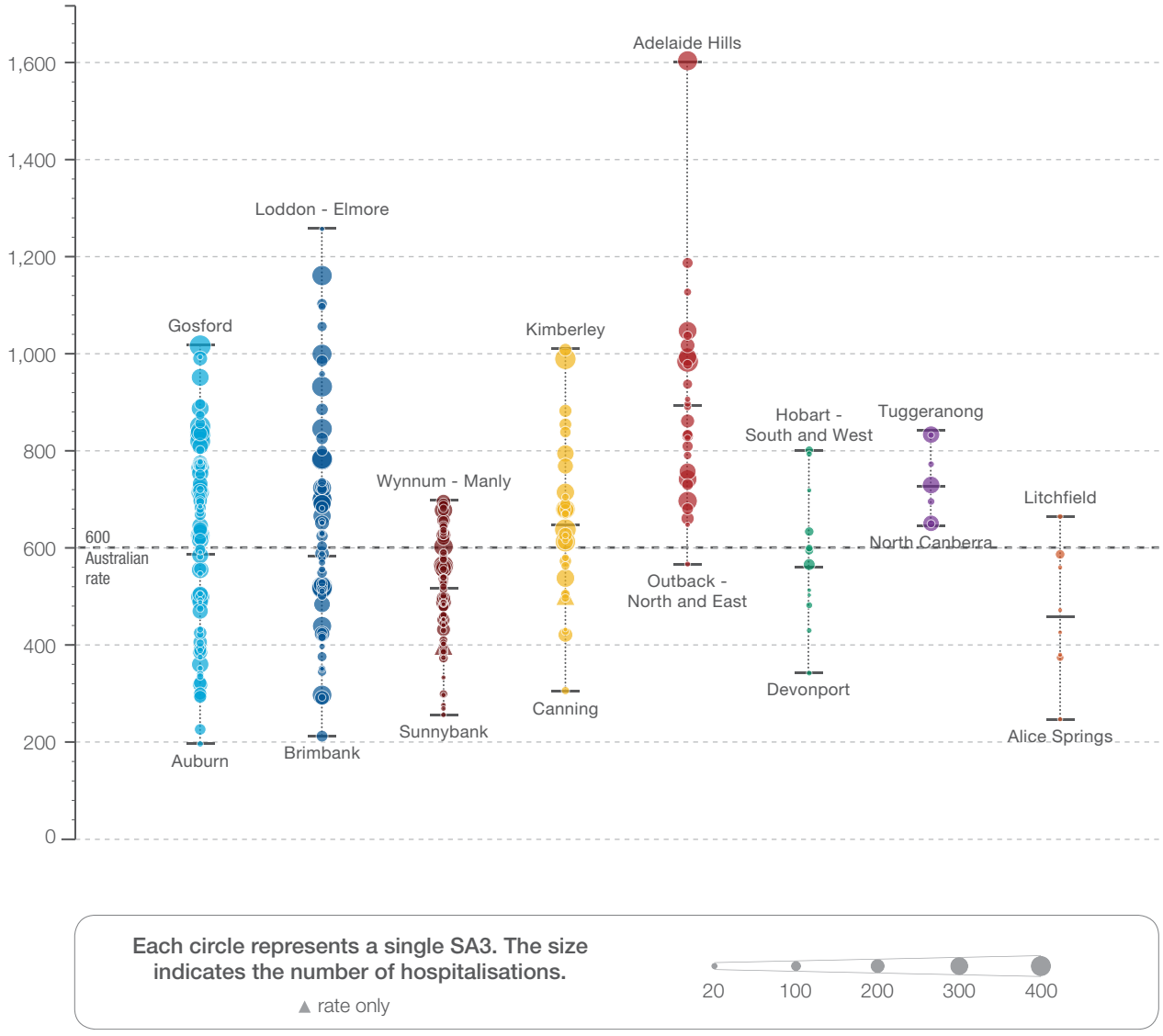
Notes:
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Myringotomy hospitalisations, 17 years and under

Rates by state and territory

Figure 3.15: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

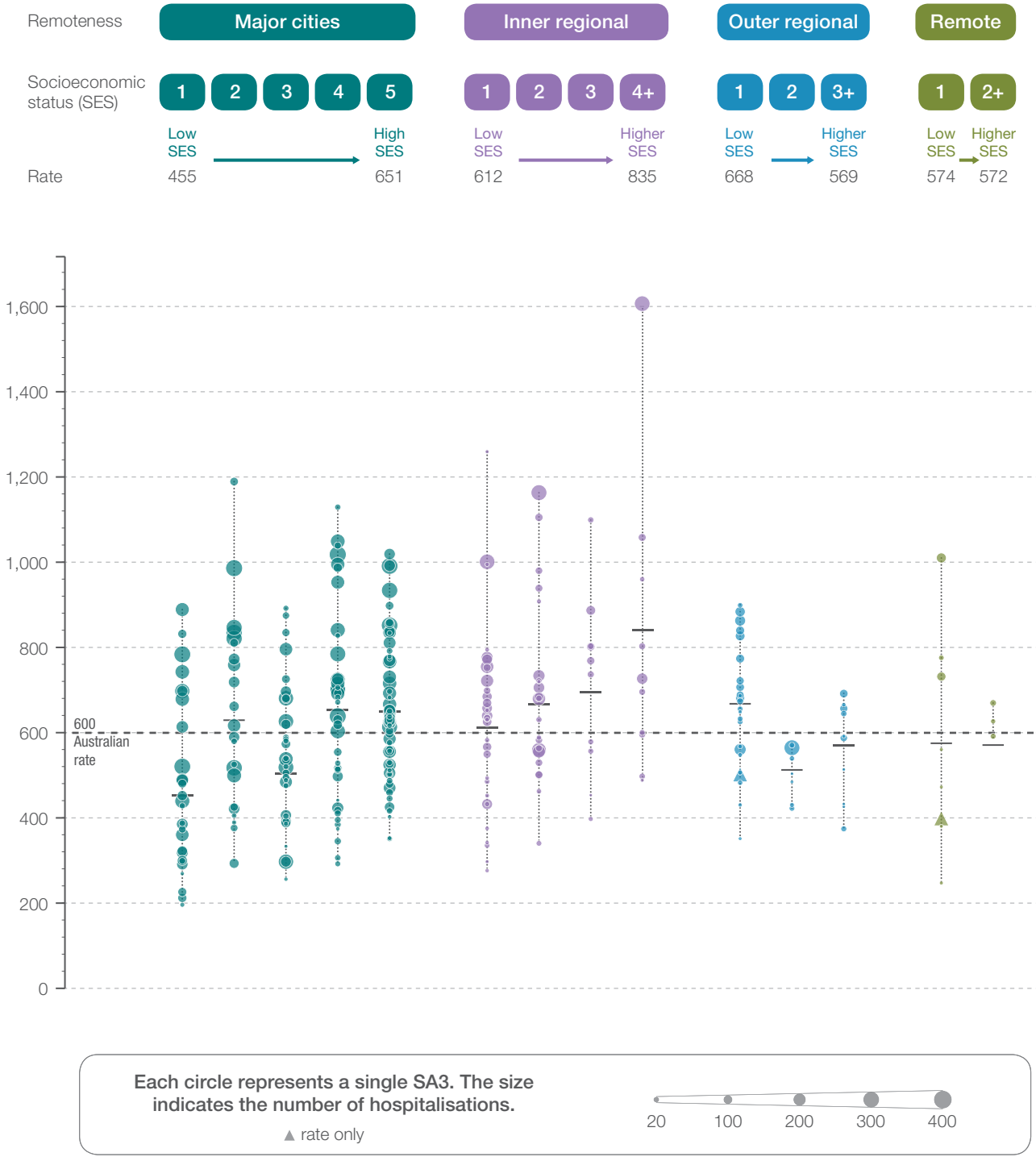
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	1,019	1,260	698	1,011	1,607	804	836	667
State/territory	586	585	518	650	895	564	727	458
Lowest rate	198	214	258	308	569	344	652	249
No. hospitalisations	10,799	8,638	6,135	4,113	3,364	633	746	310



Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

Figure 3.16: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



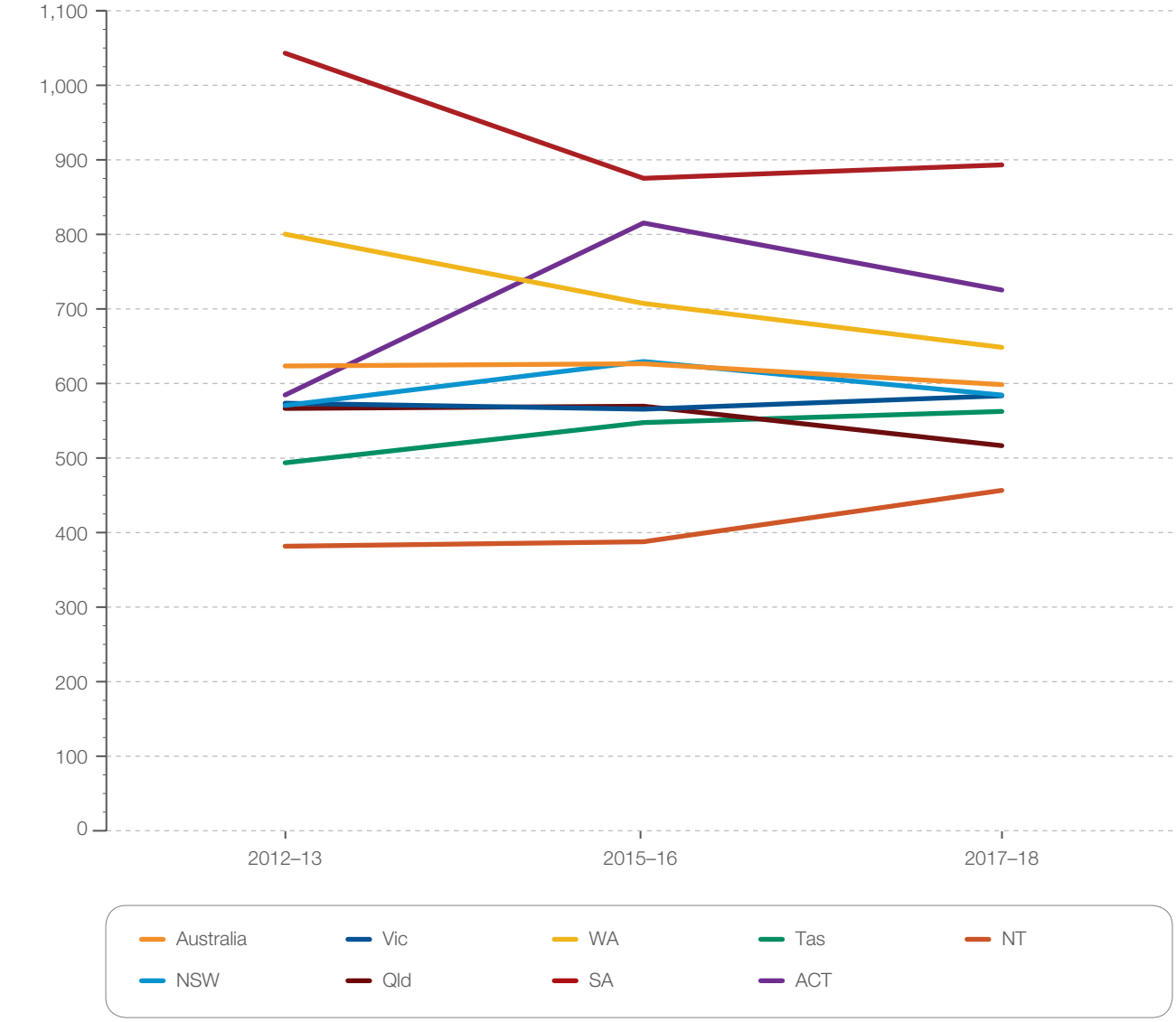
Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
For Remote and SES of 2+, the remoteness and SES rate is lower than the minimum SA3 rate as it includes SA3 rates that are not published for reliability reasons.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Myringotomy hospitalisations, 17 years and under

Rates across years

Figure 3.17: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by state and territory of patient residence, 2012–13, 2015–16 and 2017–18

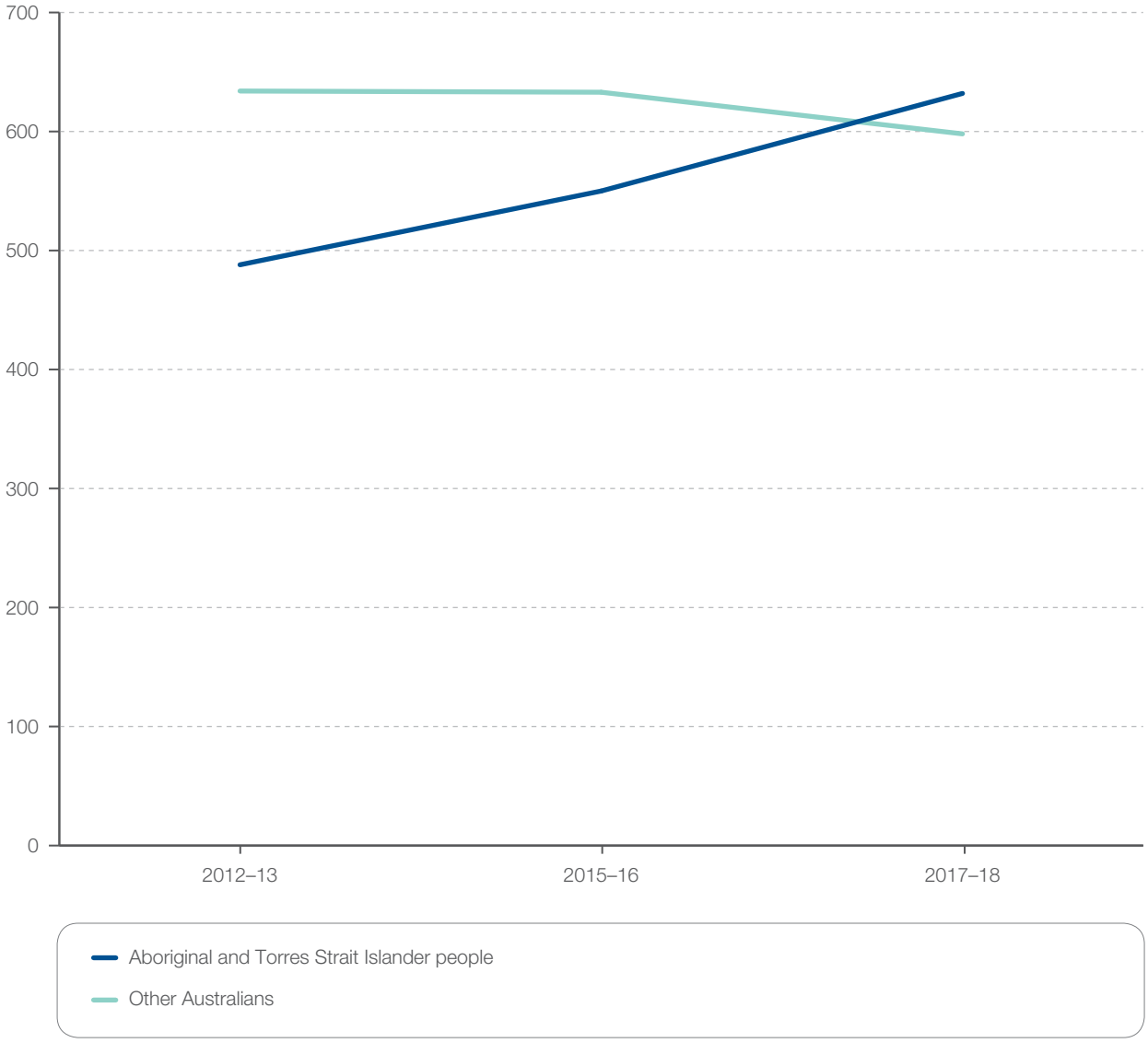
	2012–13	2015–16	2017–18
Highest SA3 rate	1,387	1,592	1,607
Australian rate	**625**	**628**	**600**
Lowest SA3 rate	222	252	198
Magnitude of variation	6.2	6.3	8.1
Magnitude of variation without top & bottom 10% SA3	2.5	2.1	2.3



Notes:
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2012, 2013 and 2015 to 2018.

Rates for Aboriginal and Torres Strait Islander people across years

Figure 3.18: Number of hospitalisations for myringotomy per 100,000 people aged 17 years and under, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2012–13, 2015–16 and 2017–18



Notes:
Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated among states and territories, with variation among states and territories.
Population estimates as at 31 December of the relevant year are calculated as the average of the 30 June populations before and after the relevant December. For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2012, 2013 and 2015 to 2018.

Myringotomy hospitalisations, 17 years and under

Resources

Australian

- *Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations*[2]
- Insertion of middle ear ventilation tubes for middle ear disease in children, Safer Care Victoria, bettersafercare.vic.gov.au/clinical-guidance/non-urgent-elective-surgery/insertion-of-middle-ear-ventilation-tubes-for-middle-ear-disease-in-children

International

- Clinical practice guideline: otitis media with effusion (update)[1]
- International consensus (ICON) on otitis media with effusion in children[33]
- Clinical practice guidelines for the diagnosis and management of otitis media with effusion (OME) in children in Japan, 2015[18]

Australian initiatives

Roadmap for Hearing Health

The Roadmap for Hearing Health works to foster collaboration between stakeholders to address the challenges facing an estimated 3.6 million Australians who experience some form of hearing impairment. The second domain of the Roadmap – Closing the Gap for Aboriginal and Torres Strait Islander Ear and Hearing Health – addresses the catastrophic levels of ear disease among Aboriginal and Torres Strait Islander people.[34]

Clinical guidelines

Recommendations for Clinical Care Guidelines on the Management of Otitis Media in Aboriginal and Torres Strait Islander Populations

The clinical care guidelines (otitismediaguidelines.com)[2] were first published in 2001, and updated in 2010 and 2017. They were disseminated nationally to all Aboriginal Community Controlled Health Services, and accompanied by clinical training and supply of equipment. The recommendations provide the evidence base for local clinical guidelines, and ear health manuals and frameworks.[35]

Vaccination

The pneumococcal conjugate vaccine (13vPCV) is part of the National Immunisation Program, and is available for all children free of charge starting at the age of 2 months. In addition, the seasonal influenza vaccine is available free for all children aged 6 months to under 5 years. (Influenza vaccination may result in a small reduction in AOM, which often follows a viral infection such as influenza.)[36]

Hearing support

Children need access to hearing support, including audiology services and ENT surgeons. Hearing Australia is piloting hearing testing in Aboriginal and Torres Strait Islander children. This may identify children needing myringotomy procedures.[7]

#Earhealthforlife (https://earandhearinghealth.org.au/blog/ear-health-life-taskforce) is a network that is committed to a national Aboriginal and Torres Strait Islander Hearing Health Taskforce that can provide evidence-based advice to government about hearing health.

HealthPathways provides clinicians with access to evidence-based guidelines on assessment, management and referral of children with AOM and OME. HealthPathways may help to achieve standardisation of care among GPs.[37]

Shared decision making

In July 2020, the Victorian Department of Health and Human Services advised Victorian health services that a variety of procedures (including myringotomy) were to be performed only for a specific list of clinical indications. Hospitals were advised that communication must involve shared and documented decision making with the patient about the evidence, risks and benefits, and other options for care. See Resources for best-care guidance on insertion of grommets for middle ear disease.

Diagnosis and treatment for Aboriginal and Torres Strait Islander children

The Australian Government's Hearing Assessment Program – Early Ears (HAP-EE) started in late 2018–19. Hearing Australia is delivering ear and hearing assessments nationally. Follow-up ENT services are delivered through the Australian Government's jurisdictional fundholders for outreach hearing services.

Queensland's Deadly Ears Program

This program was started in 2007 and provides access to specialist ear and hearing services, including audiology services and ENT surgeons, for Aboriginal and Torres Strait Islander children from communities across rural and remote Queensland.[38]

ENT surgical registry

The Australian Society of Otolaryngology Head and Neck Surgery operates a surgical register that collects data on ENT surgical procedures. The registry, which has been operating for two years, collects data on tonsillectomy, insertion of grommets and septoplasty.

Myringotomy hospitalisations, 17 years and under

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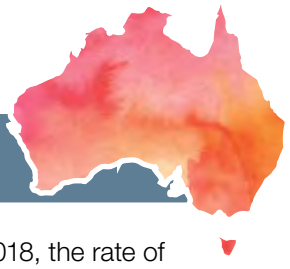
Chapter 4
Lumbar spinal surgery



At a glance

Lumbar spinal surgery refers to surgery in the lumbar spine or lower back. It is sometimes used to treat degenerative spinal disorders, which is the focus of this chapter. The Atlas excludes use of spinal surgery for treating infection, tumours or injury.

Degenerative spinal disorders are a diverse group of conditions that can cause chronic low back pain, leg pain and disability. Lumbar spinal surgery is generally only considered for certain degenerative spinal disorders if non-surgical options have not worked. There are limited data on patient outcomes, due in part to difficulties in conducting high-quality randomised controlled trials of these types of surgery. Two common lumbar spinal procedures are fusion and decompression.

Spinal fusion surgery involves joining two or more vertebrae using a bone graft. It has a role in treating a small minority of people who have degenerative spinal disorders that include nerve-related problems. Most people with chronic low back pain related to degenerative disorders do not have nerve-related symptoms. The role of spinal fusion in these circumstances is limited and controversial.

The Atlas found that, in 2015–2018, the rate of hospitalisation for lumbar spinal fusion was about 12 times higher in the local area with the highest rate than in the area with the lowest.* There was a 4% fall in the national rate of lumbar spinal fusion, and a 25% fall in the rate of lumbar spinal fusion excluding decompression, between 2012–2015 and 2015–2018.

Spinal decompression aims to increase the amount of the space in the spinal canal to relieve pressure on nerves and blood vessels.

The Atlas found that, in 2015–2018, the rate of hospitalisation for lumbar spinal decompression was about eight times higher in the local area with the highest rate than in the area with the lowest.* The national rate of lumbar spinal decompression fell by 6% between 2012–2015 and 2015–2018.

To address variation, it is important to improve access to services that provide multidisciplinary review and non-surgical treatments for chronic low back pain, and to develop the Australian Spine Registry to collect data on patient outcomes and support audit and peer review.

* After standardising to remove age and sex differences between populations.

Recommendations

The Commission consulted widely, but is solely responsible for making the recommendations; as such, the recommendations may not reflect the views of all contributors to the Atlas.

4a. Health service organisations and Primary Health Networks to implement evidence-based pathways for the management of low back pain consistent with the care described in the Low Back Pain Clinical Care Standard (planned for publication in late 2021).

4b. Health service organisations where lumbar spinal surgery is conducted to implement evidence-based guidelines; for example, the National Institute for Health and Care Excellence guidelines: *Low Back Pain and Sciatica in Over 16s: Assessment and management*.

4c. The Royal Australasian College of Surgeons to require surgeons performing lumbar spinal surgery to participate in the Australian Spine Registry as part of mandatory continuing professional development requirements.

4d. The Commission to work with relevant specialist organisations to develop a list of key safety and quality indicators for the management of specified spinal conditions, which can be used by members for audit of their practice.

4e. Health service organisations to:

i. Develop and implement scope of clinical practice models for surgeons undertaking spinal surgery

ii. Audit spinal surgery and provide the results back to clinicians to act upon in line with Action 1.28 of the National Safety and Quality Health Service (NSQHS) Standards

iii. Incorporate individual spinal surgeons' audit data as part of re-credentialing processes

iv. Report key performance indicators, trends and adverse events in spinal surgery to their governing body, consistent with the NSQHS Standards.

4f. Primary Health Networks to implement a nationally agreed health pathway for management of low back pain, including imaging and referral indications, based on the Commission's Low Back Pain Clinical Care Standard (planned for publication in late 2021).

4.1 Lumbar spinal fusion, 18 years and over

Why is this important?

Degenerative spinal disorders are a diverse group of conditions that can cause chronic low back pain, leg pain and disability.[1] Non-surgical treatments are mainly recommended as the first-line management because they help many people and the risk of harms is generally low.[2]

Spinal fusion surgery involves fusing two or more vertebrae using a bone graft. It has a role in treating a small minority of people with degenerative spinal disorders: where there is nerve or spinal cord compression[3], or where there are severe nerve-related problems.[4] Complication rates are higher for spinal fusion than for spinal decompression surgery.[5,6]

Most people with chronic low back pain related to degenerative disorders do not have nerve-related symptoms. The role of spinal fusion in these circumstances is limited and controversial.[4]

The *Second Australian Atlas of Healthcare Variation* found marked differences in rates of lumbar spinal fusion. There has been little change to the evidence base for lumbar spinal fusion since publication of the second Atlas in June 2017.

What did we find?

In 2015–2018, the rate of hospitalisation for lumbar spinal fusion was **12.4 times as high** in the area with the highest rate compared with the area with the lowest rate. Between 2012–2015 and 2015–2018, there was a small decline (4%) in the rate of lumbar spinal fusion, and a larger decline (25%) in the rate of lumbar spinal fusion excluding decompression.

What can be done?

Priority should be given to examining and improving access to services that provide multidisciplinary review and non-surgical treatments for chronic low back pain.

The substantial variation in rates of lumbar spinal fusion, a procedure recommended in limited circumstances, suggests an urgent need for high-quality evidence on who may benefit from this surgery and the degree of benefit.

Clinical trials are difficult to conduct for lumbar spinal fusion, so it is essential to improve collection of registry data on patient outcomes. The Australian Spine Registry should be developed to support data collection for all consenting patients having lumbar spinal surgery. Patients offered spinal fusion surgery should be fully informed of the potential benefits and risks for them. Surgeons should contribute data on all consenting patients, and regularly audit and review patient outcome data with their peers. Health services should include clinical audit as a credentialing requirement for surgeons who perform lumbar spinal surgery.

Lumbar spinal fusion, 18 years and over

Context

Lumbar spinal fusion is a surgical procedure that uses a bone graft to permanently join (fuse) two or more vertebrae to stop them from moving against each other. The procedure can be done with or without the use of hardware (internal fixation), such as screws, cages or plates, which support the vertebrae while the bone graft is healing.

Spinal fusion can be performed on its own or with spinal decompression, a surgical procedure that increases the amount of space in the spinal canal to relieve pressure on nearby nerves and blood vessels.

This item examines lumbar spinal fusion with or without decompression. It excludes the use of spinal fusion for infection, tumours, injury and spinal deformities such as scoliosis, and therefore focuses on the use of spinal fusion for degenerative spinal disorders and associated chronic low back pain.

Degeneration of the lumbar spinal joints and intervertebral discs is part of ageing.[5] In some people, it can cause low back pain, leg pain related to pressure on nerves (radicular pain), and reduced mobility.[7] Common types of degenerative conditions include lumbar spinal stenosis (narrowing of the spinal canal), spondylolisthesis (where one vertebra slips over another) and herniated disc (where disc material protrudes into the spinal canal or outer nerves).[5,8]

Non-surgical measures are recommended as first-line treatment for most people with acute or chronic low back pain.[7,9] These include exercise, weight loss, cognitive behavioural therapy and physiotherapy.[9] Most people with acute pain will improve within six weeks, but some people have recurrences, and around 40% develop chronic low back pain (lasting for more than three months).[10]

Surgical intervention, including spinal fusion, is recommended for patients where nerve compression from spinal degeneration causes severe or progressive weakness, or bladder and bowel problems.[4] It is also recommended in selected patients where instability (e.g. spondylolisthesis) causes nerve or spinal compression.[3]

Most people with chronic low back pain related to degenerative disorders do not have nerve-related symptoms. The role of spinal fusion in these circumstances is limited and controversial.[4]

Cochrane and other systematic reviews have reported inconclusive findings on the effectiveness of spinal fusion due to uncertainties in the available evidence, and have noted difficulties in conducting high-quality trials in this area.[2,11-13]

Spinal fusion may be an option for people who have persistent (for more than one year) disabling low back pain and significantly impaired quality of life, and who have not responded to non-surgical treatment.[4] However, most people with isolated low back pain without evidence of nerve compression are unlikely to benefit from spinal fusion.[9,14]

People who have persistent radicular pain may benefit from surgery, but the evidence about who benefits and the degree of benefit is not clear. Adding spinal fusion to decompression has not been clearly shown to achieve better outcomes for patients with spinal stenosis.[11] Added spinal fusion may result in better outcomes than decompression alone for spondylolisthesis.[6]

Sometimes spinal fusion is added to repeat decompression surgery to treat recurrent herniated disc, although this has not been shown to improve clinical outcomes compared with decompression alone.[12]

Adding fusion to decompression increases the risks of complications compared with decompression alone, and doubles the hospital costs.[5,11] Spinal fusion surgery is associated with a risk of serious complications; the risk increases with the age of the patient and complexity of the fusion procedure.[5,6] The risk of major complications with complex fusion procedures (joining of more than two vertebrae) is several times the risk of major complications of decompression alone.[5]

It is important that patients are informed about the possible complications of spinal fusion, particularly older people and Aboriginal and Torres Strait Islander people, who may have other medical conditions (comorbidity) that can increase the risk of complications.[6]

Reoperation because of continuing symptoms may also be needed. Rates of reoperation depend on the type of degenerative condition and type of surgery.[15]

Guidelines from the United Kingdom National Institute for Health and Care Excellence (NICE) recommend against spinal fusion to treat low back pain unless as part of a randomised controlled trial.[9] Belgian guidelines recommend that spinal fusion for people with low back pain should only be considered after non-surgical interventions have failed as part of a multidisciplinary evaluation. The treatment should also preferably be recorded in a register.[16]

Why revisit variation in lumbar spinal fusion?

The first and second editions of the *Australian Atlas of Healthcare Variation* examined hospitalisation rates for lumbar spinal surgery in people aged 18 years and over.[17,18]

The first Atlas examined variation in lumbar spinal decompression and lumbar spinal fusion combined, and found that, over the three-year period 2010–11 to 2012–13, the rate was 4.8 times as high in the area with the highest rate as in the area with the lowest rate.[17]

The second Atlas separately explored variation in spinal decompression (without fusion) and lumbar spinal fusion (with or without decompression). It found that, over the three-year period 2012–2015, the number of hospitalisations for lumbar spinal fusion across 305 local areas (Statistical Area Level 3 – SA3) ranged from 10 to 69 per 100,000 people aged 18 years and over. The rate was 6.9 times as high in the area with the highest rate compared with the area with the lowest rate. Rates of surgery were higher in inner regional areas than in major cities or outer regional areas, and were lowest in remote areas.[18]

It is important to continue to monitor rates of spinal fusion for degenerative spinal conditions because of the low quality of the evidence on the effectiveness of this procedure.

About the data

Data are sourced from the National Hospital Morbidity Database, and include admitted patients in both public and private hospitals.

Rates are based on the number of hospitalisations for lumbar spinal fusion (with or without decompression) per 100,000 people aged 18 years and over in 2012–13 to 2014–15 and 2015–16 to 2017–18. Hospitalisations resulting from infection, tumours, injury and spinal deformities such as scoliosis are excluded from this analysis.

Because a record is included for each hospitalisation for the procedure, rather than for each patient, patients hospitalised for the procedure more than once in the financial year will be counted more than once.

It is not possible to estimate rates of staged surgery across separate hospitalisations from these data. Hospitalisations for the same patient have not been linked. Therefore, a patient who was hospitalised for spinal fusion without decompression may have had a hospitalisation for decompression in the same data collection period.

The analysis and maps are based on the usual residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures. Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

It is not possible to examine variation in fusion for chronic axial back pain at a small area level because of confidentiality reasons.

Lumbar spinal fusion, 18 years and over

Principal diagnoses included and the percentage of hospitalisations for lumbar spinal fusion with or without decompression for 2015–2018* are:

- Spinal stenosis (lumbar and lumbosacral), 36%
- Lumbar and other intervertebral disc disorders with radiculopathy, 21%
- Spondylolisthesis (lumbar and lumbosacral), 25%
- Radiculopathy (lumbar and lumbosacral), 5%
- Low back pain, 5%
- Other specified intervertebral disc displacement, 5%
- Lumbago with sciatica, 1%
- Lumbar and other intervertebral disc disorders with myelopathy, 1%
- Unspecified dorsalgia (lumbar and lumbosacral) and other dorsalgia (lumbar and lumbosacral), 1%.

What do the data show?

Magnitude of variation

Over the three-year period 2015–2018, there were 14,608 hospitalisations for lumbar spinal fusion (with or without decompression), representing 24 hospitalisations per 100,000 people aged 18 years and over (the Australian rate). The median age for patients was 64 years, and varied across states and territories, from 55 in the Northern Territory to 67 in South Australia.

The number of hospitalisations for lumbar spinal fusion (with or without decompression) across 307† local areas (Statistical Area Level 3 – SA3) ranged from 7 to 87 per 100,000 people. The rate was **12.4 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations for lumbar spinal fusion (with or without decompression) varied across states and territories, from 11 per 100,000 people in the Northern Territory to 50 in Tasmania (Figures 4.3–4.6).

After the highest and lowest 10% of results were excluded and 249 SA3s remained, the number of hospitalisations per 100,000 people was 2.7 times as high in the area with the highest rate compared with the area with the lowest rate.

There were 1,860 hospitalisations for lumbar spinal fusion excluding decompression for people aged 18 years and over during this three-year period. This equates to an Australian rate of 3 hospitalisations per 100,000 people. The graph for this analysis is available at safetyandquality.gov.au/atlas

Analysis by remoteness and socioeconomic status

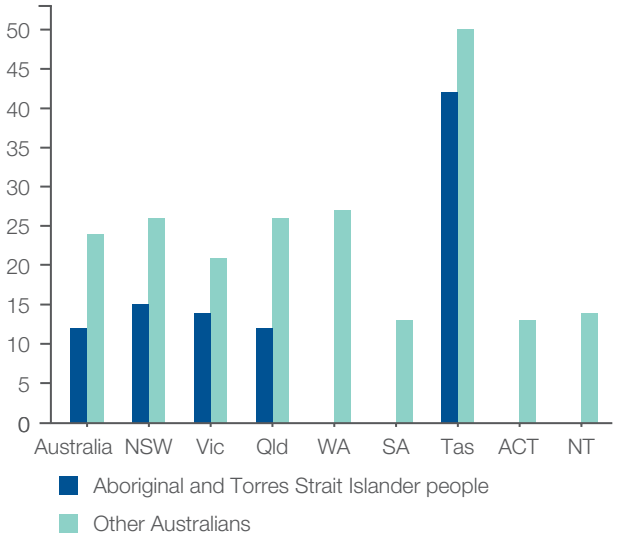
Rates for lumbar spinal fusion (with or without decompression) hospitalisations were generally higher in inner regional areas than in outer regional areas or major cities, and were lowest in remote areas. In major cities and remote areas, rates decreased with socioeconomic disadvantage, but this pattern was not evident for other categories of remoteness (Figure 4.7).

* Australian Commission on Safety and Quality in Health Care analysis of Admitted Patient Care National Minimum Data Set, 2015–16 to 2017–18.
† There are 340 SA3s. For this item, data were suppressed for 33 SA3s due to a small number of hospitalisations and/or population in an area.

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander people (12 per 100,000 people) was 50% lower than the rate for other Australians (24 per 100,000 people). This difference was most pronounced in Queensland, where the rate for Aboriginal and Torres Strait Islander people was 54% lower than the rate for other Australians (Figure 4.1).

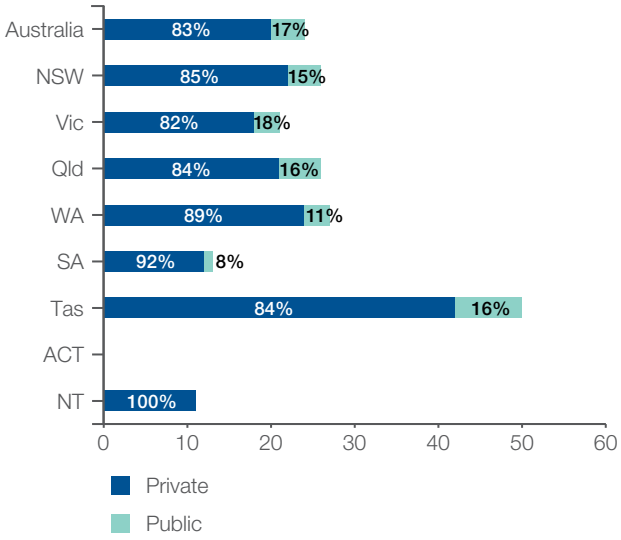
Figure 4.1: Number of hospitalisations for lumbar spinal fusion (with or without lumbar spinal decompression) per 100,000 people aged 18 years and over, age and sex standardised, by state or territory of patient residence, by Aboriginal and Torres Strait Islander status, 2015–16 to 2017–18*



Analysis by patient funding status

Overall, 83% of hospitalisations for lumbar spinal fusion (with or without decompression) were for privately funded patients. This proportion varied from 82% in Victoria to 100% in the Northern Territory (Figure 4.2).†

Figure 4.2: Number of hospitalisations for lumbar spinal fusion (with or without lumbar spinal decompression) per 100,000 people aged 18 years and over, age and sex standardised, by state or territory of patient residence, by patient funding status, 2015–16 to 2017–18†



The data for Figures 4.1 and 4.2 are available at safetyandquality.gov.au/atlas

Notes:

* Data for some states and territories (Aboriginal and Torres Strait Islander people) have been suppressed. Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated, with variation among states and territories.

† Data for the Northern Territory (public patients) are not published for reliability reasons. The 100% private patients are a result of rounding. For 2016–17, there were data quality issues related to the recording of patient funding source for patients admitted to ACT private hospitals. ACT private hospitals for 2016–17 are excluded from the analysis and data for the ACT are not published. Hospitalisations for public patients do not incur a charge to the patient or a third-party payer (for example, a private health insurance fund), unlike hospitalisations for private patients.

Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.

For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Lumbar spinal fusion, 18 years and over

Analysis by age group

Rates for lumbar spinal fusion (with or without decompression) hospitalisations were higher for patients aged 75–84 years (73 per 100,000 people) and 65–74 years (70 per 100,000 people) than for patients aged 18–64 years (16 per 100,000 people) or 85 years and over (17 per 100,000 people).

The data and graphs for analysis by age group and by Primary Health Network are available at safetyandquality.gov.au/atlas

Trends over time

Between 2012–2015 and 2015–2018, the rate of hospitalisations for lumbar spinal fusion (with or without decompression) decreased by 4% (from 25 per 100,000 people to 24 per 100,000 people) in the Australian population as a whole (Figure 4.8).

The rate for Aboriginal and Torres Strait Islander people increased by 50% (from 8 per 100,000 people to 12 per 100,000 people) over the same period.

Over the same period, the rate of hospitalisations for lumbar spinal fusion excluding decompression decreased by 25% (from 4 per 100,000 people to 3 per 100,000 people) in the population as a whole.

The data for analysis over time for Aboriginal and Torres Strait Islander people, and analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

Interpretation

Variation in rates of lumbar spinal fusion surgery is likely to be due to geographical differences in the factors discussed below.

Variations between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on where people live rather than where they obtain their health care. Patients may travel outside their local area to receive care.

Clinical decision making

Problems with the current evidence base may contribute to variation in rates of spinal fusion. In the absence of good evidence and clearly established guidelines, differing perceptions among spinal surgeons about the benefits that some patients derive from spinal fusion will lead to variation in practice.

Patients' expectations

Patients' expectations about the need for spinal surgery to deal with chronic low back pain may drive variation. These expectations may be affected by psychosocial factors, such as dependence on alcohol or other drugs (e.g. opioids), depression and job loss.

Access to services

One reason for the very high variation in the rates of spinal fusion may be lack of access to affordable and accessible alternatives to surgery, such as physiotherapy with cognitive behavioural therapy, multidisciplinary back pain assessment clinics and pain clinics. People who are unable to access these types of care and who have persistent disabling pain may be referred for surgical opinion in the absence of other options for management of pain.

Having private health insurance allows affordable and timely access to spinal fusion in private hospitals. Atlas data found that most (83%) hospitalisations for lumbar spinal fusion (with or without decompression) were for privately funded patients.

Also, private health insurance may not cover the cost of non-surgical treatments for degenerative spinal conditions.

Workforce issues

Workforce factors may influence the overall rates of spinal surgery and geographic variation in rates, and this should be explored further. One possible reason for high rates in some areas is an undersupply of health practitioners who provide alternatives to surgical intervention. Differences in geographical access to spinal surgeons will also influence the use of these interventions. An oversupply of surgeons may lead to increased rates of surgery.

Addressing variation

Considering the burden of disease, the costs associated with low back pain and the number of spinal operations occurring in Australia, priority should be given to ensuring that there are appropriate services for multidisciplinary review and non-surgical management of chronic back pain in health services throughout the country.

Because of uncertainty in the evidence base and the risks of spinal fusion surgery, high-quality research is needed to identify whether there are subgroups of patients who would benefit from the surgery, and what degree of benefit might be gained compared with use of more conservative treatments. Better information on surgery outcomes, including patient-reported outcomes in the medium to longer term, is also required.

Given the burden of disease, and numbers of spinal operations occurring in Australia, priority should be given to further developing the Australian Spine Registry so that it can capture information on all eligible patients, provide information for effective peer review of spinal surgery and add to the knowledge base about outcomes for specific groups of patients.

Patients with degenerative spinal conditions who are offered the option of spinal fusion surgery should be fully informed of the potential benefits and the risk of complications for them.

All patients who decide to have surgery should be informed about the Australian Spine Registry and, if they fulfil the registration criteria, should be asked if they are willing to be included. Surgeons undertaking this procedure should contribute data on all eligible patients to the Australian Spine Registry and participate in routine peer review.

Initiatives to address variation could include the following:

High-quality research and outcome monitoring

- Undertake high-quality research to resolve uncertainties about benefit for patients with degenerative spinal conditions
- Ensure resourcing to support widespread use of the Australian Spine Registry
- Develop agreed measures for audit

Clear information for patients

- Ensure that all patients have clear information about treatment options, likely risks and benefits, and the uncertainties about the evidence base – before and after specialist referral

Access to services

- Increase access to healthcare services that provide alternatives to surgical intervention, particularly physiotherapy services with cognitive behavioural therapy and specialist pain management services, especially for those with opioid dependence
- Ensure that psychosocial factors are part of any assessment for axial chronic low back pain before referral for surgery
- Establish a targeted strategy to improve access to spinal surgery for Aboriginal and Torres Strait Islander people

Lumbar spinal fusion, 18 years and over

Training and professional development

- Improve fellowship training through ongoing curriculum review
- Improve post-fellowship training and possibly develop a qualification
- Focus on continuing professional development, mentoring and peer review
- Educate clinicians about the benefits, costs and complications of surgery compared with other options

Credentialing and scope of practice

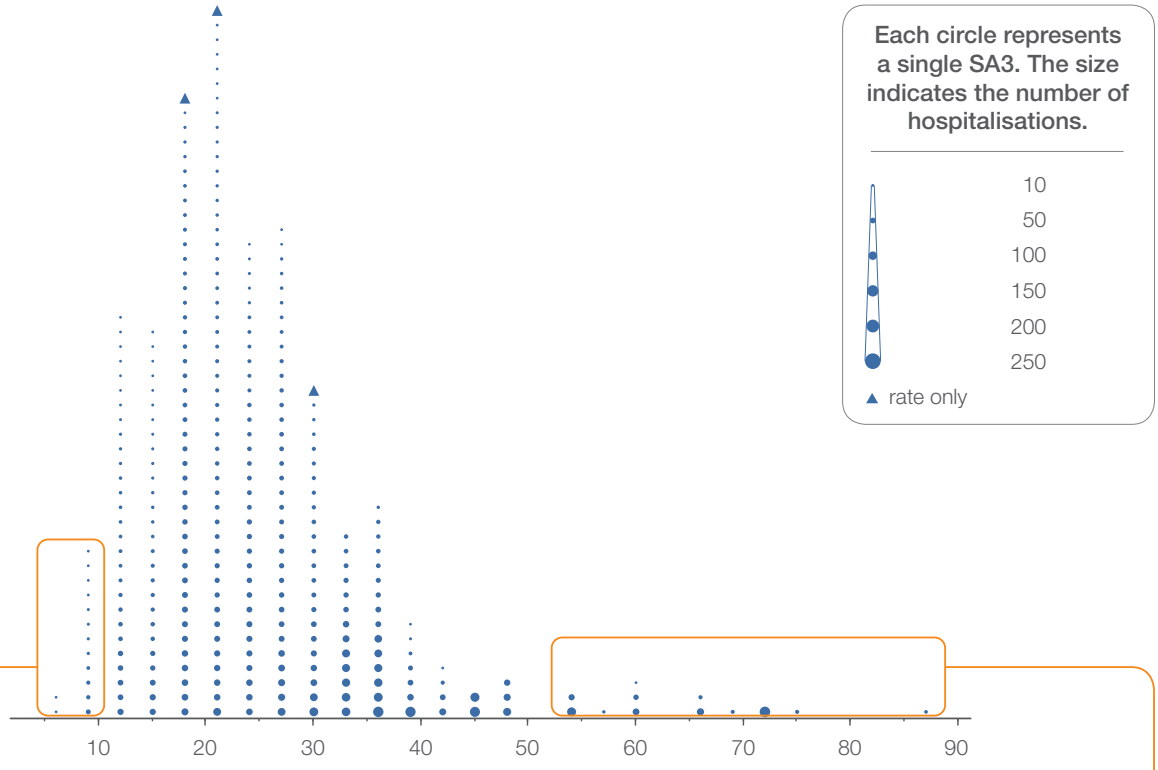
- Develop appropriate credentialing and definition of scope of practice in all hospitals
- Develop best-practice guidelines, especially in complex surgery

Care pathways

- Implement multidisciplinary clinical pathway and multidisciplinary preoperative review
- Develop evidence-based care pathways, including referral guidelines for general practitioners

Rates by local area

Figure 4.3: Number of hospitalisations for lumbar spinal fusion (with or without lumbar spinal decompression) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Port Adelaide - East	SA	7	12
Burnside	SA	8	14
Marrickville - Sydenham - Petersham	NSW	9	11
Strathfield - Burwood - Ashfield	NSW	10	35
Canterbury	NSW	10	33
Murray and Mallee	SA	10	21
Leichhardt	NSW	10	15
Townsville	Qld	11	46
Fleurieu - Kangaroo Island	SA	11	27
Auburn	NSW	11	19
Maribyrnong	Vic	11	18
Campbelltown (SA)	SA	11	17
Charters Towers - Ayr - Ingham	Qld	11	13
Sunnybank	Qld	11	13

Highest rate areas

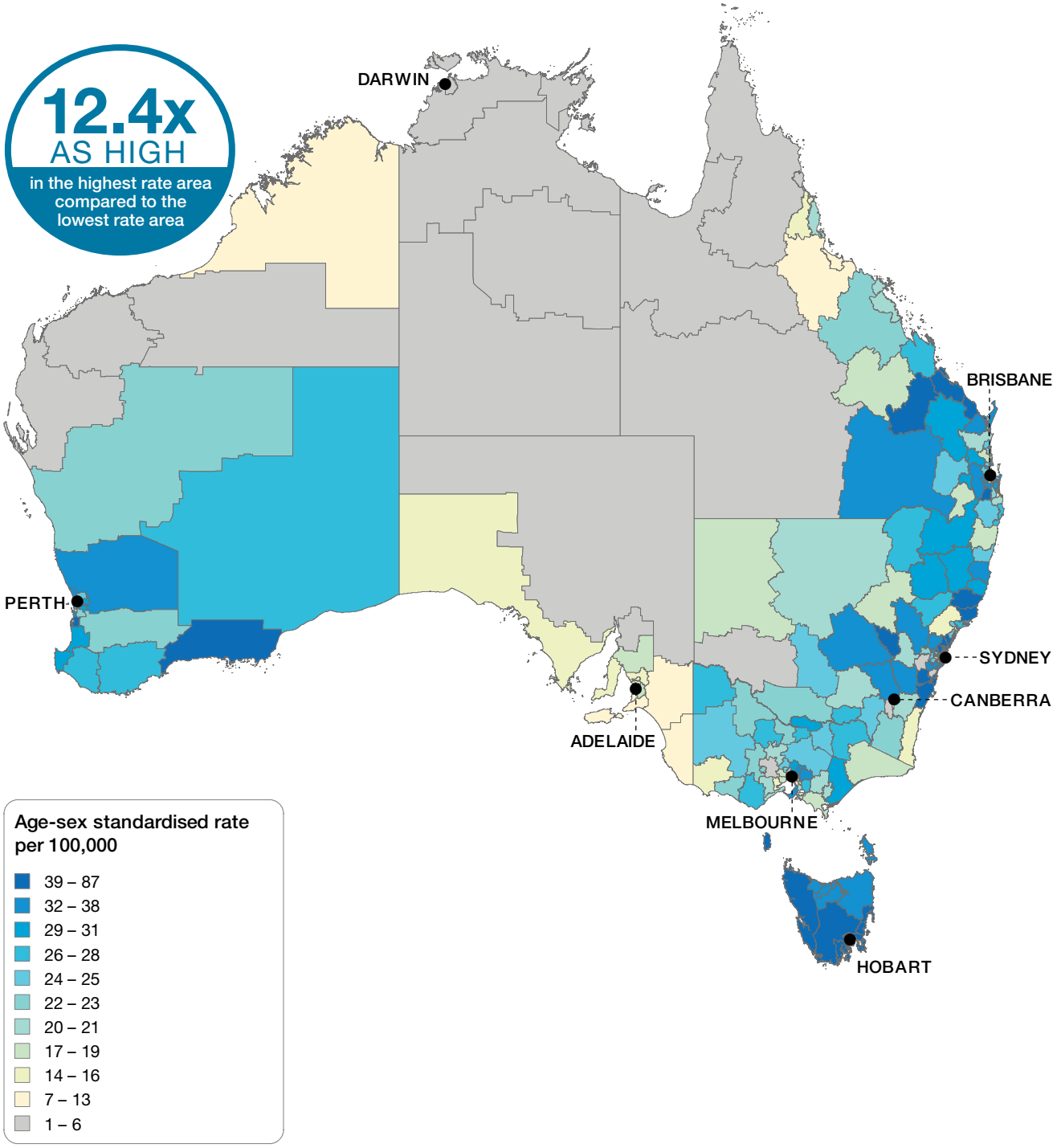
SA3	State	Rate	Hospitalisations
Central Highlands (Tas.)	Tas	87	26
Sorell - Dodges Ferry	Tas	75	32
Bundaberg	Qld	73	207
West Coast	Tas	70	31
Hobart - North East	Tas	68	98
Huon - Bruny Island	Tas	66	33
Hobart - South and West	Tas	62	55
Hobart - North West	Tas	61	86
South East Coast	Tas	61	13
Brighton	Tas	58	22
Mandurah	WA	54	151
Hobart Inner	Tas	54	72

Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Lumbar spinal fusion, 18 years and over

Rates across Australia

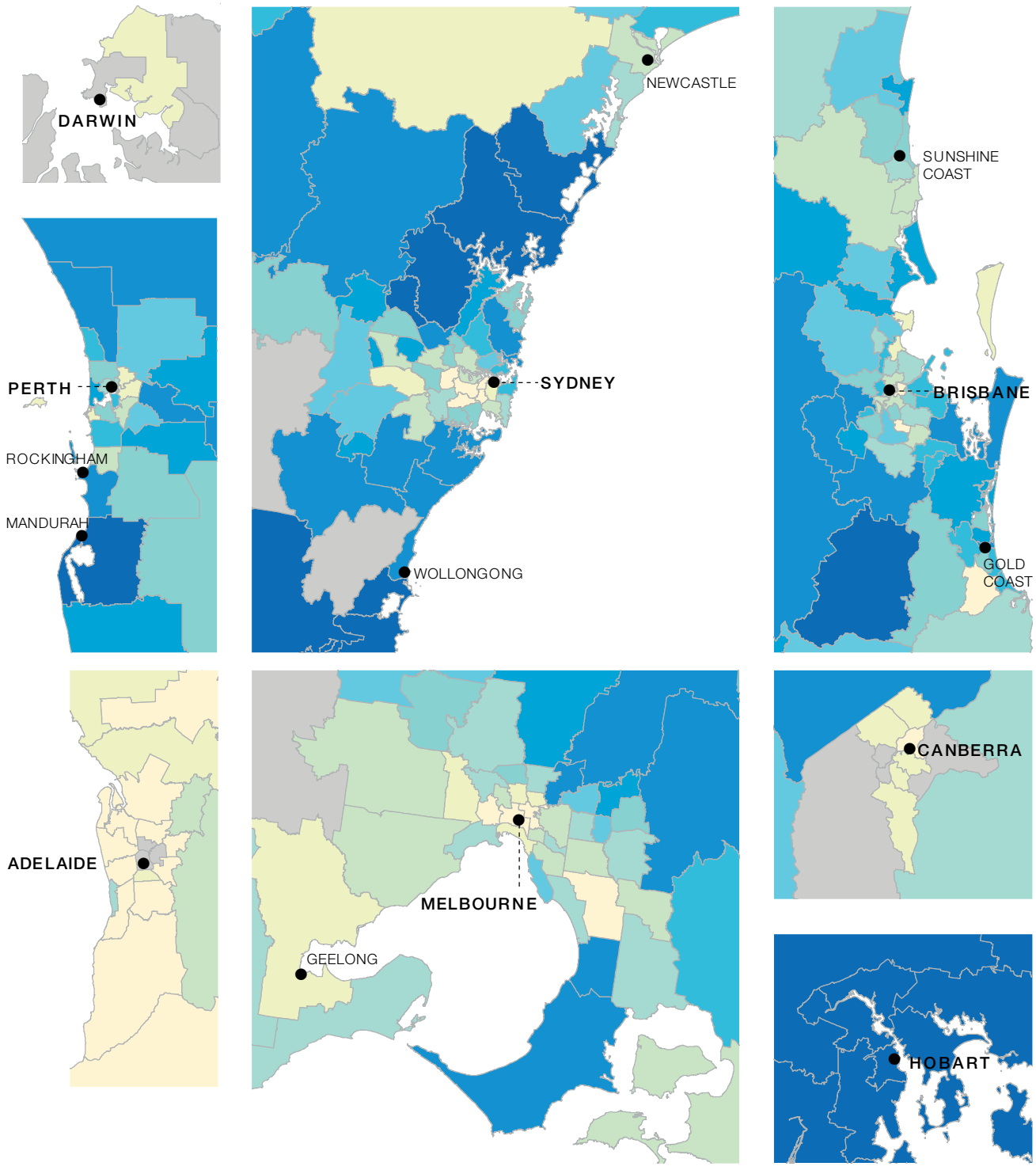
Figure 4.4: **Number of hospitalisations for lumbar spinal fusion (with or without lumbar spinal decompression) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18**



Notes:
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Rates across capital city areas

Figure 4.5: **Number of hospitalisations for lumbar spinal fusion (with or without lumbar spinal decompression) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18**



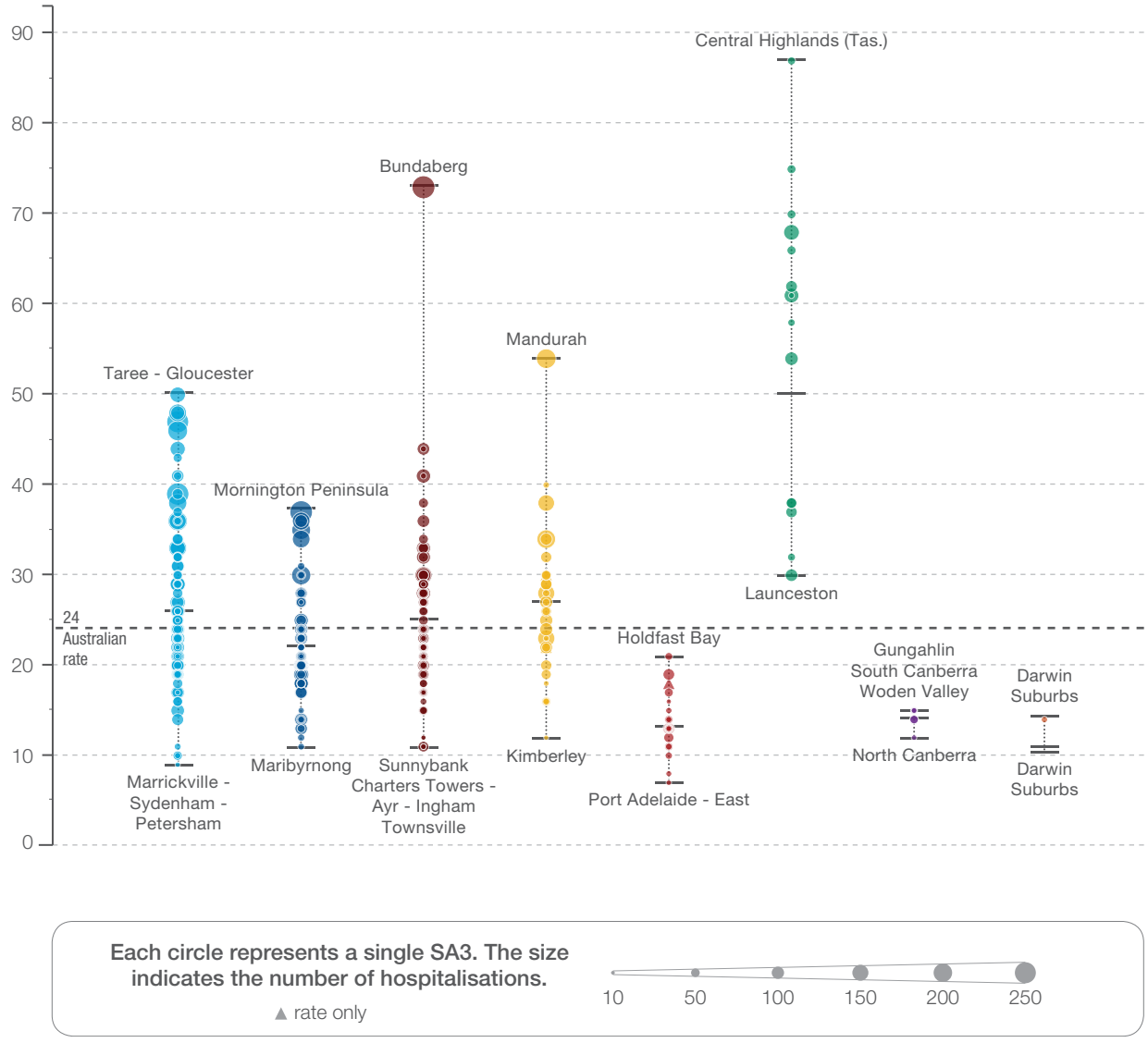
Notes:
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Lumbar spinal fusion, 18 years and over

Rates by state and territory

Figure 4.6: **Number of hospitalisations for lumbar spinal fusion (with or without lumbar spinal decompression) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18**

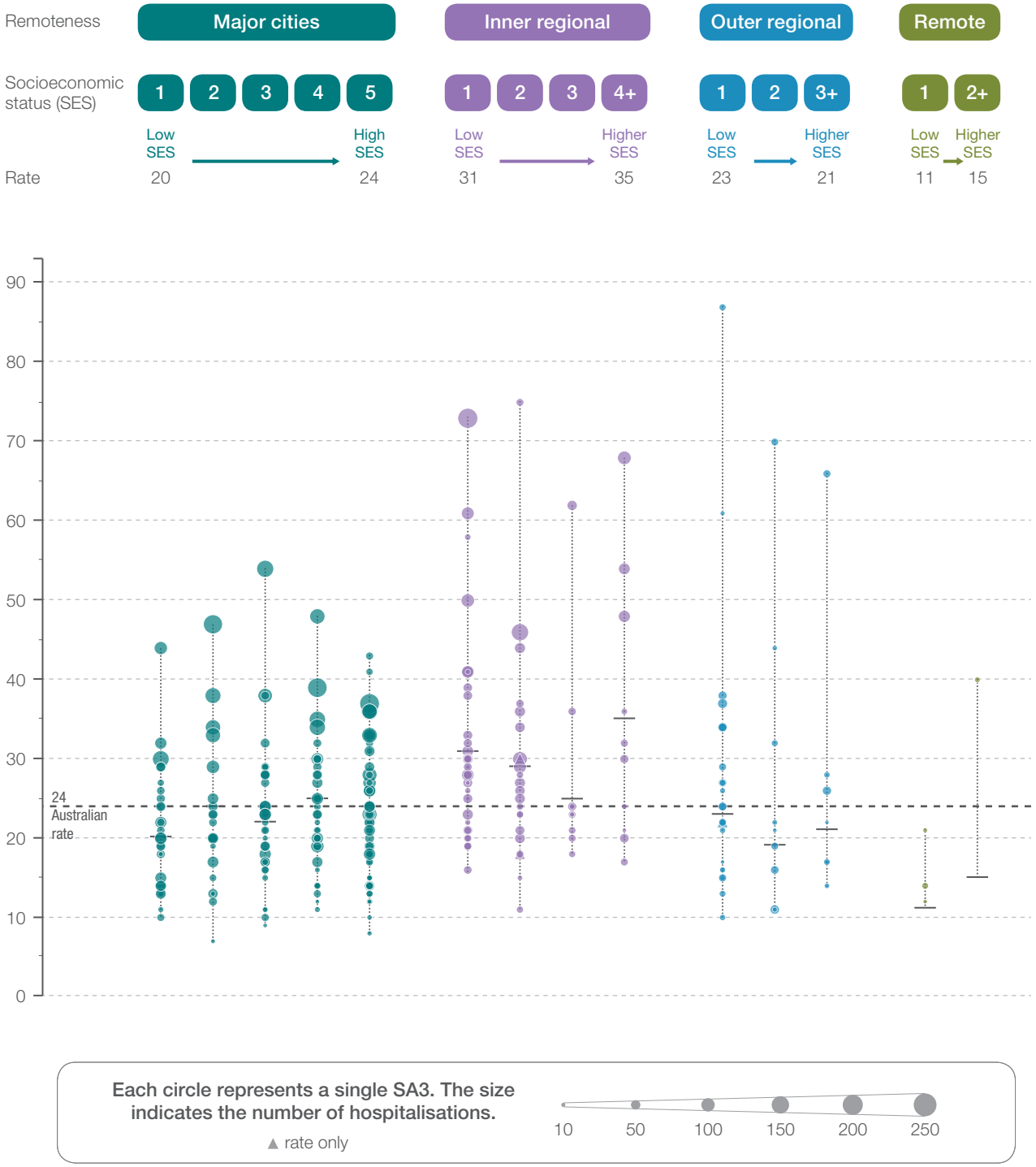
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	50	37	73	54	21	87	15	14
State/territory	26	22	25	27	13	50	14	11
Lowest rate	9	11	11	12	7	30	12	14
No. hospitalisations	5,121	3,320	3,008	1,662	615	699	123	50



Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
For the NT, the territory rate is lower than the minimum SA3 rate as it includes SA3 rates that are not published for reliability reasons. Only Darwin suburbs is publishable.
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Rates by remoteness and socioeconomic status

Figure 4.7: Number of hospitalisations for lumbar spinal fusion (with or without lumbar spinal decompression) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18



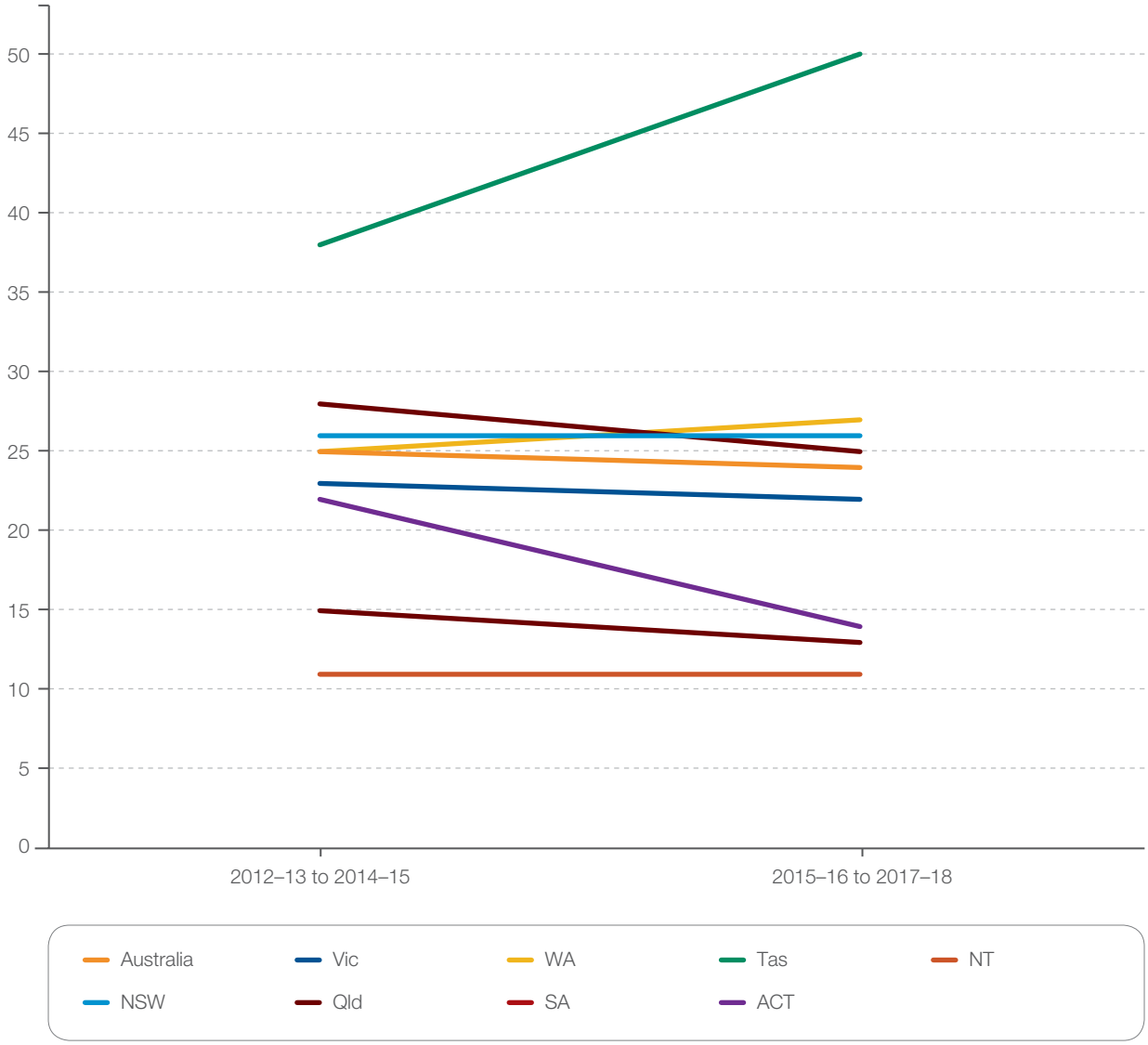
Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
For Remote (SES of 1 and SES of 2+), the remoteness and SES rate is lower than the minimum SA3 rate as it includes SA3 rates that are not published for reliability reasons.
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Lumbar spinal fusion, 18 years and over

Rates across years

Figure 4.8: Number of hospitalisations for lumbar spinal fusion (with or without lumbar spinal decompression) per 100,000 people aged 18 years and over, age and sex standardised, by state and territory of patient residence, 2012–13 to 2014–15 and 2015–16 to 2017–18

	2012–13 to 2014–15	2015–16 to 2017–18
Highest SA3 rate	67	87
Australian rate	**25**	**24**
Lowest SA3 rate	9	7
Magnitude of variation	7.4	12.4
Magnitude of variation without top & bottom 10% SA3	2.4	2.7



Notes:
Denominator populations are the sum of the population estimates as at 31 December of 2012 to 2014 and 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2012 to 2015 and 2015 to 2018.

Resources

Australian

- Spinal fusion for chronic axial low back pain: resource for clinicians, Safer Care Victoria, bettersafercare.vic.gov.au/clinical-guidance/non-urgent-elective-surgery/spinal-fusion-for-chronic-axial-low-back-pain
- Back pain, Better Health Victoria, betterhealth.vic.gov.au/health/ConditionsAndTreatments/Back-pain

International

- *Low Back Pain and Sciatica in Over 16s: Assessment and management*. Invasive treatments for low back pain and sciatica. NICE guideline NG59[9]
- The MIST guidelines: the Lumbar Spinal Stenosis Consensus Group guidelines for minimally invasive spine treatment[19]
- Danish national clinical guidelines for surgical and nonsurgical treatment of patients with lumbar spinal stenosis[7]
- Subacute and chronic low back pain: surgical treatment[4]

Australian initiatives

The Australian Spine Registry (spineregistry.org.au) has been collecting data since January 2018 about spine surgery in Australia, aiming to improve the quality of care. The registry is supported by the Spine Society of Australia, in partnership with Monash University. It collects data on the frequency of spine surgery; the usefulness, safety and results of different procedures; factors that predict favourable and unfavourable outcomes; and the care provided to Australians having spine surgery and how it compares with international best practice.

In July 2020, the Victorian Department of Health and Human Services advised health services that a range of procedures (including spinal fusion for chronic axial back pain) should be performed only for a specific list of clinical indications. Hospitals were advised that communication must involve shared and documented decision making with the patient about evidence, risks and benefits, and other options for care. Victoria is developing resources to support patients and healthcare providers to make decisions together about the most appropriate pathways of care. Spinal fusion surgery for chronic axial low back pain is one of these pathways.

Low Back Pain Clinical Care Standard (planned for publication late 2021), Australian Commission on Safety and Quality in Health Care. safetyandquality.gov.au/standards/clinical-care-standards/low-back-pain-clinical-care-standard

Lumbar spinal fusion, 18 years and over

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4.2 Lumbar spinal decompression, 18 years and over

Why is this important?

Degenerative spinal disorders are a diverse group of conditions that can cause chronic low back pain, leg pain and disability.[1] Non-surgical treatments are mainly recommended as the first-line management because they help many people and the risk of harms is generally low.[2]

Spinal decompression surgery aims to increase the space in the spinal canal to reduce pressure on nerves and blood vessels. It may be considered when non-surgical treatments have not worked or for selected people with serious symptoms.[3]

The *Second Australian Atlas of Healthcare Variation* found marked differences in rates of lumbar spinal decompression. There has been little change to the evidence base for lumbar spinal decompression since publication of the second Atlas in June 2017.

What did we find?

In 2015–2018, the rate of hospitalisation for lumbar spinal decompression (excluding lumbar spinal fusion) was **7.7 times as high** in the area with the highest rate compared with the area with the lowest rate. There was a small decline (6%) in the national rate of lumbar spinal decompression between 2012–2015 and 2015–2018.

What can be done?

Priority should be given to improving access to services that provide multidisciplinary review and non-surgical treatments for chronic low back pain.

Clinical trials are difficult to conduct for lumbar spinal decompression, so it is essential to improve collection of registry data on patient outcomes. The Australian Spine Registry should be developed to support data collection for all consenting patients having lumbar spinal surgery. Patients offered lumbar spinal decompression surgery should be fully informed of the potential benefits and risks for them. Surgeons should contribute data on all consenting patients, and regularly audit and review patient outcome data with their peers. Health services should include clinical audit and review as a credentialing requirement for surgeons who perform lumbar spinal surgery.

Lumbar spinal decompression, 18 years and over

Context

Lumbar spinal decompression is a surgical procedure that increases the amount of space in the spinal canal to relieve pressure on nearby nerves and blood vessels.

Spinal decompression procedures include laminectomy (removal of a section of bone from one of the vertebrae) and discectomy (removal of a section of a damaged disc). In many cases, a combination of these techniques is used.

Spinal decompression is sometimes performed to treat spinal injuries such as fractures, and spinal cord compression due to metastatic cancer. Spinal decompression can be performed in combination with spinal fusion surgery (joining at least two vertebrae to stop movement), but it is often done on its own.[4]

This item focuses on the use of spinal decompression for degenerative spinal conditions. It excludes the use of spinal decompression for infection, tumours and injury, and therefore focuses on degenerative spinal disorders and associated chronic low back pain.

Spinal decompression is often performed to treat symptoms associated with degenerative conditions of the spine where there is pressure on the nerves. These conditions include lumbar spinal stenosis (narrowing of the spinal canal), spondylolisthesis (where one vertebra slips over another) and herniated disc (where disc material protrudes into the spinal canal or outer nerves).[4,5]

Degenerative spinal disorders are a diverse group of conditions that cause a range of symptoms and disabling effects. Although some patients are likely to benefit from surgery, in other patients the place of surgery for treating these conditions is not clear. There are limited data on patient outcomes, and it is difficult to conduct high-quality randomised controlled trials comparing treatment options and outcomes.[6]

Lumbar spinal stenosis

People with spinal stenosis can experience a range of symptoms due to nerve compression, including low back pain that radiates to the buttocks and legs, numbness and weakness, and problems with walking and balance. Symptoms are often worse when standing or walking.[3] Spinal stenosis is a common condition in older people[7], and sometimes occurs with degenerative spondylolisthesis.

Conservative measures are recommended as first-line treatments for most people with spinal stenosis who have mild symptoms.[3,8] Spinal decompression is recommended as an option if conservative measures have not worked and there is sciatica (pain going down one or both legs).[8] It is also recommended when there are serious symptoms, such as progressive weakness, or bladder or bowel disturbance related to nerve compression.[3,9]

Herniated disc

A herniated (or prolapsed) disc can press on nearby nerves and lead to sciatica.[8] A herniated disc is usually the result of disc degeneration due to ageing, although it can occur in a younger age group.

Most people with herniated disc will get better without treatment.[5] Conservative treatments, including physiotherapy and steroid injections, are usually tried first if symptoms persist.[5]

Spinal decompression (discectomy) is considered when there is uncontrolled pain, numbness or weakness, or bladder or bowel problems, and conservative measures have not worked.[5] It has been found to be more effective than conservative management in relieving back and leg pain and disability in people whose herniated disc has not responded to initial conservative options.[5,10]

Complications from lumbar spinal decompression

It is important that patients are informed about the possible complications of spinal decompression, particularly older people and Aboriginal and Torres Strait Islander people, who may have other medical conditions (comorbidity) that can increase the risk of complications.[11]

Reoperation because of continuing symptoms may also be needed. Rates of reoperation depend on the type of degenerative condition.[12–14]

Why revisit variation in lumbar spinal decompression?

The first and second editions of the *Australian Atlas of Healthcare Variation* examined hospitalisation rates for lumbar spinal surgery in people aged 18 years and over.[15,16]

The first Atlas examined variation in lumbar spinal decompression and lumbar spinal fusion combined. It found that, over the three-year period 2010–11 to 2012–13, the rate was 4.8 times as high in the area with the highest rate as in the area with the lowest rate.[15]

The second Atlas separately explored variation in spinal decompression (without fusion). It found that, over the three-year period 2012–2015, the number of hospitalisations for lumbar spinal decompression across 322 local areas (Statistical Area Level 3 – SA3) ranged from 30 to 156 per 100,000 people aged 18 years and over. The rate was 5.2 times as high in the area with the highest rate compared with the area with the lowest rate.[16]

Rates of surgery were higher in inner regional areas than in major cities, and were lowest in outer regional areas and remote areas. Rates of surgery decreased with socioeconomic disadvantage.[16]

It is important to continue to monitor rates of spinal decompression for degenerative spinal stenosis as the evidence on effectiveness of different therapies develops and because of changes in the supply of the health workforce.

About the data

Data are sourced from the National Hospital Morbidity Database, and include admitted patients in both public and private hospitals.

Rates are based on the number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over in 2015–2018. Hospitalisations resulting from infection, tumours and injury are excluded from this analysis.

Because a record is included for each hospitalisation for lumbar spinal decompression surgery, rather than for each patient, patients hospitalised for the procedure more than once in the financial year will be counted more than once.

The analysis and maps are based on the usual residential address of the patient and not the location of the hospital.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Data quality issues – for example, the extent of identification of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

Some private hospitals in Tasmania admit public patients under a contractual arrangement. There is a small over-count of hospitalisations for the procedure in Tasmania because hospitalisations were recorded by both contracting hospital and contracted hospital.

Lumbar spinal decompression, 18 years and over

What do the data show?

Over the three-year period 2015–2018, there were 43,185 hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion), representing 74 hospitalisations per 100,000 people aged 18 years and over (the Australian rate). The median age for patients was 58 years, and varied across states and territories, from 49 in the Northern Territory to 62 in South Australia.

The number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) across 327* local areas (Statistical Area Level 3 – SA3) ranged from 27 to 209 per 100,000 people. The rate was **7.7 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 34 per 100,000 people in the Australian Capital Territory to 126 in Tasmania (Figures 4.11–4.14).

After the highest and lowest 10% of results were excluded and 265 SA3s remained, the number of hospitalisations per 100,000 people was 2.1 times as high in the area with the highest rate compared with the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates for lumbar spinal decompression (excluding lumbar spinal fusion) hospitalisations were higher in inner regional areas than in major cities or outer regional areas, and were lowest in remote areas. In inner regional and remote areas, rates decreased with socioeconomic disadvantage. This pattern was not evident in major cities or outer regional areas (Figure 4.15).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander people (41 per 100,000 people) was 45% lower than the rate for other Australians (74 per 100,000 people) This difference was most pronounced in Western Australia, where rates for Aboriginal and Torres Strait Islander people were 79% lower than rates for other Australians (Figure 4.9).

Figure 4.9: Number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2015–16 to 2017–18

* There are 340 SA3s. For this item, data were suppressed for 13 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Data for some states and territories (Aboriginal and Torres Strait Islander people) are not published for reliability reasons.

Data by Aboriginal and Torres Strait Islander status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander people are under-enumerated among states and territories.

Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.

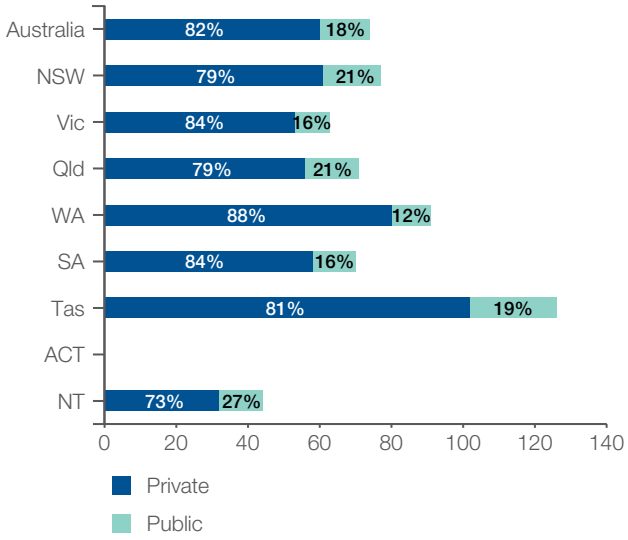
For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Analysis by patient funding status

Overall, 82% of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) were for privately funded patients. This proportion varied from 73% in the Northern Territory to 88% in Western Australia (Figure 4.10).

Figure 4.10: Number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over, age and sex standardised, by state and territory of patient residence, by patient funding status, 2015–16 to 2017–18



The data for Figures 4.9 and 4.10 are available at safetyandquality.gov.au/atlas

Trends over time

Between 2012–2015 and 2015–2018, the rate of hospitalisations for lumbar spinal decompression excluding lumbar spinal fusion per 100,000 people decreased by 6% (from 79 per 100,000 people to 74 per 100,000 people) in the Australian population as a whole (Figure 4.16).

The rate for Aboriginal and Torres Strait Islander people increased by 37% (from 30 per 100,000 people to 41 per 100,000 people) over the same period.

The data for analysis over time for Aboriginal and Torres Strait Islander people, and analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

Notes:
For 2016–17, there were data quality issues related to the recording of patient funding source for patients admitted to ACT private hospitals. ACT private hospitals for 2016–17 are excluded from the analysis and data for the ACT are not published.
Hospitalisations for public patients do not incur a charge to the patient or a third-party payer (for example, a private health insurance fund), unlike hospitalisations for private patients.
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Lumbar spinal decompression, 18 years and over

Interpretation

Variation in rates of lumbar spinal decompression surgery is likely to be due to geographical differences in the factors discussed below.

Variations between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on where people live rather than where they obtain their health care. Some patients may travel outside their local area to receive care.

Clinical decision making

High or low rates of spinal decompression in some areas may be related to differences between clinicians in interpretation of the available evidence about the effectiveness of spinal decompression, and differing clinical beliefs about the likelihood of benefits and complications of this type of spinal surgery for some groups of patients.

Patients' expectations

Patients' expectations about the need for spinal surgery to deal with chronic low back pain may drive variation. These expectations may be affected by psychosocial factors, such as dependence on alcohol or other drugs, depression and job loss.

Access to services

One reason for the high variation in the rates of spinal decompression may be lack of access to affordable and accessible alternatives to surgery, such as physiotherapy with cognitive behavioural therapy, multidisciplinary back pain assessment clinics and pain clinics. People who are unable to access these types of care and who have persistent disabling pain may be referred for surgical opinion in the absence of other options for management of pain.

Having private health insurance allows affordable access to spinal decompression in private hospitals. Atlas data found that most (82%) hospitalisations for lumbar spinal decompression were for privately funded patients.

Also, private health insurance may not cover the cost of non-surgical treatments for degenerative spinal conditions.

Workforce issues

Workforce factors may influence the overall rates of spinal surgery and geographic variation in rates, and this should be explored further. One possible reason for high rates in some areas is an undersupply of health practitioners who provide alternatives to surgical intervention. Differences in geographical access to spinal surgeons will also influence the use of these interventions. An oversupply of surgeons may lead to increased rates of surgery.

Addressing variation

Considering the burden of disease, the costs associated with low back pain and the number of spinal operations occurring in Australia, priority should be given to ensuring that there are appropriate services for multidisciplinary review and non-surgical management of chronic back pain in health services throughout the country.

Because of uncertainty in the evidence base, high-quality research is needed to identify whether there are subgroups of patients who would benefit from spinal surgery, and what degree of benefit might be gained compared with use of more conservative treatments. Better information on surgery outcomes, including patient-reported outcomes in the medium to longer term, is also required.

Given the burden of disease and numbers of spinal operations occurring in Australia, priority should be given to further developing the Australian Spine Registry so that it can capture information on all eligible patients, provide information for effective peer review of spinal surgery and add to the knowledge base about outcomes for specific groups of patients.

Patients with degenerative spinal conditions who are offered the option of spinal decompression surgery should be fully informed about the potential benefits and the risk of complications for them.

All patients who decide to have surgery should be informed about the Australian Spine Registry and, if they fulfil the registration criteria, should be asked if they are willing to be included. Surgeons undertaking this procedure should contribute data on all eligible patients to the Australian Spine Registry and participate in routine peer review.

Initiatives to address variation could include the following:

High-quality research and outcome monitoring

- Undertake high-quality research to resolve uncertainties about benefit
- Ensure resourcing to support widespread use of the Australian Spine Registry
- Develop agreed measures for audit

Clear information for patients

- Ensure that all patients have clear information about treatment options, likely risks and benefits, and the uncertainties about the evidence base – before and after specialist referral

Access to services

- Increase access to healthcare services that provide alternatives to surgical intervention
- Ensure that psychosocial factors are part of any assessment for axial chronic low back pain before referral for surgery
- Establish a targeted strategy to improve access to spinal surgery for Aboriginal and Torres Strait Islander people

Training and professional development

- Improve fellowship training through ongoing curriculum review
- Improve post-fellowship training and possibly develop a qualification
- Focus on continuing professional development, mentoring and peer review
- Educate clinicians about the benefits, costs and complications of surgery compared with other options

Credentialing and scope of practice

- Develop appropriate credentialing and definition of scope of practice in all hospitals
- Develop best-practice guidelines, especially in complex surgery

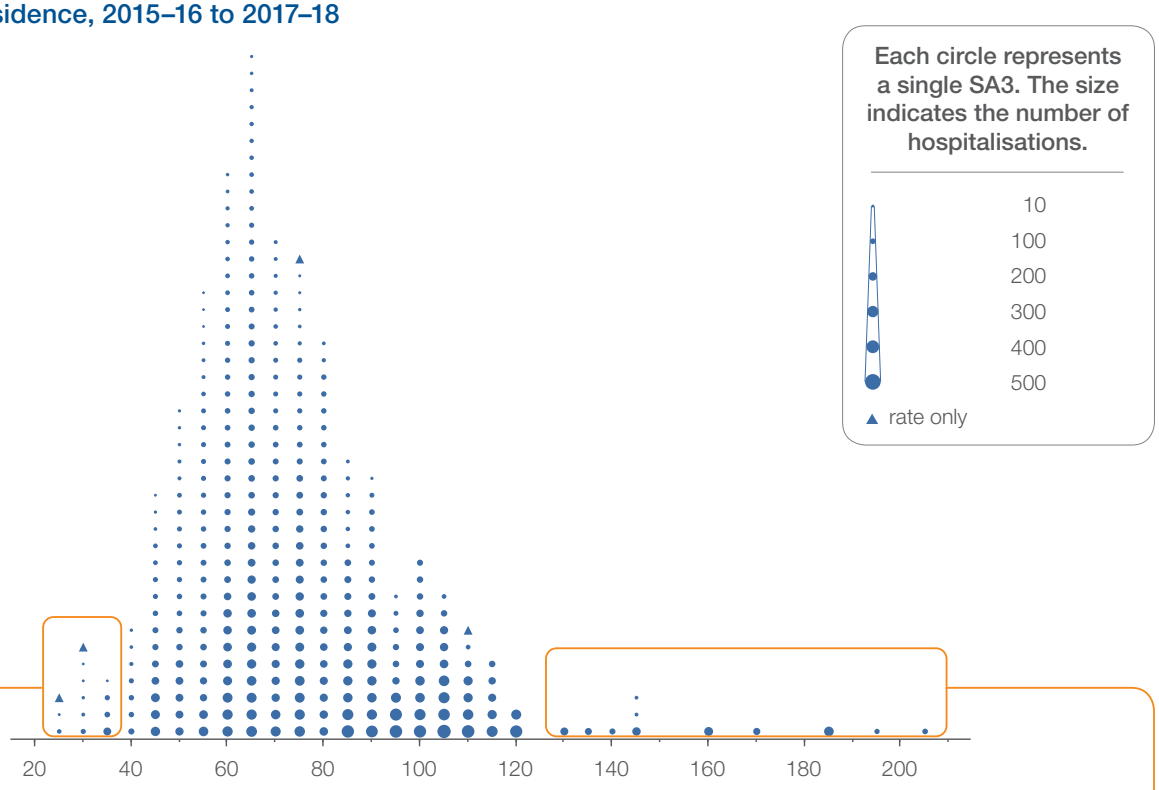
Care pathways

- Implement multidisciplinary clinical pathways and multidisciplinary preoperative review
- Develop evidence-based care pathways, including referral guidelines for general practitioners

Lumbar spinal decompression, 18 years and over

Rates by local area

Figure 4.11: Number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Belconnen	ACT	27	59
Far North	Qld	28	n.p.
Alice Springs	NT	29	24
North Canberra	ACT	30	33
Katherine	NT	30	12
Tablelands (East) - Kuranda	Qld	30	n.p.
Cairns - South	Qld	31	73
Gungahlin	ACT	32	42
South Canberra	ACT	32	23
Melbourne City	Vic	37	90
Port Douglas - Daintree	Qld	37	12
Brimbank	Vic	38	172
Tuggeranong	ACT	38	76

Highest rate areas

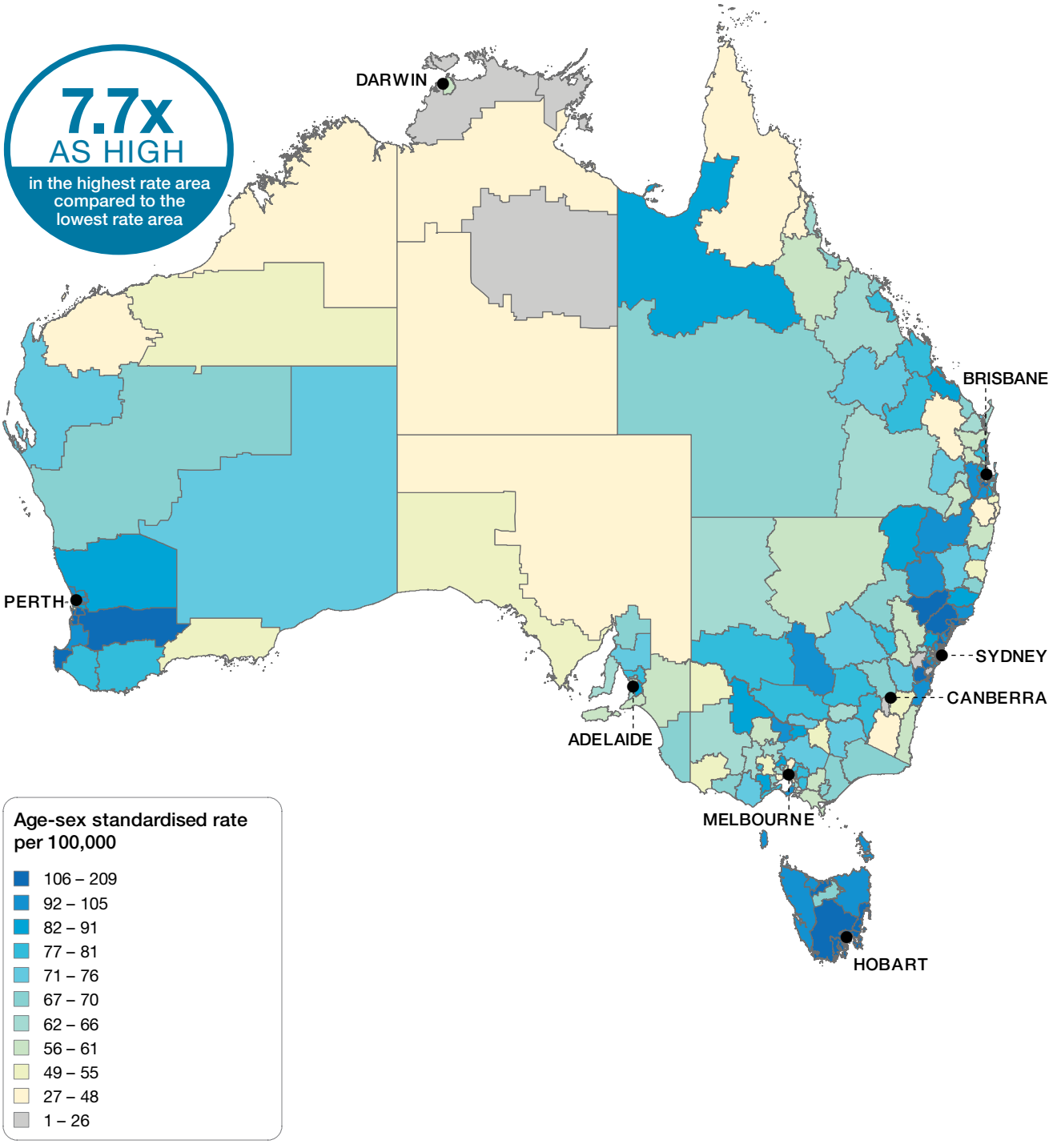
SA3	State	Rate	Hospitalisations
Sorell - Dodges Ferry	Tas	209	89
Brighton	Tas	197	77
Hobart - North East	Tas	186	257
Hobart - South and West	Tas	172	143
Camden	NSW	163	220
Hobart - North West	Tas	149	197
South East Coast	Tas	149	40
Central Highlands (Tas.)	Tas	148	42
Upper Hunter	NSW	140	102
Wollondilly	NSW	139	136
Hobart Inner	Tas	133	175

Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published (n.p.) for confidentiality reasons.
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Lumbar spinal decompression, 18 years and over

Rates across Australia

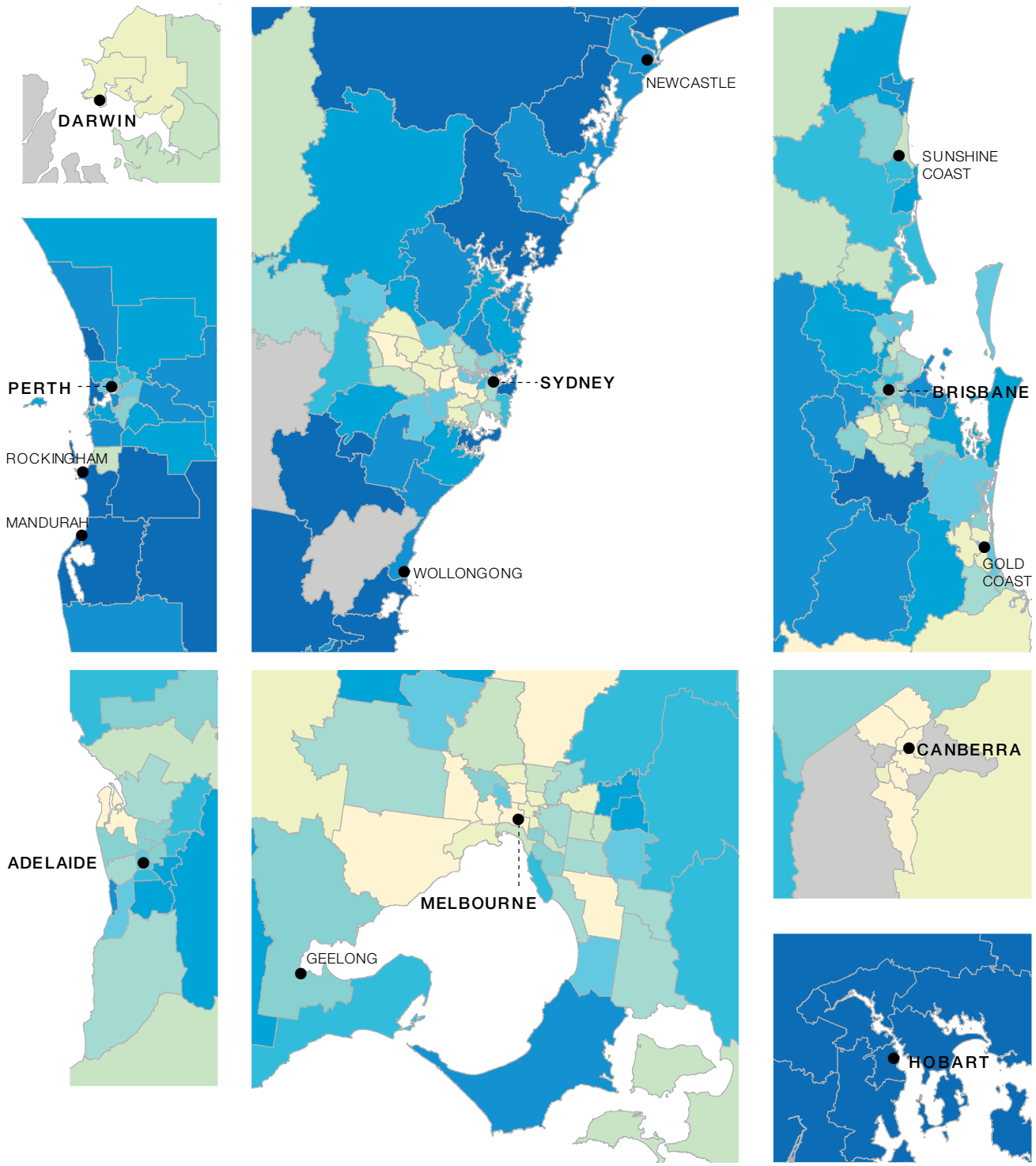
Figure 4.12: **Number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18**



Notes:
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Rates across capital city areas

Figure 4.13: **Number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18**



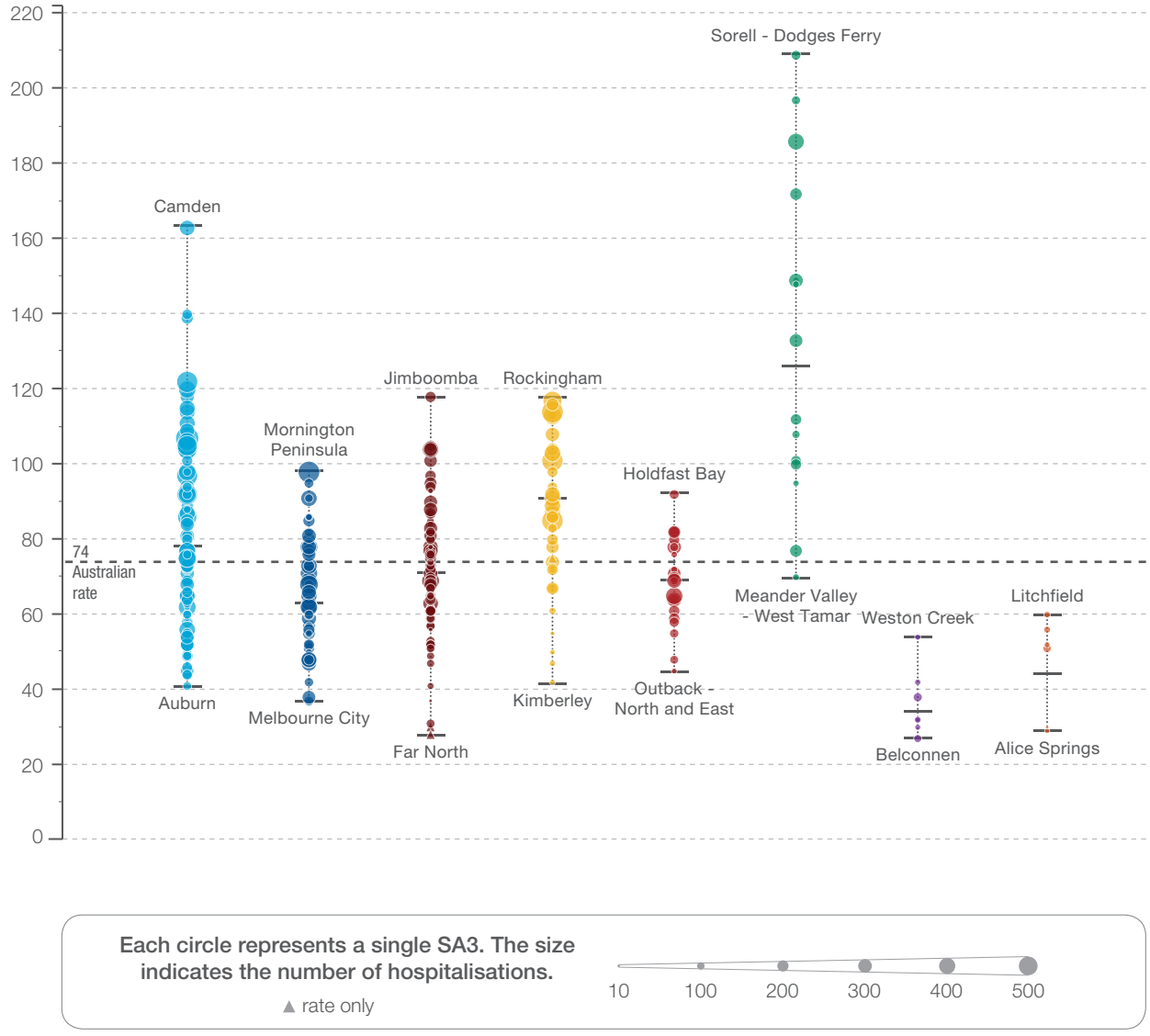
Notes:
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Lumbar spinal decompression, 18 years and over

Rates by state and territory

Figure 4.14: Number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18

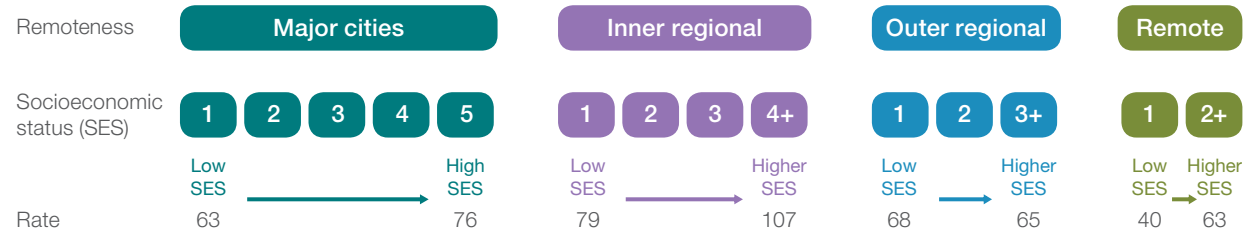
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	163	98	118	117	92	209	54	60
State/territory	78	63	71	91	69	126	34	44
Lowest rate	41	37	28	42	45	70	27	29
No. hospitalisations	14,783	9,490	8,144	5,462	3,059	1,657	307	229

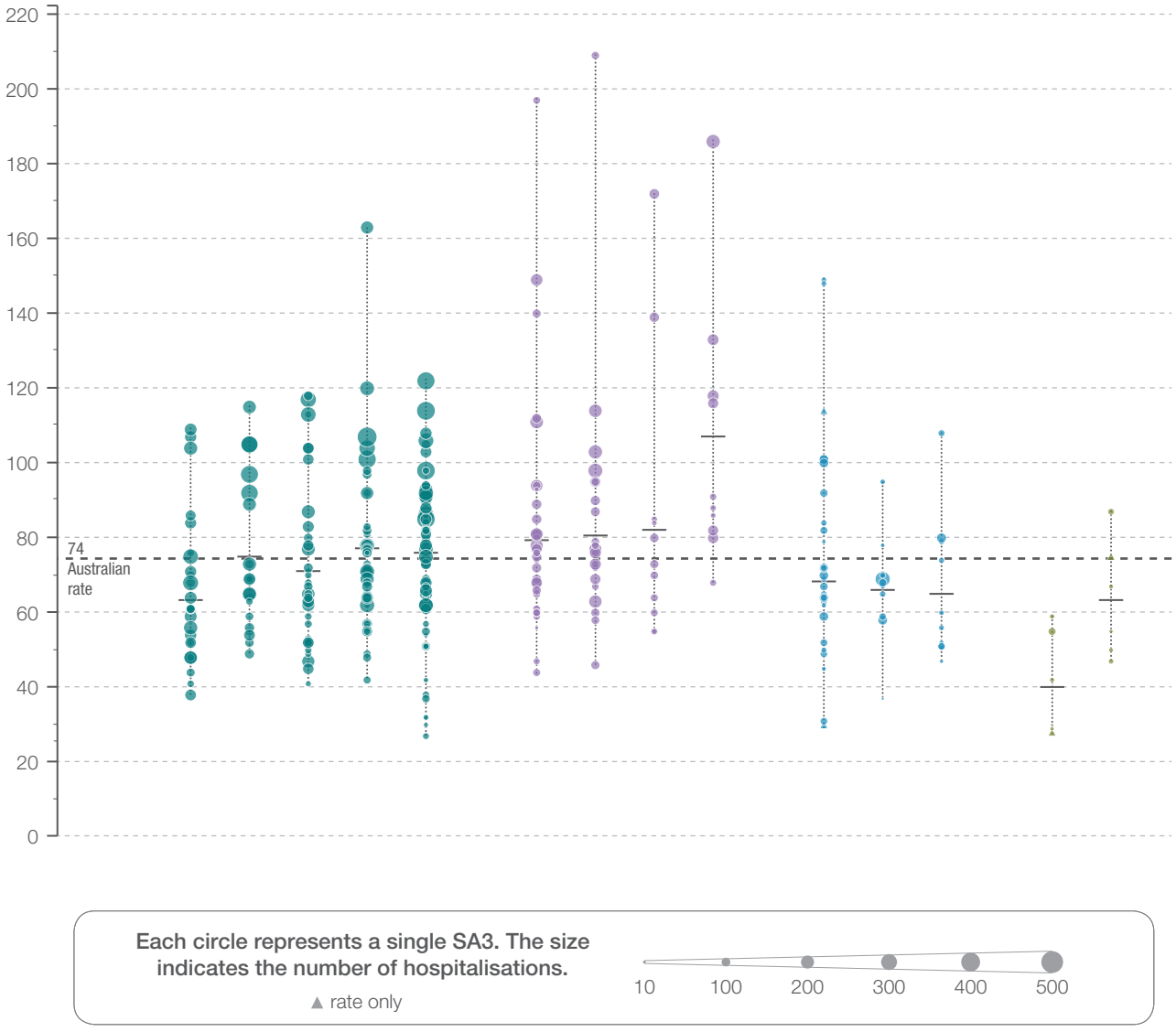


Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Rates by remoteness and socioeconomic status

Figure 4.15: Number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2015–16 to 2017–18





Each circle represents a single SA3. The size indicates the number of hospitalisations.

▲ rate only

10 100 200 300 400 500

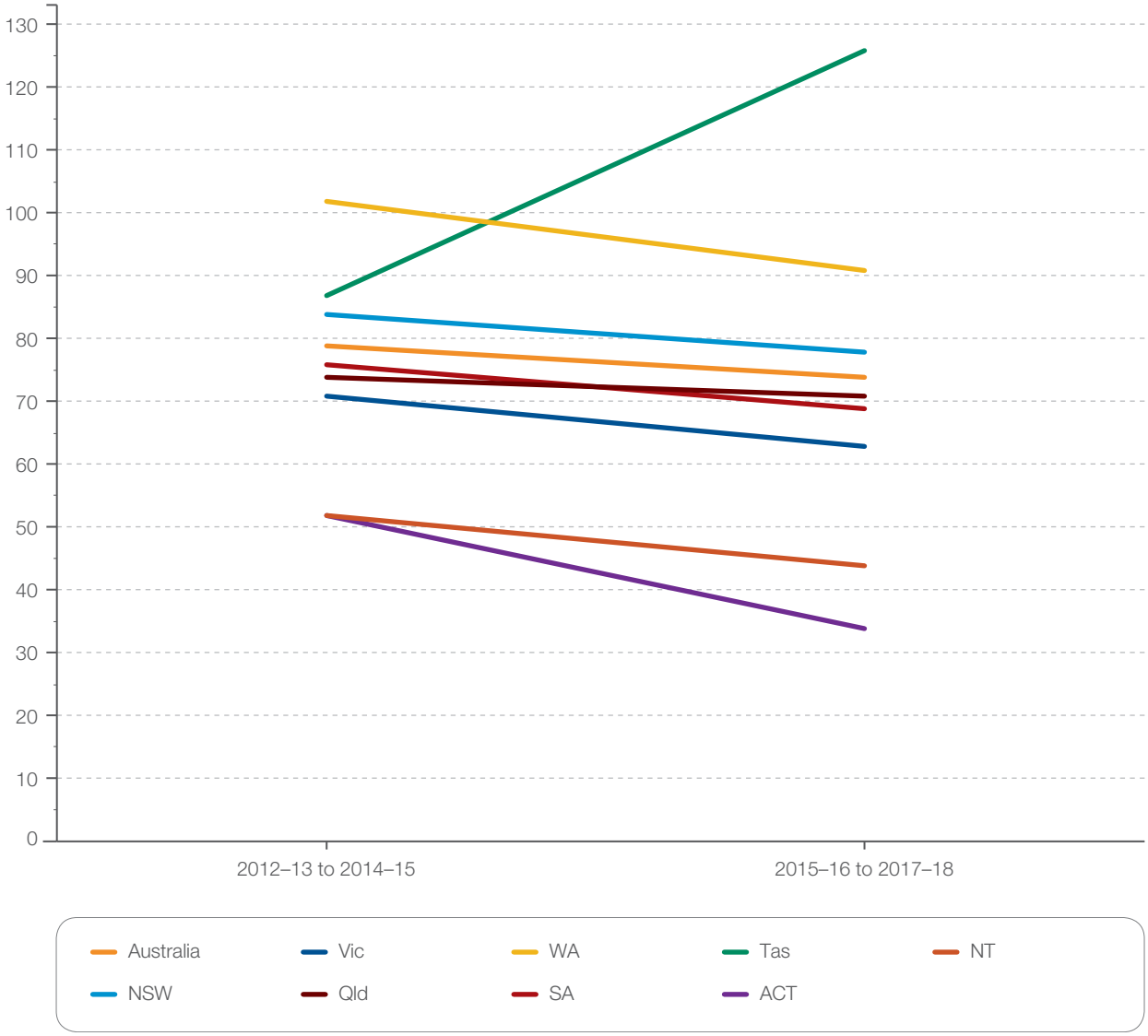
Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Denominator populations are the sum of the population estimates as at 31 December of 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2015 to 2018.

Lumbar spinal decompression, 18 years and over

Rates across years

Figure 4.16: **Number of hospitalisations for lumbar spinal decompression (excluding lumbar spinal fusion) per 100,000 people aged 18 years and over, age and sex standardised, by state and territory of patient residence, 2012–13 to 2014–15 and 2015–16 to 2017–18**

	2012–13 to 2014–15	2015–16 to 2017–18
Highest SA3 rate	156	209
Australian rate	**79**	**74**
Lowest SA3 rate	30	27
Magnitude of variation	5.2	7.7
Magnitude of variation without top & bottom 10% SA3	2.0	2.1



Notes:
Denominator populations are the sum of the population estimates as at 31 December of 2012 to 2014 and 2015 to 2017. Population estimates as at 31 December are calculated as the average of the 30 June populations before and after the relevant December.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2012 to 2015 and 2015 to 2018.

Resources

Australian

- Back pain, Better Health Victoria, betterhealth.vic.gov.au/health/ConditionsAndTreatments/Back-pain
- Laminectomy, Better Health Victoria, betterhealth.vic.gov.au/health/conditionsandtreatments/laminectomy

International

- *Low Back Pain and Sciatica in Over 16s: Assessment and management*. Invasive treatments for low back pain and sciatica. NICE guideline NG59[8]
- The MIST guidelines: the Lumbar Spinal Stenosis Consensus Group guidelines for minimally invasive spine treatment[9]
- Danish national clinical guidelines for surgical and nonsurgical treatment of patients with lumbar spinal stenosis[3]
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Australian initiatives

SUcceSS trial: SUrgery for Spinal Stenosis

This Australian trial will help to fill a gap in evidence by measuring the effect of spinal decompression versus placebo surgery on walking and function in patients with symptomatic lumbar spinal stenosis. This will be the first randomised placebo-controlled trial of surgery for spinal stenosis. It aims to provide high-quality evidence on the efficacy of spinal decompression for treating spinal stenosis.[17] The trial is enrolling participants until December 2022.

Australian Spine Registry

The Australian Spine Registry (spineregistry.org.au) has been collecting data since January 2018 about spine surgery in Australia, aiming to improve the quality of care. The registry is supported by the Spine Society of Australia, in partnership with Monash University. It collects data on the frequency of spine surgery; the usefulness, safety and results of different procedures; factors that predict favourable and unfavourable outcomes; and the care provided to Australians having spine surgery and how it compares with international best practice.

Clinical care standard

Low Back Pain Clinical Care Standard (planned for publication late 2021), Australian Commission on Safety and Quality in Health Care. www.safetyandquality.gov.au/standards/clinical-care-standards/low-back-pain-clinical-care-standard

Lumbar spinal decompression, 18 years and over

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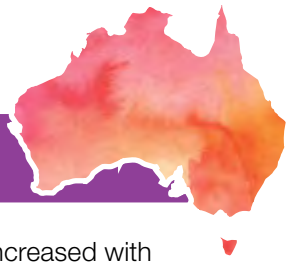
Chapter 5
Gastrointestinal investigations



At a glance

Gastroscopy is used to investigate, treat or monitor conditions of the upper gastrointestinal (GI) tract. Most conditions that affect the upper GI tract and require gastroscopy are uncommon in people aged under 55 years.

The Atlas found that, in 2018–19, the rate of Medicare Benefits Schedule (MBS)–subsidised services for gastroscopy for people aged 18–54 years was almost 11 times higher in the local area with the highest rate than in the area with the lowest.* Rates were markedly higher in major cities than elsewhere. Almost two-thirds of gastroscopy services were performed on the same day as a colonoscopy for the same person.

Few people who have an initial gastroscopy require another within three years. Repeat gastroscopy is used mainly to monitor conditions that increase the risk of upper GI cancer or bleeding in high-risk groups.

The Atlas found that, in 2018–19, the rate of MBS-subsidised services for repeat gastroscopy performed within two years and 10 months of an earlier gastroscopy was almost 15 times higher in the local area with the highest rate than in the area with the lowest.* Rates were markedly higher in major cities and also increased with socioeconomic advantage.

National guidance on appropriate use of gastroscopy, including when to perform repeat gastroscopy, is needed. Education for clinicians and consumers about the low risk of upper GI cancer for most people, especially those aged under 55 years, and improved consumer understanding about the role of gastroscopy, are required.

Repeat colonoscopy is used mainly to monitor for bowel cancer in people at increased risk. The timing of repeat colonoscopy is based on bowel cancer risk. There are limited reasons for repeating a colonoscopy within three years.

The Atlas found that, in 2018–19, the rate of MBS-subsidised services for repeat colonoscopy performed within two years and 10 months of an earlier colonoscopy was almost 20 times higher in the local area with the highest rate than in the area with the lowest.* Rates were markedly higher in major cities and increased with socioeconomic advantage.

A focus on driving implementation of national guidelines and the *Colonoscopy Clinical Care Standard* is needed.

* After standardising to remove age and sex differences between populations.

Recommendations

The Commission consulted widely, but is solely responsible for making the recommendations; as such, the recommendations may not reflect the views of all contributors to the Atlas.

5a. State and territory health departments to develop and implement evidence-based triage criteria for the prioritisation and allocation of patients to gastroscopy, colonoscopy, and gastroscopy performed with colonoscopy.

5b. Health service organisations to:

i. Audit clinicians performing endoscopy services and provide the results back to clinicians to act upon, in line with Action 1.28 of the National Safety and Quality Health Service (NSQHS) Standards

ii. Incorporate individual clinicians' audit data as part of re-credentialing processes

iii. Report key performance indicators, trends and adverse events in endoscopy to the governing body, consistent with the NSQHS Standards.

5c. The Gastroenterological Society of Australia to develop a position statement on the appropriate use and timing of gastroscopy, and of gastroscopy performed with colonoscopy, for gastroenterologists and general practitioners.

5.1 Gastroscopy MBS services, 18–54 years

Why is this important?

Gastroscopy is used to investigate or treat conditions affecting the upper gastrointestinal (GI) tract. It can also be used to monitor conditions affecting the upper GI tract that lead to cancer in certain high-risk groups.[1-3]

Most conditions affecting the upper gastrointestinal (GI) tract that require a gastroscopy are uncommon in people aged under 55 years. Oesophageal and stomach cancers are very rare in this age group, and even less common in people without certain risk factors, such as smoking.[1-3]

The *Third Australian Atlas of Healthcare Variation* found substantial variation in hospitalisations for gastroscopy among people of all ages.[4] Higher rates were seen in areas of socioeconomic advantage in major cities, and in women. These findings are not consistent with the prevalence of GI disease.

The fourth Atlas now examines gastroscopy services that are subsidised under the Medicare Benefits Schedule (MBS) in a population that has few indications for its use: people aged 18–54 years.

What did we find?

In 2018–19, there were 154,338 MBS-subsidised services for gastroscopy for people aged 18–54 years. The rate was **10.8 times as high** in the area with the highest rate as in the area with the lowest rate.

Rates were markedly higher in major cities than elsewhere. The national rate for women was 1.6 times as high as the rate for men. About six in every 10 gastroscopy services were performed on the same day as a colonoscopy service for the same person.

What can be done?

Development of national guidance on the appropriate use of gastroscopy is a priority. Guidelines should include recommendations on when gastroscopy should be done at the same time as a colonoscopy. Structured referral forms could aid assessment of appropriateness against guidelines. Health service organisations could ensure that credentialing requirements for clinicians performing gastroscopy include audit of adherence to guidelines.

Interventions are needed that focus on educating consumers and clinicians that the risk of upper GI cancer in this age group is low. Improving consumer understanding about the role of gastroscopy is also important.

More attention needs to be given to clinicians' education on the causes of iron deficiency anaemia in women aged under 55 years. Heavy menstrual bleeding, a commonly unrecognised cause, should be excluded before referral for gastroscopy.

Gastroscopy MBS services, 18–54 years

Context

This item examines rates of MBS-subsidised services for gastroscopy for people aged 18–54 years in Australia in 2018–19.

What is gastroscopy?

Gastroscopy, also known as an upper GI endoscopy, is the examination of the upper part of the GI tract, using a small, flexible tube with a camera on the end, called an endoscope. The procedure can also include a biopsy, if needed. The procedure, requires an empty stomach for an accurate examination. It is usually quick to perform, taking up to about 15 minutes.[1,5]

What is it used for?

Gastroscopy is used to investigate, treat or monitor certain upper GI symptoms or diseases. Recommended uses are[1]:

- Investigation of suspected bleeding from the upper GI tract and upper small bowel
- Investigation of symptoms suggestive of cancer (such as difficulty swallowing, weight loss, bleeding and stomach pain) or no response to acid suppression therapy
- Tissue diagnosis of suspected cancer or coeliac disease
- Surveillance of high-risk groups with chronic conditions that can increase cancer risk (for example, Barrett's oesophagus).

Gastroscopy is also used to treat bleeding in the upper GI tract, some upper GI cancers or a narrowed oesophagus (oesophageal stricture). However, gastroscopies for treatment (therapeutic gastroscopies) are not included in this data item.

Most conditions affecting the upper GI tract that require investigation with gastroscopy are uncommon in people aged under 55 years. They become more common with increasing age, the onset of chronic disease, or the use of certain medicines such as non-steroidal anti-inflammatory drugs.[2,3]

Gastroscopy is not required to investigate uncomplicated reflux[2,3,6,7], a common condition that affects more than one in 10 people in Australia[8,9], with a few exceptions. This is because:

- Most people with reflux have heartburn or regurgitation that can be diagnosed clinically without investigation and managed effectively with dietary or lifestyle modifications, or acid suppression medicines[6]
- Only about one-third of people with gastro-oesophageal reflux disease (GORD), a condition in which reflux affects wellbeing and requires treatment, have abnormalities visible on gastroscopy[2]
- Most reflux does not progress to changes in the cells lining the upper GI tract, which can lead to Barrett's oesophagus or oesophageal cancer.[2]

Investigation with gastroscopy is required if reflux does not respond to a trial of acid suppression therapy and if 'alarm features' suggestive of cancer are present, such as difficulty swallowing, bleeding, weight loss, recurrent vomiting and anaemia. It is also required if the diagnosis is unclear or there are complications such as stricture.[2,6,7,10-12]

Upper GI cancer is rare in people of any age and even lower in people aged under 55 years. Use of gastroscopy for population-based screening for upper GI cancer is not recommended because the chance of diagnosing serious disease is low. Upper GI cancer rates are lower in women than in men, and lower in people without risk factors, such as those who have never smoked[2,13-17] (Table 5.1). These are important considerations for the appropriate use of gastroscopy, particularly for common conditions.

Table 5.1: Upper GI cancer rates per 100,000 people, by sex and age group, 2019

	Oesophageal cancer		Gastric cancer	
Age	Males	Females	Males	Females
35–39	0.5	0.1	1.6	1.9
40–44	1.0	0.2	3.4	2.5
45–49	2.9	1.3	5.6	1.6
50–54	7.2	1.5	11.2	5.7

Source: Australian Institute of Health and Welfare[18]

Coeliac disease is a common and under-diagnosed condition. Gastroscopy is used to confirm a diagnosis for people with positive coeliac serology or where the diagnosis is uncertain.[6,10,19] Repeat gastroscopy after treatment with a gluten-free diet is controversial and is yet to be shown as cost-effective.[20]

Gastroscopy is also used to investigate causes of suspected GI blood loss. People without a clear reason for iron deficiency should have a gastroscopy to exclude GI bleeding or malignancy (for example, postmenopausal women and most men). Menstruating women, blood donors and people with vegetarian or vegan diets should have other common causes of iron deficiency excluded first to avoid a missed diagnosis and unnecessary gastroscopy.[21,22]

Why examine gastroscopy in people aged 18–54 years?

This Atlas examines variation in MBS-subsidised gastroscopy services for an age group in which signs and symptoms appropriate for investigation with gastroscopy are uncommon: adults aged under 55 years. Findings from the *Third Australian Atlas of Healthcare Variation* and a New South Wales study support exploration of variation in gastroscopy in this age group.[4,23]

The third Atlas reported more than half a million (505,544) hospitalisations for gastroscopy among people of all ages in Australia in 2016–17.[4] The rate in the area with the highest rate was 7.4 times as high as the rate in the area with the lowest rate. Higher rates were seen in areas of socioeconomic advantage in major cities, and in women. More than one-third (36%) of hospitalisations for colonoscopy included a gastroscopy.

The third Atlas findings highlighted a clear anomaly between the prevalence of risk factors for upper GI disease and gastroscopy hospitalisations, suggesting that some people are receiving care that is inappropriate and of no or little benefit.

Inappropriate use of gastroscopy in people aged under 55 years was examined in a New South Wales study.[23] Use of gastroscopy for investigating dyspepsia (indigestion or heartburn) in people aged under 55 years was considered low-value care – defined as care that provides no benefit, or a risk of harm that is greater than the benefit, or a benefit that is disproportionately low compared with its cost. About 14% of gastroscopies in adults aged under 55 years in New South Wales public hospitals were identified as low-value care in 2016–17. The rate of low-value gastroscopy increased by about 8% each year between 2010–11 and 2016–17.

Gastroscopy MBS services, 18–54 years

About the data

Data are sourced from the MBS dataset. This dataset includes information on MBS claims processed by Services Australia. It covers a wide range of services (attendances, procedures, tests) provided across primary care and hospital settings.

The dataset does not include:

- Services for publicly funded patients in hospital
- Services for patients in public outpatient clinics
- Services covered under Department of Veterans' Affairs arrangements.

The dataset does not allow analysis by Aboriginal and Torres Strait Islander status.

Rates are based on the number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years in 2018–19.

Because a record is included for each service rather than for each patient, patients who receive the service more than once in the financial year will be counted more than once.

The analysis and maps are based on the patient's postcode recorded in their Medicare file and not the location of the service.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

What do the data show?

Magnitude of variation

In 2018–19, there were 154,338 MBS-subsidised services for gastroscopy, representing 1,247 services per 100,000 people aged 18–54 years (the Australian rate).

The number of MBS-subsidised services for gastroscopy across 327* local areas (Statistical Area Level 3 – SA3) ranged from 218 to 2,348 per 100,000 people. The rate was **10.8 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of MBS-subsidised services for gastroscopy varied across states and territories, from 481 per 100,000 people in the Northern Territory to 1,312 in Victoria (Figures 5.5–5.8).

After the highest and lowest 10% of results were excluded and 263 SA3s remained, the number of MBS-subsidised services per 100,000 people was 2.9 times as high in the area with the highest rate compared with the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates were markedly higher in major cities than in other areas, and markedly lower in remote areas than in other areas. Overall, the rate for major cities was 3.4 times as high as the rate for remote areas (Figures 5.1 and 5.9).

Rates decreased with socioeconomic disadvantage in major cities, and in inner regional and remote areas. Overall, the rate of gastroscopy in the highest socioeconomic group was 1.4 times as high as in the lowest group (Figures 5.2 and 5.9).

* There are 340 SA3s. For this item, data were suppressed for 13 SA3s due to a small number of services and/or population in an area, or potential identification of individual patients, practitioners or business entities.

Notes:

Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

For further detail about the methods used, please refer to the Technical Supplement.

Figure 5.1: Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years, age and standardised, by remoteness of patient residence, 2018–19

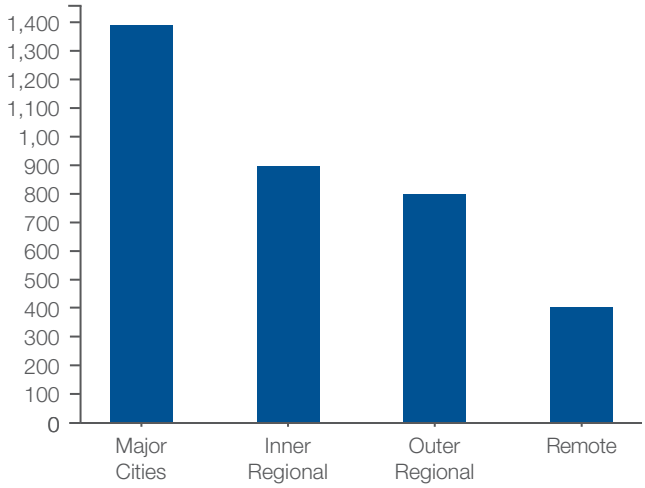
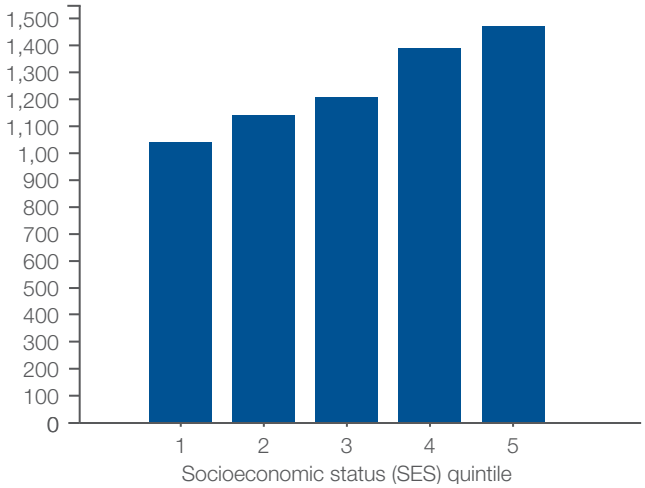


Figure 5.2: Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years, age and standardised, by socioeconomic area of patient residence, 2018–19*



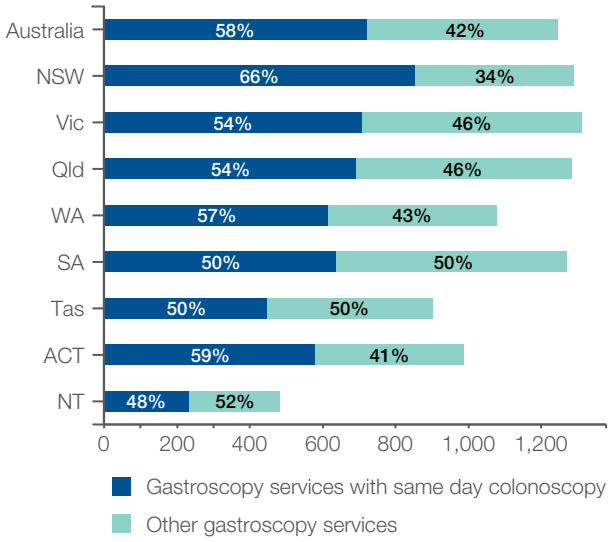
Notes:
* Areas with a low SES (=1) have a high proportion of relatively disadvantaged people. Areas with a high SES (=5) have a low proportion of relatively disadvantaged people.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Gastroscopy MBS services, 18–54 years

Number of MBS-subsidised services for gastroscopy and colonoscopy for the same patient on the same day

In 2018–19, 58% of MBS-subsidised services for gastroscopy were performed on the same day as an MBS-subsidised service for colonoscopy for the same patient. There were 89,399 services for gastroscopy that accompanied a colonoscopy (Figure 5.3).

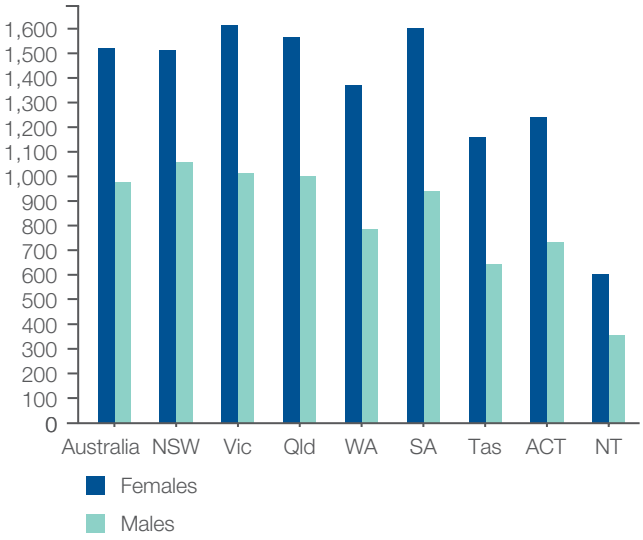
Figure 5.3: Number of MBS-subsidised services for gastroscopy on the same patient and same day as an MBS-subsidised service for colonoscopy, per 100,000 people aged 18–54 years, age and sex standardised, by state and territory of patient residence, 2018–19



Analysis by sex

The national rate of MBS-subsidised services for gastroscopy for females was 1.6 times as high as the rate for males. Rates were consistently higher for females in all states and territories (Figure 5.4).

Figure 5.4: Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years, age and sex standardised, by state and territory of patient residence, by sex, 2018–19



The data for Figures 5.3 and 5.4, and the data and graphs for analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

Notes:
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Interpretation

There is wide variation in gastroscopy use, probably involving overuse in some areas and underuse in others. Rates of gastroscopy were markedly higher in major cities than elsewhere. Rates were also higher for women than for men in all states and territories.

These findings are consistent with those in the third Atlas, which examined public and private hospitalisations for gastroscopy.

Variation in rates of gastroscopy is likely to be due to geographical differences in the factors discussed below.

Variation between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on where people live rather than where they obtain their health care. People may travel outside their local area to receive health care.

Clinical decision-making

Variation in adherence with available clinical guidelines may influence rates of gastroscopy.

International evidence suggests that a high proportion of gastroscopies do not accord with guideline recommendations. A 2010 meta-analysis of more than 13,000 patients undergoing gastroscopy found that 22% of procedures did not align with recommended indications in European and American guidelines.[24] More recently, a 2018 systematic review and meta-analysis reported that up to 54% of gastroscopies in 15 countries were performed for inappropriate indications.[25] Despite guidelines that recommend against using gastroscopy to investigate uncomplicated GORD[6,7,11,26], a New Zealand study reported this as one of the most common inappropriate indications for performing gastroscopy.[27]

Differences in clinical opinion on management where the evidence is unclear may contribute to variation. For example, further evidence is needed to demonstrate the benefit of gastroscopy after a diagnosis of coeliac disease.[20]

Difficulties in keeping up to date with rapidly changing evidence may also influence rates.[25]

Some clinicians may perform gastroscopy in low-risk people, such as those aged under 55 years, to relieve patient anxiety and reassure them that they do not have GI cancer. However, this reassurance may be short lived, and the procedure has a low chance of diagnosing significant disease.[28-30]

Fear of litigation for not investigating symptoms may influence clinicians' decisions about use of gastroscopy, particularly if they are unaware of current recommendations or evidence about the incidence of upper GI cancers. Concerns about late diagnosis and subsequent litigation, as well as few disincentives for over-testing may also contribute to overuse of gastroscopy.[25]

Higher rates of gastroscopy in women than in men may be related to higher rates of iron deficiency in women. Gastroscopy might have been used before exclusion of dietary causes of iron deficiency, or heavy menstrual bleeding in menstruating women. Higher gastroscopy rates in women raise concern of delayed diagnoses and treatment, because common causes of iron deficiency are being missed.

Gastroscopy and colonoscopy performed on the same day

The ease of performing a gastroscopy at the same time as a colonoscopy may contribute to variation. About six in 10 gastroscopy services were performed on the same day in the same person. Both procedures should be performed concurrently for only a limited number of conditions, so the high rates suggest inappropriate use.

Australia's National Bowel Cancer Screening Program offers a two-yearly faecal occult blood test (FOBT) for people aged 50–74 years. Guidelines recommend colonoscopy for people who have a positive FOBT to assist with diagnosing disease.[31] Some clinicians performing gastroscopies may be unaware that a FOBT only detects lower GI tract bleeding.

Gastroscopy MBS services, 18–54 years

Higher rates of both procedures may also reflect investigation of iron deficiency in menstruating women before excluding diet or heavy menstrual bleeding as the cause.

Referral practices

Variation in gastroscopy rates may be due to referral practices. A New Zealand study found that 42% of referrals did not follow American Society of Gastroenterology criteria. No cancers were found in gastroscopies from inappropriate referrals.[27] Surveillance of healed benign lesions was the most common inappropriate reason to request a gastroscopy among hospital-based clinicians (31% of consultant requests). Investigation of symptoms considered functional in origin (heartburn) was the most common inappropriate reason among general practitioners (GPs) (25% of requests).

Consumer expectations

Consumer expectations and perception of cancer risk may contribute to variation in rates of gastroscopy use.[26,32] People often have incorrect beliefs about their cancer risk.[32,33] This may influence their perceptions about the benefits of interventions such as screening to detect GI cancer, and their preference and demand for investigations, even when their risk of cancer is low.

In the United Kingdom, the 'Be Clear on Cancer' campaign in 2015, which aimed to raise awareness of GI cancers, increased demand for gastroscopy by 48% but did not affect the rate of cancer diagnosis.[34]

Access to services and number of clinicians providing services

Access to clinicians may influence the likelihood of people seeking care and the rates of gastroscopy use. The practice styles of individual clinicians may be more likely to affect rates in areas with fewer clinicians, such as rural and regional locations, than in areas with more clinicians.

Availability and affordability of services may also influence patterns of use. Ability to pay out-of-pocket costs for gastroscopy is likely to be lower in areas of socioeconomic disadvantage, and access is likely to be more difficult in areas with fewer services. Open-access endoscopy services, where GPs are able to request gastroscopy without specialist review, may also influence patterns of use.

Financial incentives

Greater remuneration for providing a service rather than consultation may lead to variation and over-servicing in some areas.

Promoting appropriate care

Unwarranted variation in the use of gastroscopy in people aged under 55 years could be addressed by reducing the rate of inappropriate gastroscopies and increasing access in areas that are under-served.

Australia's finite health resources should be directed to high-value care, and away from low-value care such as use of gastroscopy to investigate reflux in people aged under 55 years, where it will not change the diagnosis or management. Improving awareness of the causes of iron deficiency unrelated to the upper GI tract will reduce unnecessary gastroscopy and avoid delays in diagnosis. Reducing inappropriate referrals for gastroscopy could also free up resources to reduce waiting times for public colonoscopy services.

Guideline and resource development

Development of national guidance to support appropriate use of gastroscopy is a priority. These could be used to assess appropriateness of referrals and for clinical audit of clinicians' gastroscopy practices. The guidelines should cover guidance on appropriate use of same-day upper and lower GI endoscopy, as recommended by the Medicare Benefits Schedule Review Taskforce.[35]

Integration of cancer mortality and lifestyle data into healthcare pathways, training guidelines, and specialist and consumer resources could also support appropriate use of gastroscopy.

Clinical decision-making

Strategies to improve clinicians' skills in provisional diagnosis could improve the assessment of reflux symptoms and iron deficiency, and reduce unnecessary gastroscopy.

Use of medicines that can cause GORD symptoms should be excluded in people presenting with reflux.

Dietary causes and heavy menstrual bleeding should be excluded in women with iron deficiency. Improved awareness and application of the *Heavy Menstrual Bleeding Clinical Care Standard* may reduce delays in diagnosis of heavy menstrual bleeding and the rates of unnecessary gastroscopy in menstruating women.[4,36]

Improved use of medicines to manage GORD symptoms may help reduce inappropriate gastroscopies. Proton pump inhibitors (PPIs), which are commonly used to manage GORD symptoms, are most effective when taken at least half an hour before the first meal of the day.[6] Taking PPI medicines at the wrong time can lead to poor symptom control, and may contribute to unnecessary use of gastroscopy to investigate symptoms.

Consumer education and reassurance

Informing people aged under 55 years about the limited role of gastroscopy in the management of most upper GI symptoms, and reassuring them that their risk of developing upper GI cancer is very low may reduce demand for inappropriate gastroscopy. Interactive tools that identify a person's risk or the incidence of cancer – such as the Australian Institute of Health and Welfare cancer summary data tool (see 'Resources' on page 264) – may help clinicians when having conversations with their patients about upper GI cancer risk.[18]

Consumer education for women about the importance of considering heavy menstrual bleeding or diet as a cause of iron deficiency anaemia may also reduce unnecessary demand and use of gastroscopy.

Reducing risk factors

Making lifestyle changes to reduce the risk of GORD, upper GI cancers and bowel cancer should be the focus for people aged under 55 years presenting with reflux symptoms who are concerned about cancer, rather than having a gastroscopy. For example, weight loss can reduce GORD symptoms. In women, a 3.5 kg/m^2 reduction in body mass index can result in a nearly 40% reduction in the risk of frequent GORD symptoms.[37,38] Improving a person's understanding about their cancer risk – particularly in people aged under 55 years – is important to reduce anxiety and dispel myths about cancer.[39]

Public health initiatives that address diet, smoking, obesity, excessive alcohol consumption and sedentary lifestyle should be targeted to areas with a high prevalence of risk factors for upper GI disease.

Clinical audit and clinician education

Clinical audit is a tool that could be used more widely to support appropriate use of gastroscopy in Australia.

Health service organisations could ensure that credentialing requirements for clinicians include a clinical audit against evidence-based guidelines. Audits in this area could form part of continuing education requirements for clinicians.

A study of Australian GPs found that participation in clinical self-audit against Gastroenterological Society of Australia recommendations improved management of GORD.[40] Referral for gastroscopy fell from 48% to 45% of patients during the audit program. Other aspects of management improved – for example, identification of risk factors that triggered symptoms (such as medicines), and recommendations for lifestyle changes such as weight loss and dietary changes.[40]

An indicator to measure gastroscopies performed after a positive FOBT (which is contrary to guidelines which recommend a colonoscopy only) could be developed for clinical audits.

Gastroscopy MBS services, 18–54 years

Structured referral forms and checklists for GPs could support appropriate requests for gastroscopy in younger adults. Using guidelines to assess the appropriateness of referrals could also increase the likelihood that the procedure will assist with providing a diagnosis.

Educational programs for gastroenterologists and GPs could improve the appropriateness of requests for gastroscopy. Education could cover the:

- Non-GI causes of iron deficiency anaemia
- Low risk of upper GI cancer in people aged under 55 years
- Limited role of gastroscopy in GORD
- Low chance that gastroscopy will diagnose significant disease for simple upper GI symptoms.

Appropriate prioritisation of colonoscopy and gastroscopy

Health service organisations need to examine the volume of gastroscopies that may be tying up resources needed to perform colonoscopies. Colonoscopy for people with a positive FOBT should be prioritised over gastroscopy for people whose management is unlikely to change as a result of the gastroscopy, such as people aged under 55 years with typical symptoms of reflux. Better use of resources according to clinical need would improve the likelihood of diagnosing significant disease and reduce delays in diagnosis.

Triage systems

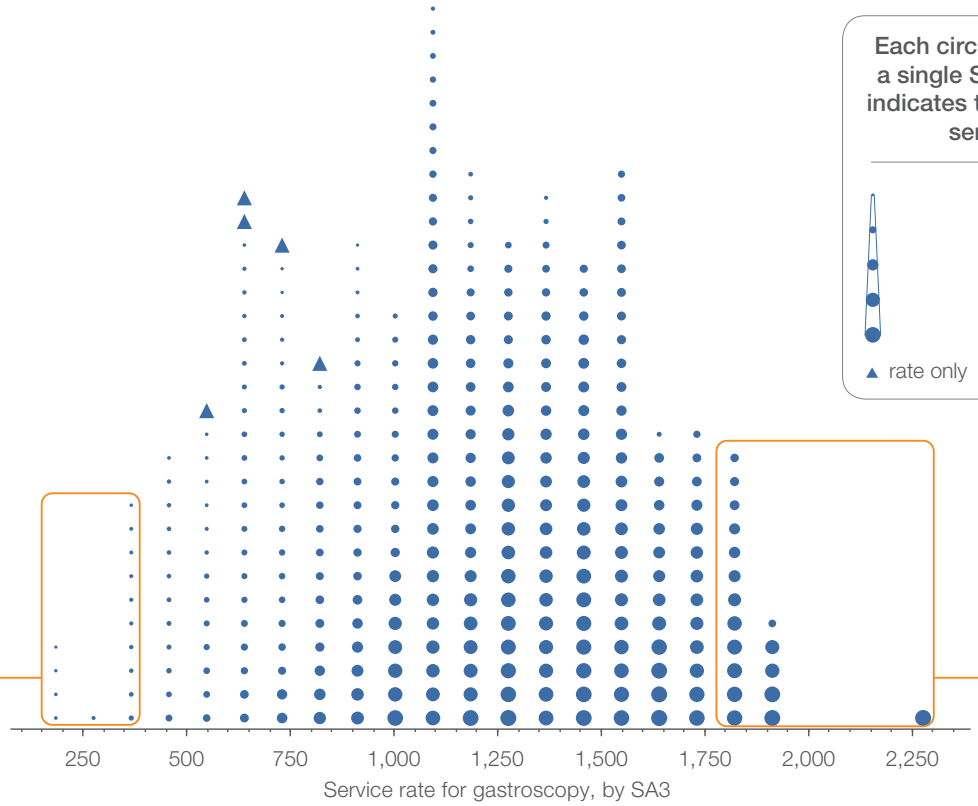
Many states and territories are introducing evidence-based triage systems for prioritising and allocating people for gastroscopy and colonoscopy, with the aim of reducing variation in use of these procedures:

- Victorian health services require clinicians to refer people for gastroscopy according to the categorisation guidelines; these guidelines specify the appropriate use of gastroscopy in people aged under 55 years who have symptoms of GORD with no alarm features, and surveillance of people with Barrett's oesophagus[41]
- Tasmania has adopted the Victorian categorisation guidelines and formed a statewide endoscopy network to monitor the quality of its services[42]
- Queensland and Western Australia have introduced clinical prioritisation criteria for many clinical areas, including gastroenterology, to triage patients referred to public specialist outpatient services.[43,44]

Wider use of these triage systems could result in more appropriate prioritisation of gastroscopy and colonoscopy.

Rates by local area

Figure 5.5: Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Lowest rate areas

SA3	State	Rate	Services
Alice Springs	NT	218	47
Daly - Tiwi - West Arnhem	NT	226	21
Glenelg - Southern Grampians	Vic	240	38
Kimberley	WA	268	48
West Pilbara	WA	344	68
Wellington	Vic	368	71
Wangaratta - Benalla	Vic	386	78
Goldfields	WA	389	80
Meander Valley - West Tamar	Tas	393	39
Colac - Corangamite	Vic	412	65
East Pilbara	WA	420	64
Outback - North	Qld	434	66
North East	Tas	435	71
Albany	WA	438	119
Clarence Valley	NSW	448	93

Highest rate areas

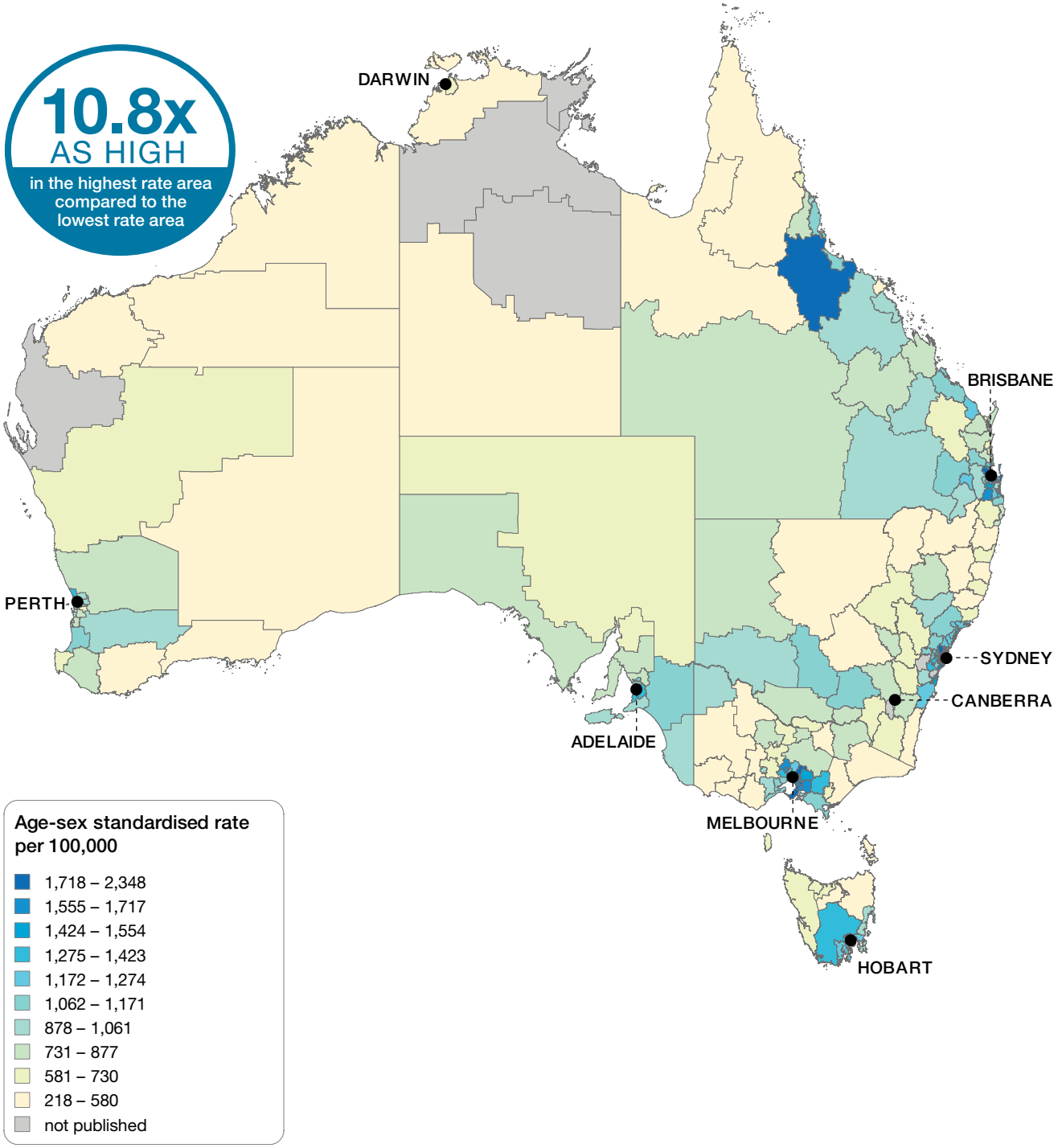
SA3	State	Rate	Services
Eastern Suburbs - North	NSW	2,348	1,722
Baulkham Hills	NSW	1,973	1,503
The Hills District	Qld	1,967	925
Dural - Wisemans Ferry	NSW	1,962	255
Bayside	Vic	1,950	1,007
Glen Eira	Vic	1,929	1,619
Pennant Hills - Epping	NSW	1,905	501
Sutherland - Menai - Heathcote	NSW	1,904	1,046
Mornington Peninsula	Vic	1,903	1,372
Capalaba	Qld	1,900	704
Keilor	Vic	1,898	586
Bald Hills - Everton Park	Qld	1,880	415
Ku-ring-gai	NSW	1,877	1,165
Carindale	Qld	1,874	536
Strathpine	Qld	1,859	366
Centenary	Qld	1,850	312
Frankston	Vic	1,843	1,326
Kingston	Vic	1,827	1,221

Notes:
Triangles (▲) indicate SA3s where only rates are published. The number of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Gastroscopy MBS services, 18–54 years

Rates across Australia

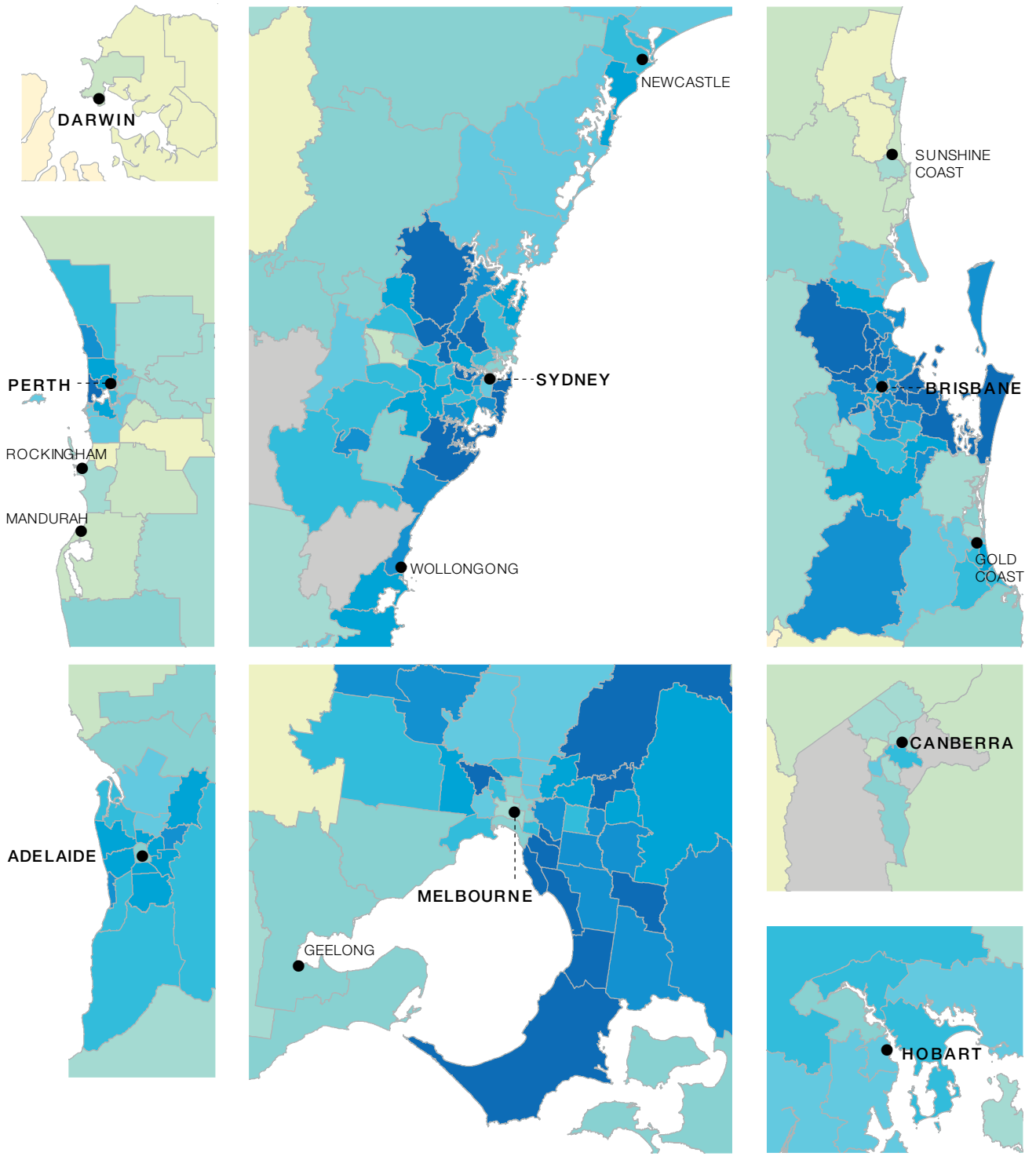
Figure 5.6: Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Rates across capital city areas

Figure 5.7: Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



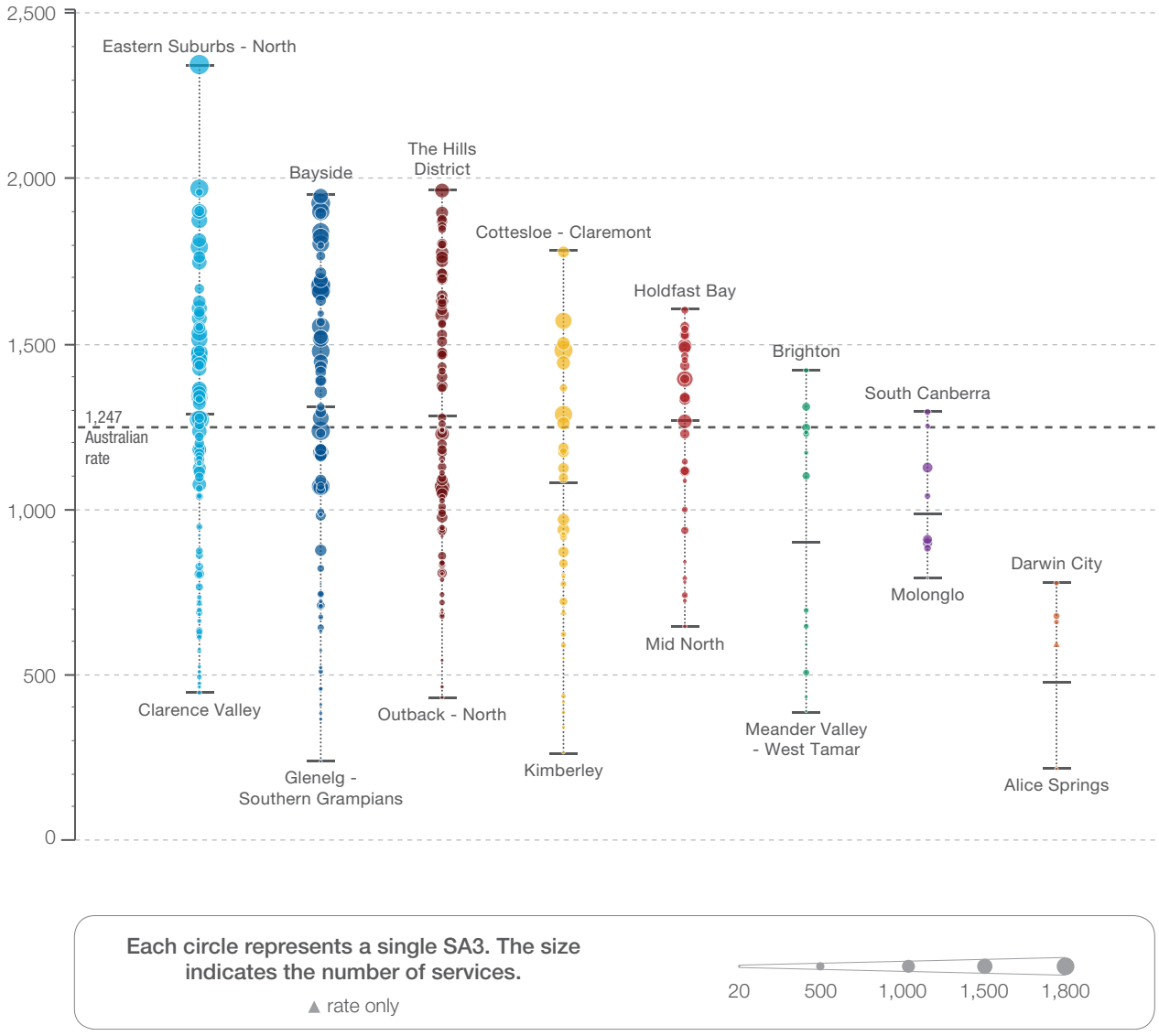
Notes:
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Gastroscopy MBS services, 18–54 years

Rates by state and territory

Figure 5.8: Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19

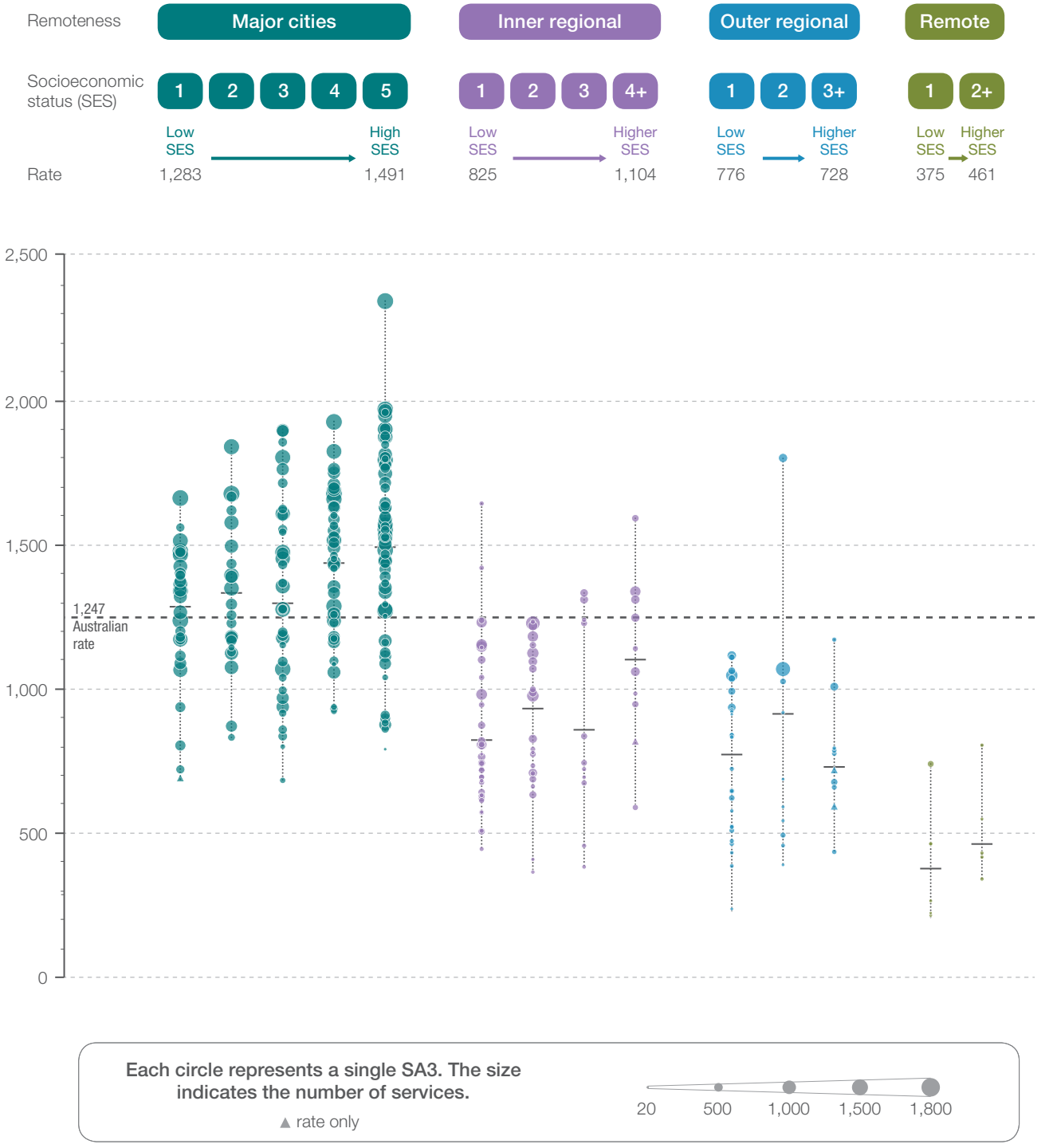
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	2,348	1,950	1,967	1,781	1,605	1,423	1,297	779
State/territory	1,287	1,312	1,282	1,078	1,270	902	987	481
Lowest rate	448	240	434	268	649	393	794	218
Total services	50,349	42,576	31,703	14,143	10,549	2,198	2,167	641



Notes:
Triangles (▲) indicate SA3s where only rates are published. The number of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Rates by remoteness and socioeconomic status

Figure 5.9: Number of MBS-subsidised services for gastroscopy per 100,000 people aged 18–54 years, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Triangles (▲) indicate SA3s where only rates are published. The number of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Gastroscopy MBS services, 18–54 years

Resources

- Australian Institute of Health and Welfare, Cancer summary data visualisations[18], aihw.gov.au/reports/cancer/cancer-data-in-australia/contents/cancer-summary-data-visualisation
- *Gastro-oesophageal Reflux Disease in Adults: Clinical update* (2011)[2]
- *Clinical Practice Guidelines for the Diagnosis and Management of Barrett's Oesophagus and Early Oesophageal Adenocarcinoma*[16]
- *Therapeutic Guidelines: Gastrointestinal*, version 6[6]
- *Gastro-oesophageal Reflux Disease and Dyspepsia in Adults: Investigation and management* (clinical guideline)[3]
- *Suspected Cancer: Recognition and referral – upper gastrointestinal tract cancers*[45]
- Guidelines for the diagnosis and management of gastroesophageal reflux disease[7]
- The role of endoscopy in the management of GERD[11]

Australian initiatives

The information in this chapter will complement work already underway to improve the use of gastroscopy in Australia. At a national level, this work includes:

- Royal Australasian College of Surgeons, Choosing Wisely recommendation 4: Do not use endoscopy for investigation in gastric band patients with symptoms of reflux[46]
- A review of the impact of the changes made to the MBS items for gastroenterology services in response to the Medicare Benefits Schedule Review Taskforce.[35]

Many state and territory initiatives are also in place to address access to gastroscopy, including:

- *Upper Gastrointestinal Endoscopy Categorisation Guidelines for Adults*, Victoria[41]
- *Endoscopy Action Plan*, Queensland[47]
- Clinical prioritisation criteria: endoscopy[48] and Clinical prioritisation criteria: gastroenterology[43], Queensland
- *Referral Guidelines: Direct Access Gastrointestinal Endoscopic Procedures*, Western Australia[49]
- *Urgency Categorisation and Access Policy for Public Direct Access Adult Gastrointestinal Endoscopy Services*, Western Australia[44]
- Statewide endoscopy care network, which monitors and assesses the quality of endoscopy services, Tasmania.[42]

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5.2 Repeat colonoscopy MBS services, all ages

Why is this important?

Colonoscopy is used to investigate bowel problems or symptoms. Repeat colonoscopy is mainly used to monitor for bowel cancer and its precursor, polyps (adenomas), in people with an increased risk of developing bowel cancer. Less commonly, colonoscopy is repeated to manage chronic inflammatory conditions of the bowel.

The first and third Atlases in the *Australian Atlas of Healthcare Variation* series found substantial variation in rates of colonoscopy according to where people live.[1,2] Differences in adherence to surveillance guidelines were identified as a possible reason for the variation. Guideline recommendations on the timing of repeat colonoscopies are based on bowel cancer risk. There are limited reasons for repeating a colonoscopy after a period of less than three years.

The fourth Atlas examines rates of colonoscopy that are repeated within two years and 10 months of an earlier colonoscopy, using Medicare Benefits Schedule (MBS) data.

What did we find?

In 2018–19, there were almost 148,000 MBS-subsidised services for repeat colonoscopy performed within two years and 10 months in people of all ages.

The rate in the area with the highest rate was **19.9 times as high** as the rate in the area with the lowest rate. Rates were markedly higher in major cities than elsewhere. In major cities, rates increased with socioeconomic advantage.

What can be done?

More needs to be done to improve the consistent application of the national guidelines on bowel cancer screening and surveillance. A concerted focus by clinicians, medical colleges and health service organisations to drive implementation of the *Colonoscopy Clinical Care Standard* and national guidelines could reduce inappropriate requests for repeat colonoscopies and free up services for people at high risk of bowel cancer.[3-5]

Structured referral forms could aid assessment of requests for repeat colonoscopies against guidelines. Health service organisations could ensure that re-credentialing requirements for clinicians performing colonoscopy include clinical audit against guidelines to promote high-quality colonoscopies.

Wider consumer awareness about the impact of lifestyle on cancer risk is needed. Educating people on ways they can reduce their risk of bowel cancer and improve their general health should be an integral part of surveillance. Integration of data about cancer incidence and lifestyle into healthcare pathways, training guidelines and consumer resources could help prompt discussion between clinicians and patients and may reduce inappropriate repeat colonoscopy.

Repeat colonoscopy MBS services, all ages

Context

This item examines rates of MBS-subsidised services for repeat colonoscopy performed within two years and 10 months of an earlier colonoscopy for people of all ages in Australia in 2018–19.

What is colonoscopy?

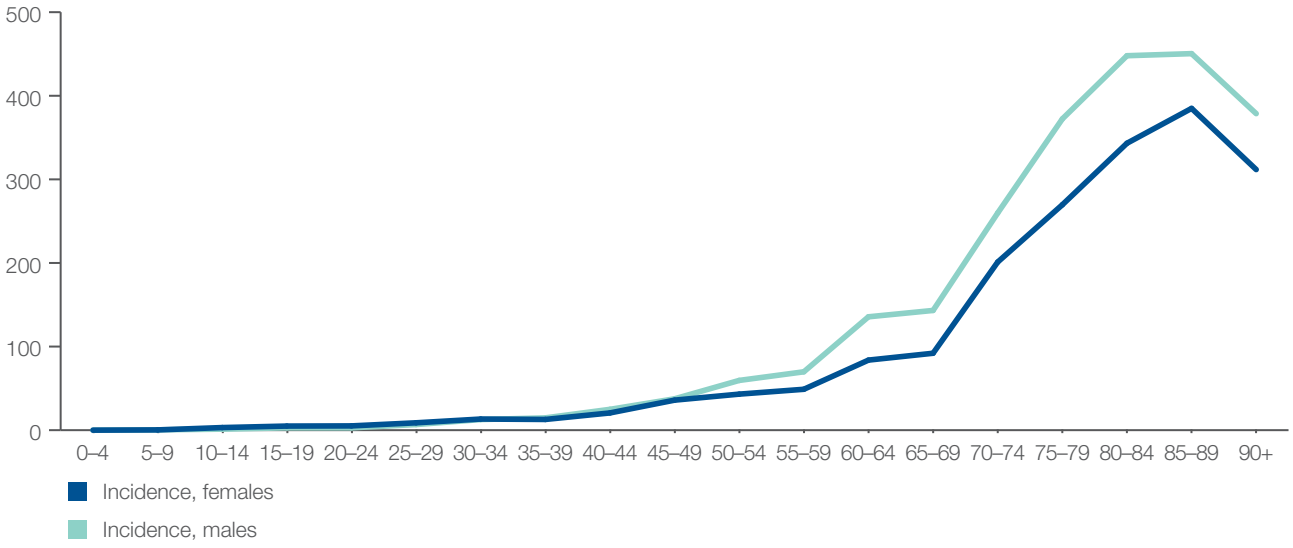
Colonoscopy is the examination of the large bowel (colon) using a small, flexible tube with a camera on the end, called a colonoscope. It can also include removal of polyps (adenomas) or other abnormal growths, and a biopsy. Polyps can be precursors of bowel cancer and are a marker of increased risk.

What is it used for?

Colonoscopy is used to investigate bowel problems or symptoms. It is also used to monitor for and detect polyps or bowel cancer (colorectal cancer) in people with no symptoms but with an increased risk, and to manage chronic conditions of the bowel, such as inflammatory bowel disease (IBD). Increased risk of bowel cancer can be identified from a faecal occult blood test (FOBT) of a person's bowel motion (possibly done as part of the National Bowel Cancer Screening Program [NBCSP]), previous results of a colonoscopy, a family history of bowel cancer or a high-risk genetic condition.[3] Bowel cancer is the fourth most commonly diagnosed cancer in Australia.[6,7] After the age of 50, the incidence of bowel cancer steadily increases (Figure 5.10).[4] About 55% of the bowel cancer burden in Australia can be attributed to lifestyle factors including diet (high in processed meat, red meat and sugar), physical inactivity, being overweight, smoking and alcohol use.[7]

While the age-standardised incidence of bowel cancer in Australia declined from 2001 to 2020* (from 66 to 51 cases per 100,000 people), the estimated number of people diagnosed with bowel cancer increased (from 12,806 to 15,494 people) because of the ageing population.[8]

Figure 5.10: Colorectal cancer rates (per 100,000 people), by sex and age group, 2020*



* 2020 incidence estimates are projections based on 2007–2016 incidence data.
Source: Australian Institute of Health and Welfare.[8]

When does a colonoscopy need to be repeated?

The most common reasons to repeat a colonoscopy are[4,5]:

- Monitoring (surveillance) of the bowel after colorectal surgery or removal of polyps that can lead to bowel cancer
- Monitoring (surveillance) of chronic conditions of the bowel such as IBD
- Regular screening of people with a strong family history of bowel cancer, or a hereditary cancer syndrome that can lead to bowel cancer
- Removal (treatment) of previously identified polyps
- Onset of new signs or symptoms thought to be from the lining of the bowel
- Inadequate previous colonoscopy; for example, because of an incomplete colonoscopy or poor bowel preparation.

High-quality colonoscopy can detect about 95% of bowel cancers and polyps, but it is an invasive and costly procedure with a risk of complications.[5] For this reason, colonoscopy for population screening is reserved for people with an increased risk of bowel cancer, if there is a higher chance of diagnosing significant disease.[7] Similarly, recommendations for a repeat colonoscopy and its timing for greatest benefit are based on a person's risk of bowel cancer.

The national *Colonoscopy Clinical Care Standard* mandates that, if surveillance is required, colonoscopy is repeated at intervals consistent with evidence-based guidelines.[3] Two Australian national guidelines address the need for and timing of repeat colonoscopy – one focuses on the use of colonoscopy in screening high-risk groups (that is, people with a family history of bowel cancer or a hereditary cancer syndrome), while the other focuses on the use of colonoscopy for surveillance.[4,5]

If guidelines are followed, a small proportion of people who have an initial colonoscopy might be expected to need a repeat within three years. These would usually be people identified as having a high risk of bowel cancer or who have IBD. A poor-quality colonoscopy, or uncertainty about when a previous colonoscopy was performed, are also reasons a colonoscopy may be repeated within one or two years.[4,5] However, the *Colonoscopy Clinical Care Standard* addresses the problem of uncertainty about the timing of a previous colonoscopy by stipulating that the results of colonoscopies are communicated to the person who had the procedure, the general practitioner (GP) and any other relevant clinicians involved in the person's care.[3]

Colonoscopy surveillance guidelines identify a person's risk of bowel cancer based on the results of their previous colonoscopy or colonoscopies.[5,9] These guidelines apply to anyone who has had a colonoscopy, including participants in the NBCSP who had a colonoscopy because of a positive FOBT. The timing of the next colonoscopy, if needed, depends on the number, size and type of polyps removed.[9] The greater the risk, the smaller the interval before repeating the procedure. People at potentially high risk will generally require a repeat colonoscopy every one to two years. Yearly colonoscopies are also recommended for high-risk people with IBD, and a repeat colonoscopy is also recommended within 12 months of bowel resection (surgery).[5]

A colonoscopy is also recommended every one to two years for people with, or at high risk of having, a hereditary cancer syndrome, such as Lynch syndrome, and may start at 25 years or younger for people with this syndrome.[4]

Repeat colonoscopies are also recommended for other groups, such as people with a strong family history and people otherwise at moderate risk of bowel cancer. However, for most people in these groups, the recommended intervals between colonoscopies are longer than that examined in this Atlas.[4,5]

Repeat colonoscopy MBS services, all ages

Why examine repeat colonoscopy?

The first and third Atlases in the *Australian Atlas of Healthcare Variation* series examined MBS-subsidised services for colonoscopy and hospitalisations for colonoscopy, respectively.[1,2] Although these Atlases used different datasets, each found substantial variations in colonoscopy rates according to where people live. They also found patterns of use that did not match the burden of disease. Outer regional areas and areas of socioeconomic disadvantage have the highest rates of bowel cancer incidence and mortality in Australia[7,10], yet both Atlases found the highest rates of colonoscopy in the most socioeconomically advantaged areas of major cities.

Clinical practice that is not supported by guidelines, such as repeating colonoscopies sooner than is recommended, was identified as a possible reason for the high rates of colonoscopy in some metropolitan areas. Differences in uptake of the NBCSP were also identified as a possible reason for the variation between major cities and other areas.[1,2]

Little is known about the rate of repeat colonoscopies in Australia. This Atlas examines variation in rates of short-interval repeat colonoscopy using MBS-subsidised services performed in the same person in 2018–19. The interval of two years and 10 months was chosen to exclude services to people who present early for their three-yearly colonoscopy.

Data from this Atlas item should provide a baseline for evaluating changes to MBS items for colonoscopy introduced by the Australian Government in 2019, which included new item numbers with guideline-recommended surveillance intervals.[11] It should also be helpful for evaluating implementation of the *Colonoscopy Clinical Care Standard*, mandated in 2019, as part of the National Safety and Quality Health Service (NSQHS) Standards for the accreditation of all hospitals and day procedure services performing colonoscopy.[3,12]

About the data

Data are sourced from the MBS dataset. This dataset includes information on MBS claims processed by Services Australia. It covers a wide range of services (attendances, procedures, tests) provided across primary care and hospital settings.

The dataset does not include:

- Services for publicly funded patients in hospital
- Services for patients in outpatient clinics of public hospitals
- Services covered under Department of Veterans' Affairs arrangements.

The dataset does not allow analysis by Aboriginal and Torres Strait Islander status.

Rates are based on the number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, age and sex standardised, in 2018–19.

Because a record is included for each service rather than for each patient, patients who receive the service more than once in the financial year will have more than one service counted.

In the patient count analysis, patient counts reflect the number of unique patients, regardless of the number of services the patient may have received in the year.

The analysis and maps are based on the patient's postcode recorded in their Medicare file and not the location of the service.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

What do the data show?

Magnitude of variation

In 2018–19, there were 147,875 MBS-subsidised services for repeat colonoscopy performed within two years and 10 months, representing 522 services per 100,000 people of all ages (the Australian rate).

The number of MBS-subsidised services for repeat colonoscopy across 324* local areas (Statistical Area Level 3 – SA3) ranged from 62 to 1,236 per 100,000 people. The rate was **19.9 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of MBS-subsidised services for repeat colonoscopy varied across states and territories, from 191 per 100,000 people in the Northern Territory to 596 in Queensland (Figures 5.13–5.16).

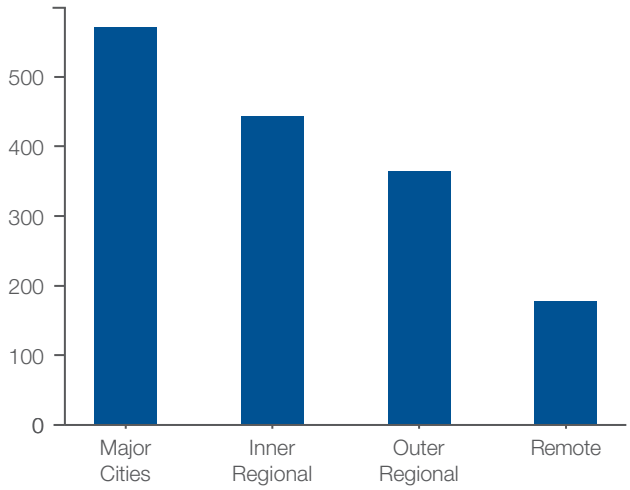
After the highest and lowest 10% of results were excluded and 260 SA3s remained, the number of MBS-subsidised services per 100,000 people was 2.7 times as high in the area with the highest rate compared with the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates for MBS-subsidised services for repeat colonoscopy were higher in major cities than elsewhere. The rate for major cities was 3.2 times as high as the rate for remote areas (Figures 5.11 and 5.17).

Rates increased with socioeconomic advantage in major cities and overall. The rate in the highest socioeconomic group was 1.6 times as high as the rate in the lowest (Figures 5.12 and 5.17).

Figure 5.11: Number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, age and sex standardised, by remoteness of patient residence, 2018–19



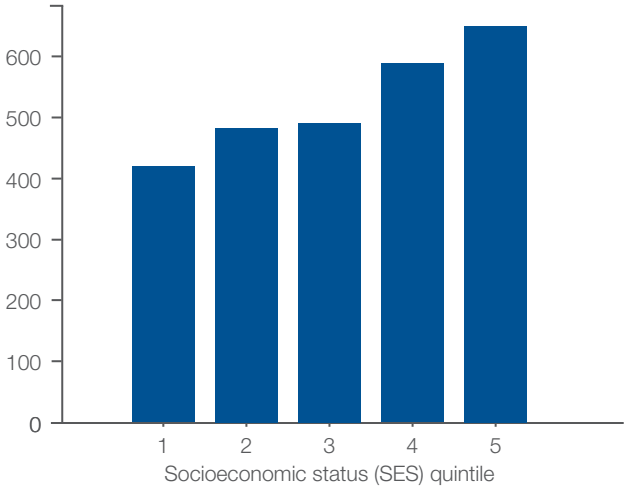
The data for Figures 5.11 and 5.12 are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, data were suppressed for 16 SA3s due to a small number of services and/or population in an area, or potential identification of individual patients, practitioners or business entities.

Notes:
Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Repeat colonoscopy MBS services, all ages

Figure 5.12: Number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, age and sex standardised, by socioeconomic area of patient residence, 2018–19



Analysis by number of people who had at least one repeat colonoscopy

In 2018–19, there were 139,072 people who had at least one MBS-subsidised service for repeat colonoscopy, representing 491 people per 100,000 people of all ages.

Analysis by number of repeat colonoscopy services without polyp removal

In 2018–19, there were 71,464 MBS-subsidised services for repeat colonoscopy without polyp removal, representing 257 services per 100,000 people of all ages (the Australian rate). The percentage of MBS-subsidised services for repeat colonoscopy without polyp removal was 49%, and varied across states and territories, from 35% in the Australian Capital Territory to 55% in Victoria and the Northern Territory.

The data and graphs for analysis by number of people who had at least one repeat colonoscopy, analysis by number of repeat colonoscopy services without polyp removal, and analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

Notes:
Areas with a low SES (=1) have a high proportion of relatively disadvantaged people. Areas with a high SES (=5) have a low proportion of relatively disadvantaged people.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Interpretation

Variation is warranted when it reflects variation in underlying disease and need for care; however, the rates of repeat colonoscopy do not appear to match this pattern, nor do they match the epidemiology of disease. There was widespread variation in repeat colonoscopy use, with rates much higher in major cities compared with elsewhere. Rates were also lower in areas of socioeconomic disadvantage.

These findings are consistent with the findings in the first and third Atlases, which examined rates of MBS-subsidised colonoscopy, and public and private hospitalisations for colonoscopy, respectively.

Variation in rates of repeat colonoscopy is likely to be due to the geographical differences in the factors discussed below.

Variation between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on where people live rather than where they obtain their health care. Patients may travel outside their local area to receive health care.

Clinical decision-making

High rates of early repeat colonoscopy may be related to clinical practice that is not supported by guidelines. Australian and international studies have found that one-third of colonoscopies are repeated at intervals sooner than the guidelines recommend, with some reporting this to be as high as half.[13-18] Difficulties in keeping up to date with guidelines and differences in clinical opinion on management may also contribute.[19]

Fear of litigation for not investigating symptoms may also influence clinicians' decisions about when and how often to provide repeat colonoscopies for the same person, particularly if they are unaware of current recommendations, or of evidence about the incidence of gastrointestinal (GI) cancers and the risk of symptoms leading to significant disease. Concerns about late diagnosis and subsequent litigation, and a lack of disincentives for over-testing, may also contribute to overuse.[19]

Some colonoscopies may be repeated because the previous report was not easily accessible or did not contain the information required to guide clinical decision-making.

Quality of bowel preparation

High-quality bowel preparation is essential for a successful colonoscopy.[5] In the United Kingdom, poor bowel preparation has been reported to account for up to 25% of failed colonoscopies.[20] Poor bowel preparation results in poor visualisation of the colon, and has been associated with up to 47% lower likelihood of detecting and removing polyps that can lead to the development of bowel cancer.[21] For this reason, people who had a colonoscopy with poor bowel preparation require a repeat colonoscopy within a year.[5,22] Poor bowel preparation also results in considerable inconvenience and waste. Australian guidelines recommend that successful bowel preparation should be achieved in at least 90% of colonoscopies.[5]

The training and experience of the colonoscopist may also contribute to variation. International studies report a three-to-six-fold difference in adenoma detection rate variability between colonoscopists.[5]

Consumer expectations

A person's understanding about their risk of bowel cancer and the rate of development of bowel cancer may drive anxiety and lead to more frequent surveillance. Anxiety about interval cancers – cancers that occur between routine surveillance – has been suggested as a reason for repeating colonoscopies at shorter intervals than guidelines currently recommend.[23] Lack of access to a GP, specialist or surgeon who is informed about the evidence to help allay a person's anxiety about their risk of developing cancer may also lead to inappropriate repeat colonoscopies.

Repeat colonoscopy MBS services, all ages

People often have incorrect perceptions of their cancer risk and the benefits of interventions such as screening and surveillance to detect GI cancer.[24,25] These perceptions can influence their preference and demand for investigations, even when their risk of cancer is low.[26]

Access to services and number of clinicians providing services

Access to clinicians may influence the likelihood of people seeking care and the rates of repeat colonoscopy. The practice styles of individual clinicians may be more likely to affect rates in areas with fewer clinicians, such as rural and regional locations, than in areas with more clinicians.

Availability and affordability of services may also influence patterns of use. Ability to pay out-of-pocket costs for services is likely to be lower in areas of socioeconomic disadvantage, and access is likely to be more difficult in areas with fewer services. Open-access endoscopy services, in which GPs are able to request colonoscopy without specialist review, may also influence patterns of use.

Financial incentives

Greater remuneration for providing a service rather than a consultation may lead to variation and over-servicing in some areas.

Promoting appropriate care

More must be done to improve the consistent application of the national guidelines on bowel cancer screening and surveillance. The Atlas shows a pattern of repeat colonoscopy use that is not consistent with the prevalence of disease, indicating possible overuse in some areas and underuse in others. Repeating the procedure in people who are unlikely to benefit puts them at risk of procedural harms and may reduce opportunities for people who are at high risk of bowel cancer and more in need of the procedure. It also results in inconvenience, cost and confusion to the individual and the health system.

A concerted focus by clinicians, medical societies and colleges, and health service organisations across Australia to implement the *Colonoscopy Clinical Care Standard*[3] is needed to drive improvements in the appropriate use of colonoscopy, reduce inappropriate short-interval repeat colonoscopies and free up services for people at high risk of bowel cancer.

The *Colonoscopy Clinical Care Standard* aims to ensure colonoscopies are used appropriately and performed safely, and is mandated as part of the NSQHS Standards for the accreditation of hospitals and day procedure services performing colonoscopy in Australia.[3,12] To improve the follow-up and reporting of a colonoscopy, it recommends that the clinician who performs the colonoscopy communicates in writing the reason for the colonoscopy, its findings, any histology results, and recommendations for management to the person having the procedure, the GP, and any other relevant clinicians, and documents this in the facility records. It recommends that, if surveillance colonoscopy is required, it must be consistent with the intervals in national evidence-based guidelines.

Health service organisations could improve the implementation of the *Colonoscopy Clinical Care Standard*[3] by ensuring that credentialing requirements for clinicians performing colonoscopy include a clinical audit against the clinical care standard, and that they provide audit results to the hospital's clinical review meetings and re-credentialing committee. Resources for colonoscopists to support implementation include a colonoscopy report template and a template for follow-up letters to GPs and patients (see Resources).

The low rates of short-interval repeat colonoscopies in disadvantaged remote areas are concerning, because they suggest that people at high risk of bowel cancer could be missing out on appropriate surveillance. These low rates are consistent with participation rates reported in the NBCSP.[7] Strategies to improve participation in the NBCSP and access to colonoscopy services for people living in remote areas are a priority.

Unwarranted variation in repeat colonoscopy could be addressed in the following ways.

Quality colonoscopy and clinical audit

Recertification of ongoing competency is now mandatory for all practitioners working in health service organisations that are assessed against the NSQHS Standards.[12] Only colonoscopists who meet the certification and recertification standards can perform colonoscopy independently in Australia. The quality indicator together with the standard for reporting should reduce the proportion of repeat colonoscopies performed because of uncertainty about the quality of another clinician's colonoscopy.

Clinical audit could be used more widely to support decision-making about repeat colonoscopies. Audits in this area could also be part of continuing education requirements for clinicians.

Structured referral forms and checklists outlining the appropriate reasons for, and frequency of, repeat colonoscopy for greatest benefit, as recommended in the *Colonoscopy Clinical Care Standard*[3] and national guidelines, could aid assessment of requests that do not meet guideline-recommended intervals.

Clinician education

Educational programs for clinicians could improve the appropriateness of requests for repeat colonoscopies. Improving clinician familiarity with guidelines, with the evidence base for recommended surveillance intervals and with the consequences of overuse of colonoscopy could better equip them to manage requests for performing colonoscopy earlier than the guidelines recommend.

Consumer education and reassurance

Informing and reassuring people of their risk of developing bowel cancer, and that the rate of progression from polyp formation to bowel cancer is generally slow may reduce demand for more frequent surveillance. Improving a person's understanding about their cancer risk is important to reduce anxiety and dispel myths about cancer. Interactive tools that identify a person's cancer risk – such as the Australian Institute of Health and Welfare cancer summary data tool (see 'Resources' on page 282) – may aid understanding.[8]

Integration of data about cancer incidence and lifestyle into healthcare pathways and consumer resources could help prompt these discussions between consumers and clinicians.

Reducing risk factors

Wider consumer awareness about risk factors and the impact of lifestyle on bowel cancer risk is needed. Bowel cancer incidence could be significantly reduced with successful modification of the key population attributable risks – that is, addressing diet (21.8%), physical inactivity (16.5%), being overweight or obese (12.5%), smoking (7.4%) and alcohol use (5.5%).[7]* Public health initiatives to address risk factors should be targeted to areas with a high prevalence of these.

Educating consumers on ways they can reduce their risk of bowel cancer and improve their general health should be an integral part of colonoscopy surveillance, and may reduce requests for colonoscopies to be performed sooner than the guidelines recommend.

* Attributable burden from multiple risk factors cannot be combined or added together due to the complex pathways and interactions between risk factors.

Repeat colonoscopy MBS services, all ages

Triage systems

Many states and territories are introducing evidence-based triage systems for prioritising and allocating people for gastroscopy and colonoscopy, with the aim of reducing variation in use of these procedures:

- Victorian health services require clinicians to refer people for colonoscopy according to the categorisation guidelines[27]
- Tasmania has adopted the Victorian categorisation guidelines and formed a statewide endoscopy network to monitor the quality of its services[28]
- New South Wales has developed categorisation guidelines to support the appropriate use of colonoscopy across all healthcare settings[29]
- Queensland and Western Australia have introduced clinical prioritisation criteria for many clinical areas, including gastroenterology, to triage patients referred to public specialist outpatient services.[30-32]

Wider use of such systems could result in more appropriate prioritisation of colonoscopy, as well as gastroscopy.

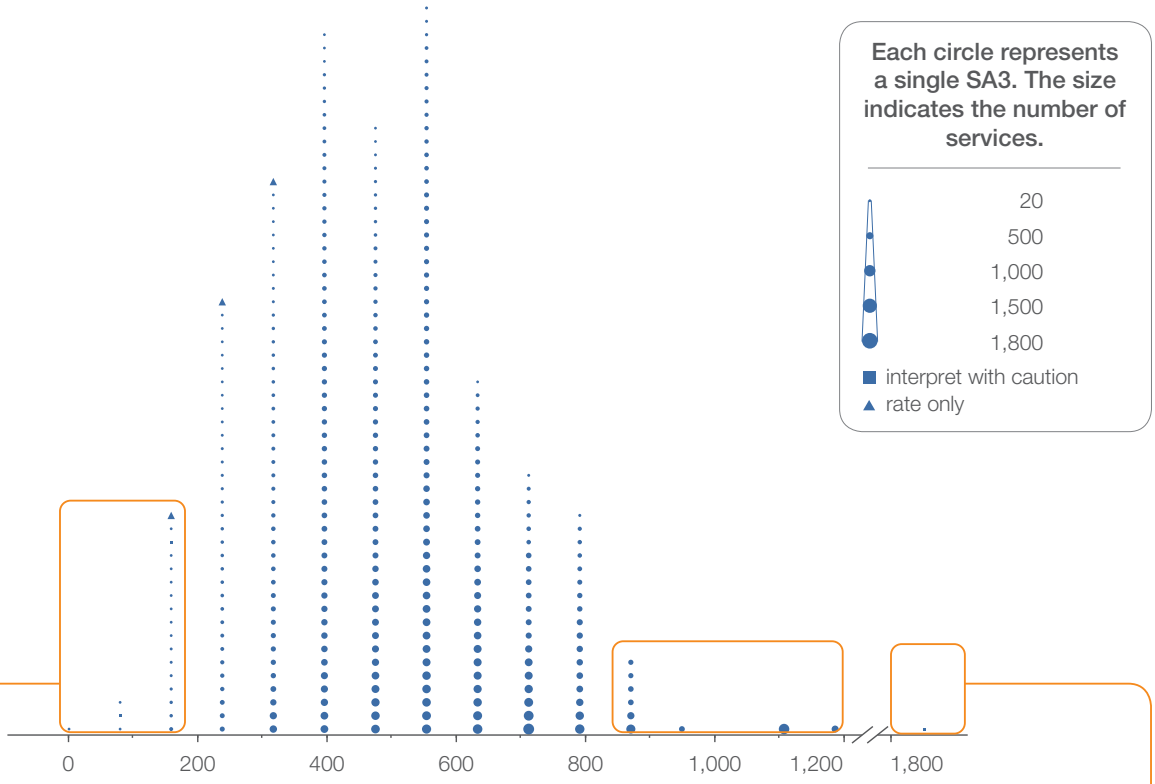
Promoting existing initiatives

As part of the Choosing Wisely Australia initiative, the Gastroenterological Society of Australia made the following recommendation in 2016, to promote the appropriate use of surveillance colonoscopy[33]:

- Do not repeat colonoscopies more often than recommended by the National Health and Medical Research Council–endorsed guidelines.

Rates by local area

Figure 5.13: Number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Lowest rate areas

SA3	State	Rate	Services
Alice Springs	NT	**62**	24
Goldfields	WA	**93**	33
West Pilbara	WA	**109***	30
Esperance	WA	**120**	22
Palmerston	NT	**164**	44
Albany	WA	**170**	142
Glenelg - Southern Grampians	Vic	**176**	94
Bourke - Cobar - Coonamble	NSW	**182**	56
Far North	Qld	**191**	59
Manjimup	WA	**198**	69
Gippsland - East	Vic	**207**	183
Inverell - Tenterfield	NSW	**210**	135
Wellington	Vic	**213**	139
Litchfield	NT	**213***	46
Wangaratta - Benalla	Vic	**222**	159
Kwinana	WA	**225**	n.p.
Armadale	WA	**227**	192
Outback - North and East	SA	**229**	68
West Coast	Tas	**229**	57
Maryborough - Pyrenees	Vic	**234**	94
Mount Druitt	NSW	**235**	253

Highest rate areas

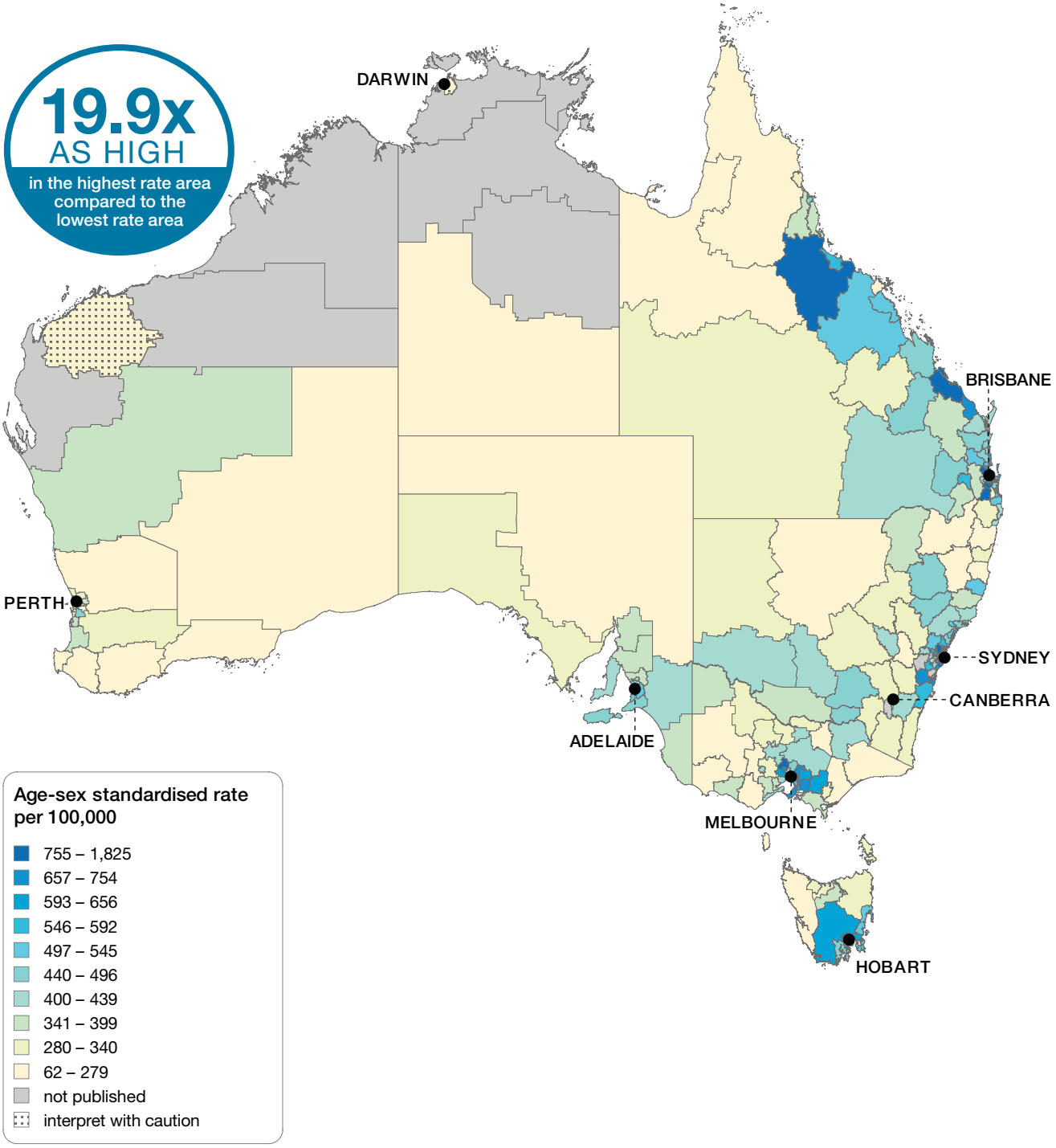
SA3	State	Rate	Services
Molonglo	ACT	**1,825***	33
Gladstone	Qld	**1,236**	787
Eastern Suburbs - North	NSW	**1,174**	1,756
Kenmore - Brookfield - Moggill	Qld	**1,010**	543
The Gap - Enoggera	Qld	**937**	512
Brisbane Inner - West	Qld	**912**	501
Sherwood - Indooroopilly	Qld	**893**	429
Kingston	Vic	**892**	1,320
Stonnington - East	Vic	**886**	430
The Hills District	Qld	**879**	836

Notes:
Squares (■) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published (n.p.) for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Repeat colonoscopy MBS services, all ages

Rates across Australia

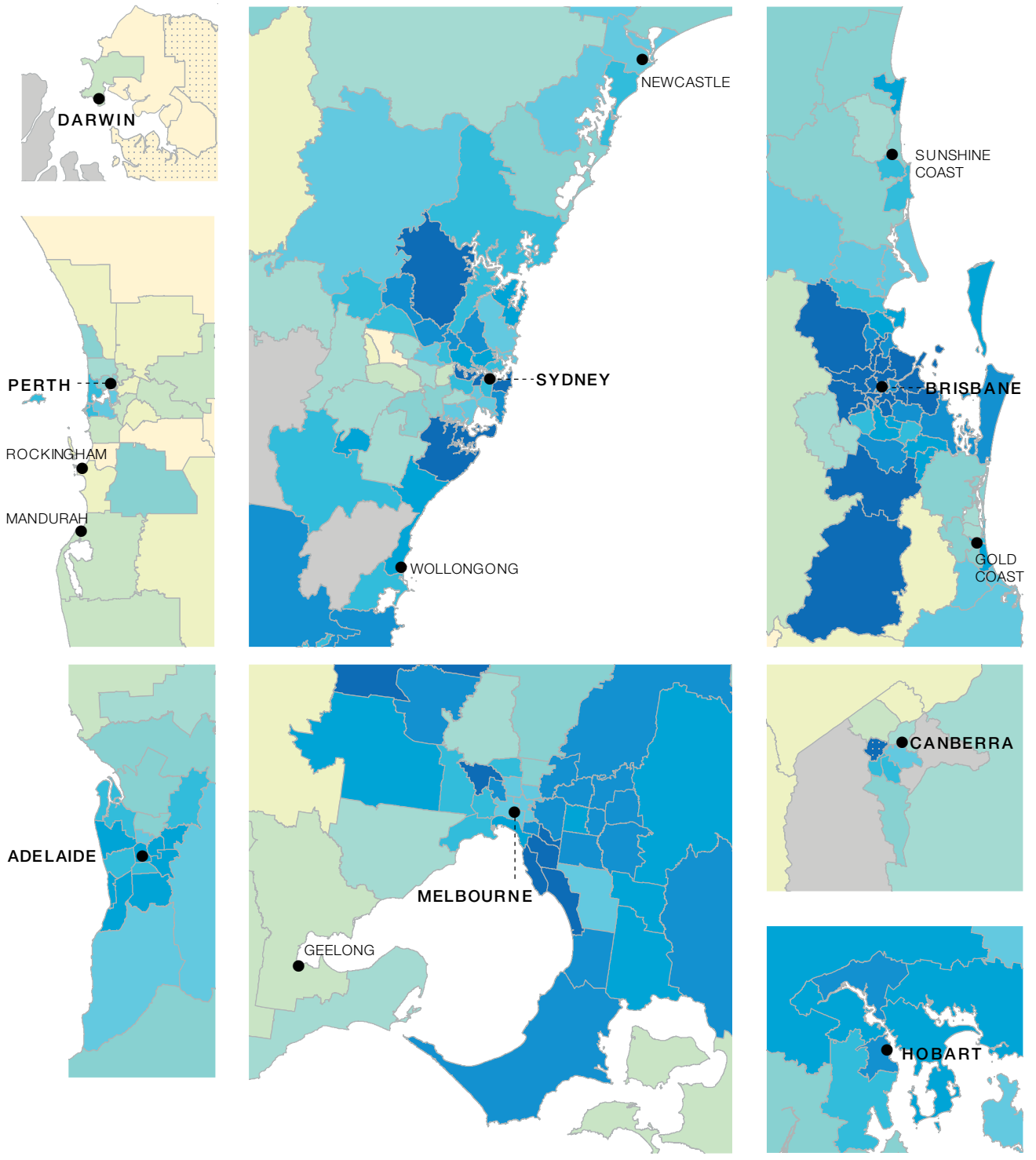
Figure 5.14: Number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Rates across capital city areas

Figure 5.15: Number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



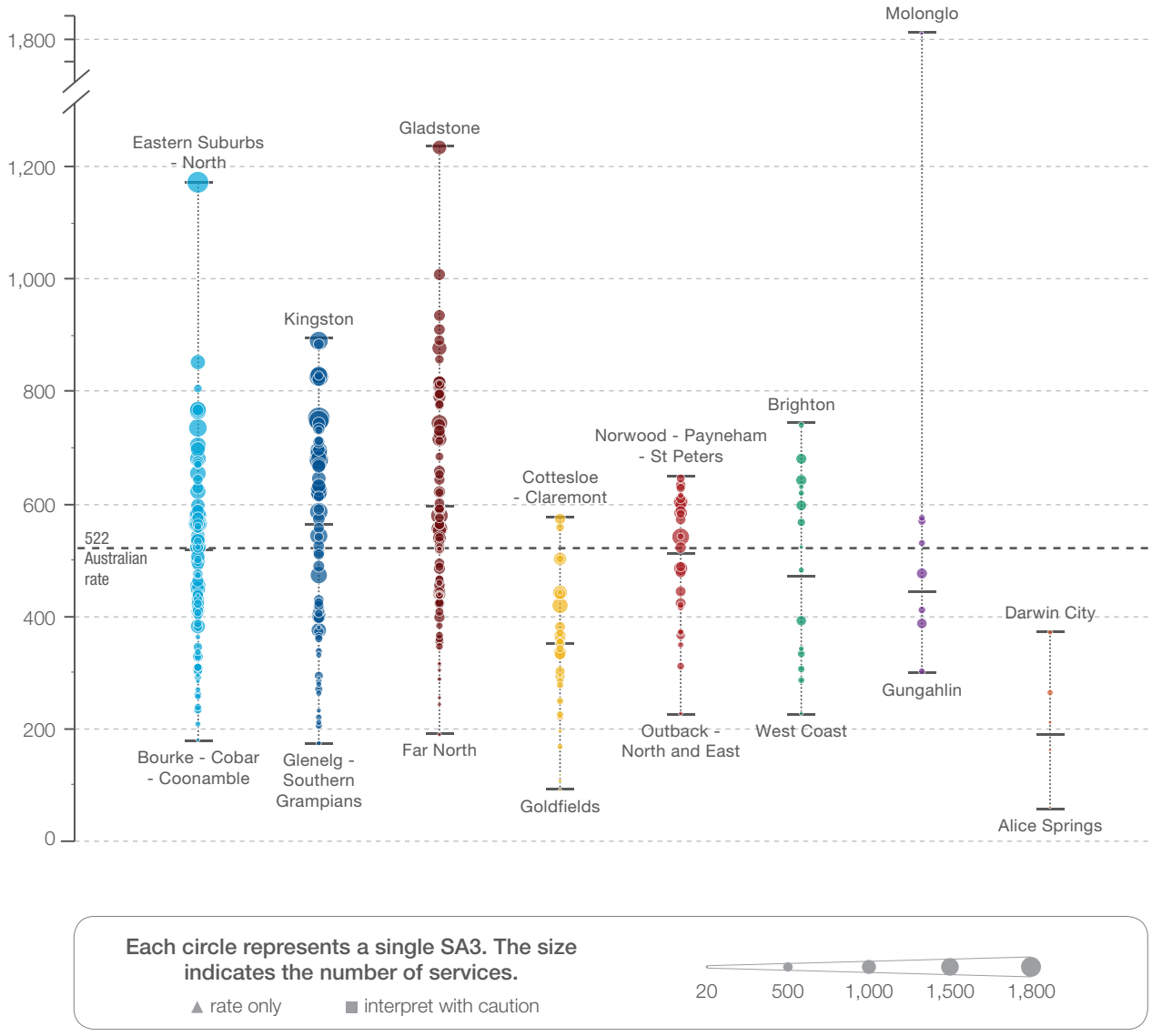
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Repeat colonoscopy MBS services, all ages

Rates by state and territory

Figure 5.16: Number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19

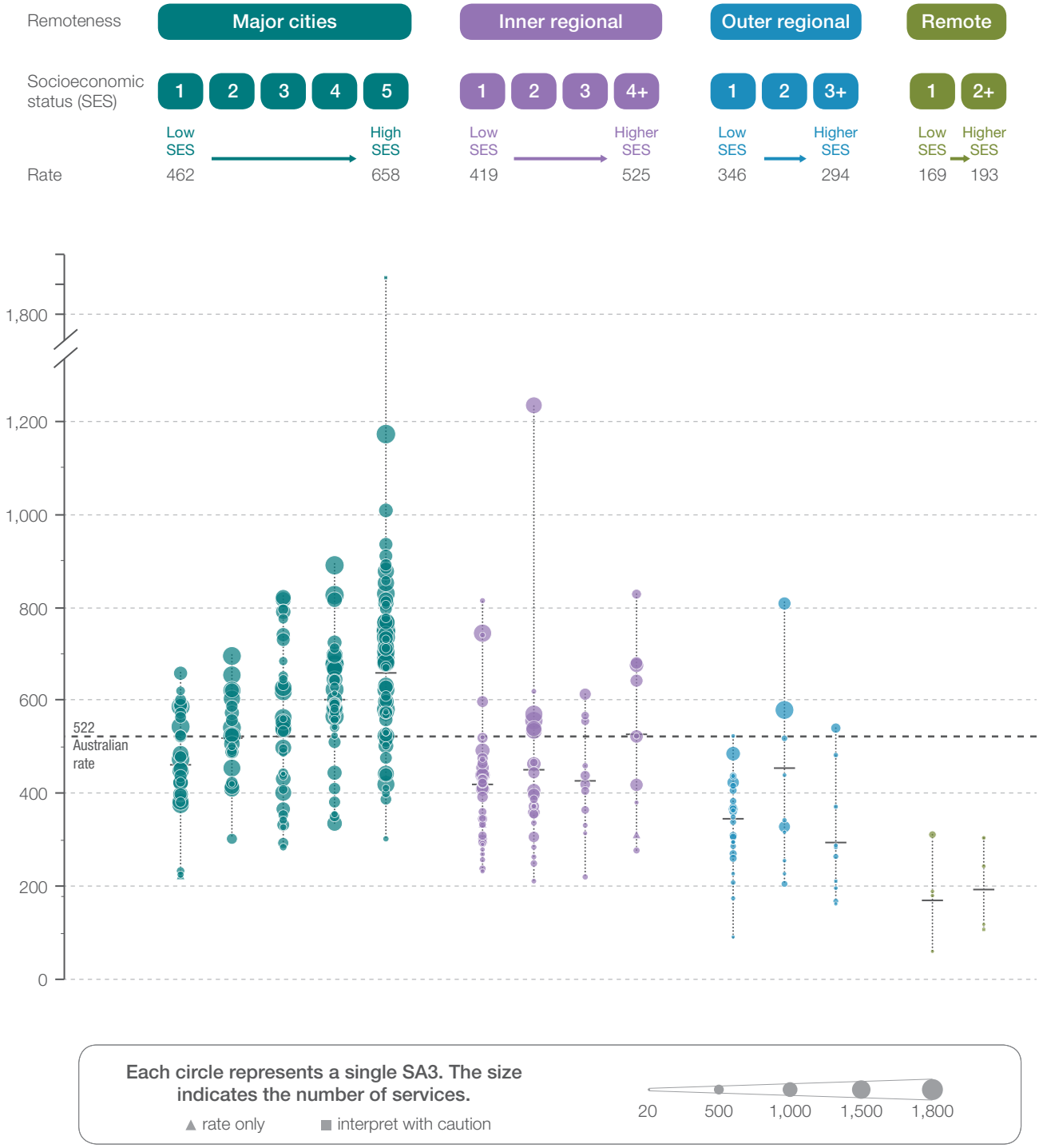
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	1,174	892	1,236	575	647	742	1,825*	373
State/territory	517	562	596	352	513	472	443	191
Lowest rate	182	176	191	93	229	229	304	62
Total services	47,257	40,377	33,629	9,977	11,002	3,331	1,884	391



Notes:
Squares (■) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Rates by remoteness and socioeconomic status

Figure 5.17: Number of MBS-subsidised services for repeat colonoscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Squares (■) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Repeat colonoscopy MBS services, all ages

Resources

- Australian Commission on Safety and Quality in Health Care, *Colonoscopy Clinical Care Standard*[3]
- Cancer Council Australia, *Clinical Practice Guidelines for the Prevention, Early Detection and Management of Colorectal Cancer*[4]
- Cancer Council Australia, *Clinical Practice Guidelines for Surveillance Colonoscopy*[5]
- Australian Institute of Health and Welfare, Cancer summary data visualisations[8], aihw.gov.au/reports/cancer/cancer-data-in-australia/contents/cancer-summary-data-visualisation

Australian initiatives

Information in this chapter will complement work already underway to prevent inappropriate repeat colonoscopy in Australia. At a national level, this work includes:

- Australian Commission on Safety and Quality in Health Care, *Colonoscopy Clinical Care Standard*[3]
- Gastroenterological Society of Australia, Choosing Wisely recommendation 1: Do not repeat colonoscopies more often than recommended by the National Health and Medical Research Council–endorsed guidelines.[33]

Many state and territory initiatives also aim to improve colonoscopy use, including:

- Clinical Priority Category: Colonoscopy[29], Agency for Clinical Innovation, New South Wales
- *Colonoscopy Categorisation Guidelines*, Victoria[34]
- *Endoscopy Action Plan*, Queensland[35]
- Clinical prioritisation criteria: endoscopy[36] and Clinical prioritisation criteria: gastroenterology[30], Queensland
- *Referral Guidelines: Direct access gastrointestinal endoscopic procedures*, Western Australia[31]
- *Urgency Categorisation and Access Policy for Public Direct Access Adult Gastrointestinal Endoscopy Services*, Western Australia[32]
- Statewide endoscopy care network, which monitors and assesses the quality of endoscopy services, Tasmania.[28]

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Repeat colonoscopy MBS services, all ages

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5.3 Repeat gastroscopy MBS services, all ages

Why is this important?

Gastroscopy is used to investigate or treat conditions affecting the upper gastrointestinal (GI) tract. It can also be used to monitor conditions affecting the upper GI tract that lead to cancer in certain high-risk groups.[1]

Differences in use of gastroscopy for monitoring were identified as a possible reason for the substantial variation seen in hospitalisations for gastroscopy reported in the *Third Australian Atlas of Healthcare Variation*.[2] There are very few clinical reasons for repeating a gastroscopy after a period of less than three years. Guidelines recommend repeating gastroscopy at three to five years to monitor for signs of cancer for most people with Barrett's oesophagus, the most common condition that may require surveillance.[3]

The fourth Atlas examines rates of gastroscopy that are repeated within two years and 10 months of an earlier gastroscopy, using Medicare Benefits Schedule (MBS) data.

What did we find?

In 2018–19, there were almost 88,000 MBS-subsidised services for repeat gastroscopy performed within two years and 10 months in people of all ages.

The rate in the area with the highest rate was **14.9 times as high** as the rate in the area with the lowest rate. Rates were markedly higher in major cities than elsewhere. Rates increased with socioeconomic advantage everywhere apart from outer regional areas.

What can be done?

Development and application of national guidance on the appropriate use of gastroscopy are priorities. The guidelines should include guidance on when it is appropriate to repeat the procedure.

Integration of data about cancer incidence and lifestyle into healthcare pathways and resources could promote discussion between clinicians and patients about the low risk of upper GI cancer for most people and reduce inappropriate requests for the procedure.

Better ways to identify people at high risk of progression to upper GI cancers are needed to improve rates of cancer detection and minimise low-value care. Educating people about the lifestyle measures that can be taken to reduce upper GI cancer risk could also reduce inappropriate repeat gastroscopy.

Repeat gastroscopy MBS services, all ages

Context

This item examines rates of MBS-subsidised services for repeat gastroscopy performed within two years and 10 months of an earlier gastroscopy for people of all ages in Australia in 2018–19.

What is gastroscopy?

Gastroscopy, also known as an upper GI endoscopy, is the examination of the upper part of the GI tract, using a small, flexible tube with a camera on the end, called an endoscope.[4] It can also include a biopsy, if needed. The procedure requires an empty stomach for a safe and accurate examination. It is usually quick to perform, taking up to about 15 minutes.[1,4]

When does a gastroscopy need to be repeated?

Gastroscopy is used to investigate, treat or monitor certain upper GI symptoms or diseases.

The most common reasons to repeat a gastroscopy are[1]:

- Monitoring (surveillance) of conditions that can increase the risk of upper GI cancer or bleeding in high-risk groups – for example, Barrett's oesophagus, gastrointestinal metaplasia (GIM) and oesophageal varices
- Investigation of new signs and symptoms, such as bleeding
- Confirmation that a stomach ulcer is healing.

Gastroscopy may be repeated within one to two years of a previous gastroscopy in people with coeliac disease to monitor response to treatment with a gluten-free diet, although there is uncertainty about its benefit.[5-8]

A repeat gastroscopy is also recommended to treat upper GI conditions detected in an earlier gastroscopy, such as bleeding, some upper GI cancers, or a narrowed oesophagus (oesophageal stricture) that may be causing difficulty swallowing. However, gastroscopies repeated for treatment (therapeutic gastroscopy) are not included in this data item.

A small proportion of people who have a gastroscopy require a repeat within three years. Many people who have a gastroscopy do not need a further one because they have a negative result or a further investigation is of no benefit.[9] A minority of people may require a repeat gastroscopy for surveillance of an upper GI condition or for the reasons noted above. However, of these, only a small number are likely to need one within three years if guidelines are followed.

Barrett's oesophagus is a chronic upper GI condition in which the cells change in the lining of the oesophagus. It requires monitoring with gastroscopy because it can lead to oesophageal cancer in some people. It affects about 5% of the general population.[10] Barrett's oesophagus is more common in men, people aged 55 years and over, and people with chronic uncontrolled gastro-oesophageal reflux disease (GORD).[10-12]

Guidelines recommend that people with Barrett's oesophagus undergo repeat gastroscopy every three to five years, with more frequent surveillance if risk factors are present.[3,11,13,14] Although this is recommended practice, there is uncertainty about the effectiveness and value of gastroscopic surveillance for people at low risk of developing cancer. The evidence base for surveillance is weak, except in high-risk groups.[15-17]

Although people with Barrett's oesophagus have up to 50 times the risk of developing oesophageal cancer of the general population, the absolute risk of progression to cancer in most people is very low.[3,12] Population-based studies estimate that the incidence of oesophageal cancer for people with Barrett's oesophagus is 0.22% per year.[18] People with Barrett's oesophagus are more likely to succumb to other conditions, such as coronary artery disease, before developing oesophageal cancer.[19] As well, the vast majority of people who develop oesophageal cancer have no previous diagnosis of Barrett's oesophagus.[3] For these reasons, the anxiety associated with surveillance may outweigh the chance of detecting cancer for people with Barrett's oesophagus who are at low risk of developing upper GI cancer, and so they may choose not to participate in gastroscopic surveillance.[11,20,21]

Similarly, in people with GIM – a condition that can lead to stomach cancer – the annual risk of progression to cancer is very low, with a Dutch study reporting estimates of 0.25% per year.[22] United Kingdom guidelines suggest surveillance with gastroscopy every three years[23], whereas United States guidelines promote participation in shared decision making instead.[24]

Use of gastroscopy for population-based screening for upper GI cancer is not recommended because of the low chance of diagnosing serious disease.

Why examine repeat gastroscopy?

The Gastroenterology Clinical Committee of the Medicare Benefits Schedule Review Taskforce reviewed numbers of repeat gastroscopies per patient.[25] It noted that more than 40% of people who had a gastroscopy between 2008–09 and 2014–15 had a repeat gastroscopy within three to five years. The number of repeat gastroscopies ranged from two to 51 per patient. The rates were higher than expected, given the taskforce's estimation of rates of recurrent bleeding.[25]

The *Third Australian Atlas of Healthcare Variation* examined rates of hospitalisation for gastroscopy and found that the rate in the area with the highest rate was 7.4 times as high as the rate in the area with the lowest rate.[2] Rates were higher in major cities and inner regional areas than elsewhere, and generally lower in areas with more socioeconomic disadvantage. Patterns of gastroscopy use did not reflect the prevalence of risk factors for, or burden of, upper GI cancer in Australia. Differences in clinical opinion on the value of gastroscopy for surveillance of people with Barrett's oesophagus and other upper GI conditions were identified as a possible reason for variation.[2]

This Atlas examines variation in rates of MBS-subsidised short-interval repeat gastroscopy services performed in the same person. The interval of two years and 10 months was chosen to exclude services to people who present early for their three-yearly gastroscopy for surveillance of Barrett's oesophagus or other conditions such as GIM.

About the data

Data are sourced from the MBS dataset. This dataset includes information on MBS claims processed by Services Australia. It covers a wide range of services (attendances, procedures, tests) provided across primary care and hospital settings.

The dataset does not include:

- Services for publicly funded patients in hospital
- Services for patients in outpatient clinics of public hospitals
- Services covered under Department of Veterans' Affairs arrangements.

The dataset does not allow analysis by Aboriginal or Torres Strait Islander status.

Rates are based on the number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, age and sex standardised, in 2018–19.

Because a record is included for each service rather than for each patient, patients who received the service more than once in the financial year will be counted more than once.

In the patient count analysis, patient counts reflect the number of unique patients, regardless of the number of services the patient may have received in the year.

The analysis and maps are based on the patient's postcode recorded in their Medicare file and not the location of the service.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Repeat gastroscopy MBS services, all ages

What do the data show?

Magnitude of variation

In 2018–19, there were 87,933 MBS-subsidised services for repeat gastroscopy performed within two years and 10 months, representing 314 services per 100,000 people of all ages (the Australian rate).

The number of MBS-subsidised services for repeat gastroscopy across 321* local areas (Statistical Area Level 3 – SA3) ranged from 61 to 908 per 100,000 people. The rate was **14.9 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of MBS-subsidised services for repeat gastroscopy varied across states and territories, from 114 per 100,000 people in the Northern Territory to 353 in Queensland (Figures 5.20–5.23).

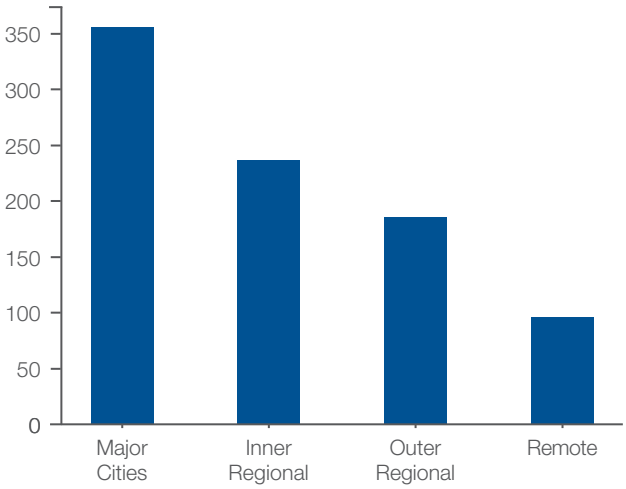
After the highest and lowest 10% of results were excluded and 257 SA3s remained, the number of MBS-subsidised services per 100,000 people was 3.1 times as high in the area with the highest rate compared with the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates for MBS-subsidised services for repeat gastroscopy were markedly higher in major cities than elsewhere. The rate for major cities was 3.7 times as high as the rate for remote areas (Figures 5.18 and 5.24).

Rates decreased with socioeconomic disadvantage in major cities, and inner regional and remote areas. Overall, the rate in the highest socioeconomic group was 1.6 times as high as the rate in the lowest (Figures 5.19 and 5.24).

Figure 5.18: Number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, age and sex standardised, by remoteness of patient residence, 2018–19



The data for Figures 5.18 and 5.19 are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, data were suppressed for 19 SA3s due to a small number of services and/or population in an area, or potential identification of individual patients, practitioners or business entities.

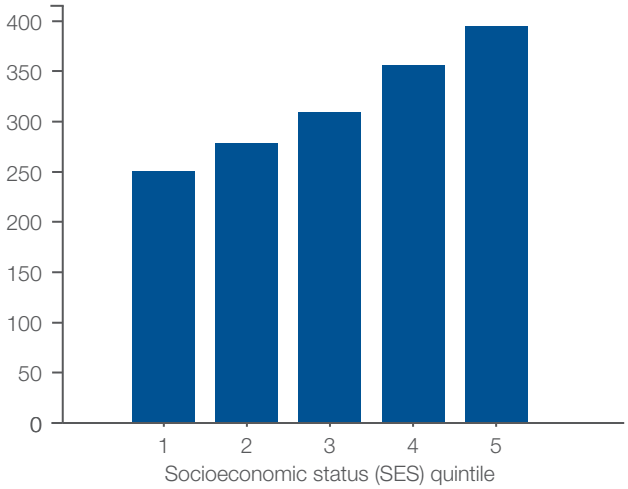
Notes:

Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Figure 5.19: Number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, age and sex standardised, by socioeconomic area of patient residence, 2018–19



Analysis by number of people who had at least one repeat gastroscopy

In 2018–19, there were 81,893 people who had at least one repeat MBS-subsidised service for gastroscopy, representing 292 people per 100,000 people of all ages.

The data and graphs for analysis by number of people who had at least one repeat gastroscopy, and for analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

Interpretation

There is wide variation in repeat gastroscopy use. Rates were higher in major cities and in areas with socioeconomic advantage than elsewhere.

These findings are consistent with those in the third Atlas, which examined hospitalisations for gastroscopy.

Variation in rates of repeat gastroscopy is likely to be due to geographical differences in the factors discussed below.

Variation between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on where people live rather than where they obtain their health care. People may travel outside their local area to receive health care.

Clinical decision-making

Variation in adherence with available clinical guidelines may influence rates of repeat gastroscopy.

A high proportion of repeat gastroscopies are performed earlier than intervals recommended in guidelines.[26-28] According to a 2012 multi-centre study in the United States of people with Barrett's oesophagus at low risk of progression to oesophageal cancer, 65% were recommended a repeat gastroscopy earlier than the recommended three to five year interval, resulting in a mean of 2.3 excess endoscopies per person.[26] A more recent study conducted in 2019, also in the United States, found that 30% of people had a repeat gastroscopy too soon.[28] A United States retrospective analysis of data from a registry of patients with Barrett's oesophagus reported that less than 16% of people had gastroscopy repeated at the interval recommended by guidelines.[27]

Notes:
Areas with a low SES (=1) have a high proportion of relatively disadvantaged people. Areas with a high SES (=5) have a low proportion of relatively disadvantaged people.
For further details about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Repeat gastroscopy MBS services, all ages

Differences in clinical opinion on management where the evidence is unclear may contribute to variation. For example, although surveillance is recommended for people with Barrett's oesophagus, whether it is beneficial is unclear, particularly in low-risk groups.[15-17] A multi-centre randomised controlled trial is currently examining the impact of two-yearly surveillance on outcomes such as overall survival, cancer-specific survival, and stage of oesophageal cancer at diagnosis in people with Barrett's oesophagus in low-risk groups. The results will help determine who may benefit most from surveillance.[29]

Difficulties in keeping up to date with evidence may also influence rates.[30]

Fear of litigation for not investigating symptoms may influence clinicians' decisions about when and how frequently to repeat a gastroscopy for the same person, particularly if they are unaware of current recommendations, or evidence about the incidence of upper GI cancers or risk of progression to significant disease. The risk of GORD progressing to Barrett's oesophagus is low, as is the risk of Barrett's oesophagus progressing to oesophageal cancer.[3]

Concerns about late diagnosis and subsequent litigation, as well as few disincentives for over-testing, may also contribute to overuse.[30]

Consumer expectations

Consumer expectations, perception of cancer risk, and anxiety about developing oesophageal cancer have been highlighted as potentially driving overuse of gastroscopic surveillance.[31,32]

People often have incorrect beliefs about their cancer risk; for example, people with Barrett's oesophagus often greatly overestimate their risk of developing oesophageal cancer.[31,33,34] This can influence their perception about the benefits of interventions such as surveillance to detect upper GI cancer, and their preference and demand for investigations, even when their risk of cancer is low.[11]

Access to services and number of clinicians providing services

Access to clinicians may influence the likelihood of people seeking care and the rates of repeat gastroscopy. The practice styles of individual clinicians may be more likely to affect rates in areas with fewer clinicians, such as rural and regional locations, than in areas with more clinicians.

Availability and affordability of services may also influence patterns of use. Ability to pay out-of-pocket costs for gastroscopy is likely to be lower in areas of socioeconomic disadvantage, and access is likely to be more difficult in areas with fewer services. Open-access endoscopy services, where general practitioners are able to request gastroscopy without specialist review, may also influence patterns of use.

Financial incentives

Greater remuneration for providing a service rather than consultation may lead to variation and over-servicing in some areas.

Promoting appropriate care

Inappropriate use of gastroscopy for monitoring, such as frequent use in people with very low risk of upper GI cancer, contributes to low-value care and can reduce access to the procedure for people who are most in need. Adherence to the recommended intervals for repeating a gastroscopy ensures that the benefits of the procedure outweigh the risk of procedural harms and costs to individuals.

Unwarranted variation in repeat gastroscopy could be addressed in the following ways:

Guideline and resource development

Development of national guidance to support appropriate use of gastroscopy services is a priority. These should incorporate the current guidelines on the diagnosis and management (including surveillance) of Barrett's oesophagus.[3] This is consistent with recommendations made by the

Medicare Benefits Schedule Review Taskforce in 2015 to develop guidelines that cover when a repeat gastroscopy is clinically appropriate.[25] The guidelines could be used to assess appropriateness of referrals and for clinical audit of clinicians' practices.

Integration of data on cancer incidence and lifestyle into healthcare pathways, training guidelines, and specialist and consumer resources could also support appropriate use of repeat gastroscopy.

Consumer education and reassurance

Informing people about the role of gastroscopy, and reassuring them that their risk of developing upper GI cancer is very low may reduce demand for gastroscopy or repeating gastroscopy earlier than guidelines recommend. Interactive tools that identify a person's cancer risk – such as the Australian Institute of Health and Welfare cancer summary data tool (see 'Resources' on page 298) – may help clinicians when having conversations with their patients about the risk of upper GI cancer.[35]

Reducing risk factors

Improved consumer awareness of risk factors for GORD and upper GI cancers, and of making lifestyle changes to reduce risk factors, should be the focus for people presenting earlier than the recommended intervals for gastroscopic surveillance. Improving a person's understanding about their cancer risk – particularly in people without additional risk factors for upper GI cancer – is important to reduce anxiety and dispel myths about cancer.[33]

Public health initiatives that address risk factors for GORD and upper GI cancer – such as smoking, obesity, excessive alcohol consumption, sedentary lifestyle or uncontrolled symptoms of GORD – should be targeted to areas with a high prevalence of these risk factors before repeating gastroscopy earlier than guidelines recommend.[33] For example, smoking cessation reduces the risk of upper GI cancers – people with Barrett's oesophagus who smoke are twice as likely to progress to oesophageal cancer as people who do not.[12,36]

Clinical audit and clinician education

Clinical audit is a tool that could be used more widely to support appropriate use of repeat gastroscopy for monitoring upper GI tract cancer.

Guidelines are available outlining which people are most at risk of developing upper GI cancer and how frequently gastroscopic surveillance should be performed. Clinical audit against these guidelines could help determine the value of surveillance and whether it can be stopped, particularly in people at low risk, to achieve more effective use of healthcare resources. Audits in this area could also form part of continuing education requirements for clinicians.

Structured referral forms and checklists outlining appropriate reasons and frequency of repeat gastroscopy for greatest benefit could support appropriate requests. Using guidelines to assess the appropriateness of requests against recommended surveillance intervals could also improve use of healthcare resources.

Educational programs for clinicians could improve the appropriateness of requests for repeat procedures. Education could cover the:

- Conditions that require gastroscopic surveillance, and the timing of surveillance for greatest benefit
- Low prevalence of conditions that require gastroscopic surveillance, such as Barrett's oesophagus, and the low risk of progression to significant disease unless other risk factors are present
- Low likelihood that repeating gastroscopy earlier than guidelines recommend will diagnose significant upper GI disease for most people.

Repeat gastroscopy MBS services, all ages

Appropriate prioritisation of services

Health service organisations need to examine the volume of gastroscopies that may be tying up resources needed to perform colonoscopies. People who need a colonoscopy for a positive faecal occult blood test should be prioritised over those having repeat gastroscopies earlier than recommended, especially when the likelihood of the findings changing management is low – for example, in people without additional risk factors for developing upper GI cancer. Better use of resources according to clinical need would improve the likelihood of diagnosing significant disease and reduce delays in diagnosis.

Triage systems

Many states and territories are introducing evidence-based triage systems for prioritising and allocating people for gastroscopy and colonoscopy, with the aim of reducing variation in use of these procedures:

- Victorian health services require clinicians to refer people for gastroscopy according to the categorisation guidelines – the guidelines specify the appropriate gastroscopic surveillance intervals for people with Barrett's oesophagus[37]
- Tasmania has adopted the Victorian categorisation guidelines and formed a statewide endoscopy network to monitor the quality of its services[38]
- Queensland and Western Australia have introduced clinical prioritisation criteria for many clinical areas, including gastroenterology, to triage patients referred to public specialist outpatient services.[39-41]

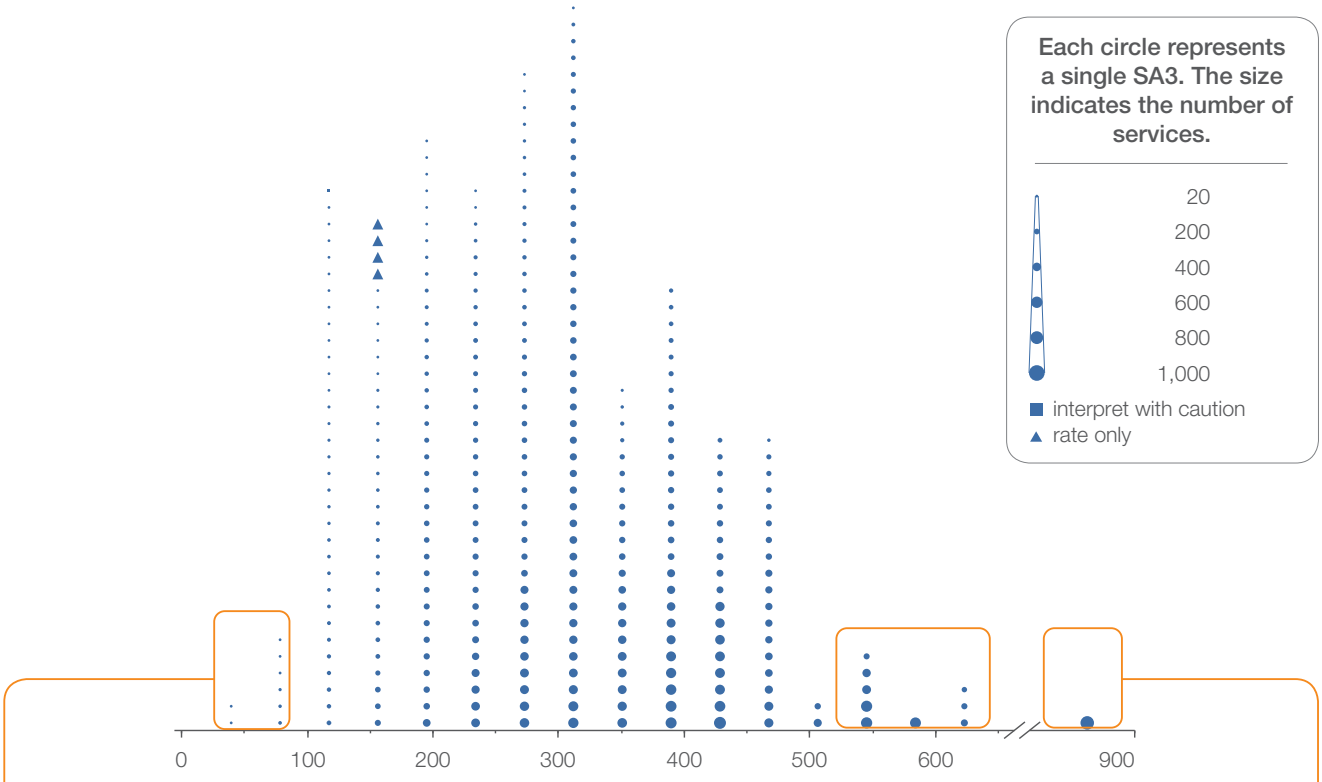
Wider use of these triage systems could result in more appropriate prioritisation of repeat gastroscopy.

Promotion of existing initiatives

In 2016, the Gastroenterological Society of Australia recommended, as part of Australia's Choosing Wisely campaign, that gastroscopy for people with Barrett's oesophagus should be questioned by people if recommended sooner than three years after their last gastroscopy.[42] This is consistent with the Choosing Wisely campaign in the United States. People with Barrett's oesophagus who have no abnormal cells present have a very low risk of developing oesophageal cancer. In these people, it is not necessary to examine the oesophagus more frequently than every three years because, if cellular changes occur, they do so very slowly. Recommendation 5 states: Do not perform a follow-up endoscopy less than three years after two consecutive findings of no dysplasia from endoscopies with appropriate four quadrant biopsies for patients diagnosed with Barrett's oesophagus.

Rates by local area

Figure 5.20: Number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Lowest rate areas

SA3	State	Rate	Services
Glenelg - Southern Grampians	Vic	**61**	33
Goldfields	WA	**70**	25
North East	Tas	**97**	59
Gippsland - East	Vic	**104**	78
Albany	WA	**108**	91
Lower North	SA	**109**	39
Esperance	WA	**111**	20
Grampians	Vic	**116**	101

Highest rate areas

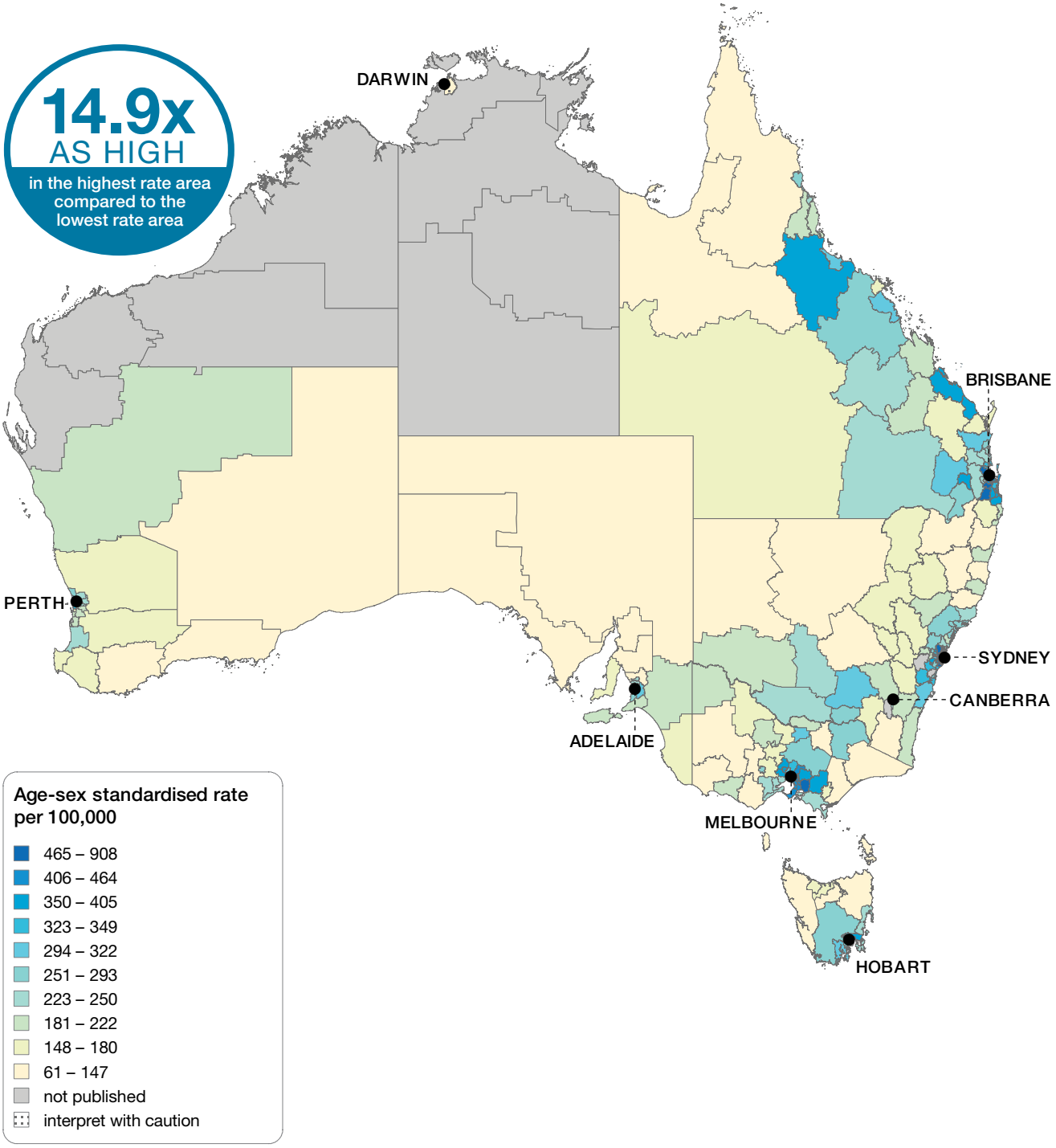
SA3	State	Rate	Services
Eastern Suburbs - North	NSW	**908**	1,349
Jimboomba	Qld	**650**	279
Dural - Wisemans Ferry	NSW	**641**	219
Pennant Hills - Epping	NSW	**640**	367
Eastern Suburbs - South	NSW	**593**	883
Canada Bay	NSW	**580**	582
Hornsby	NSW	**563**	520
Sunnybank	Qld	**546**	273
Baulkham Hills	NSW	**545**	934
Glen Eira	Vic	**545**	920

Notes:
Squares (■) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Repeat gastroscopy MBS services, all ages

Rates across Australia

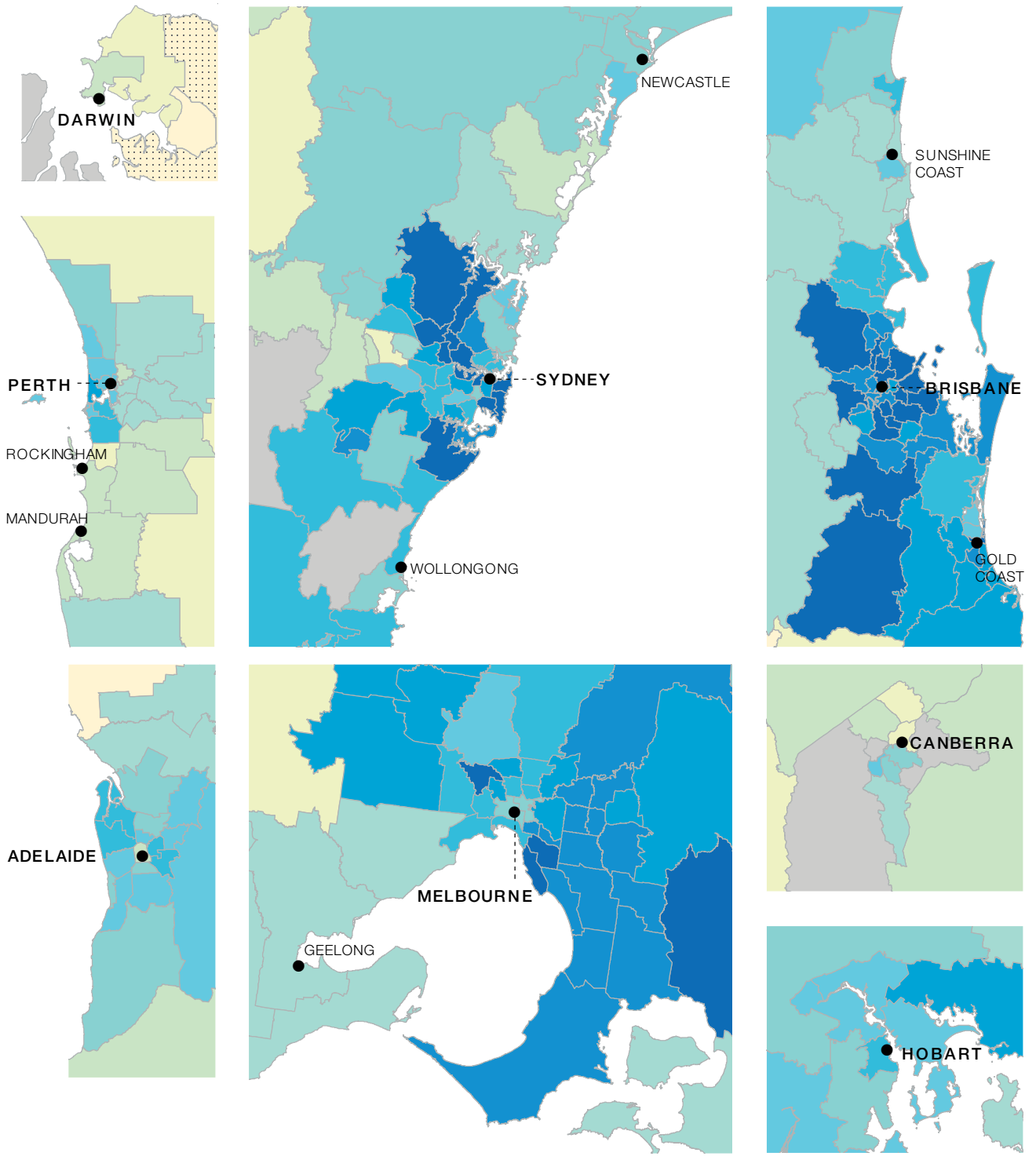
Figure 5.21: Number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Rates across capital city areas

Figure 5.22: Number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



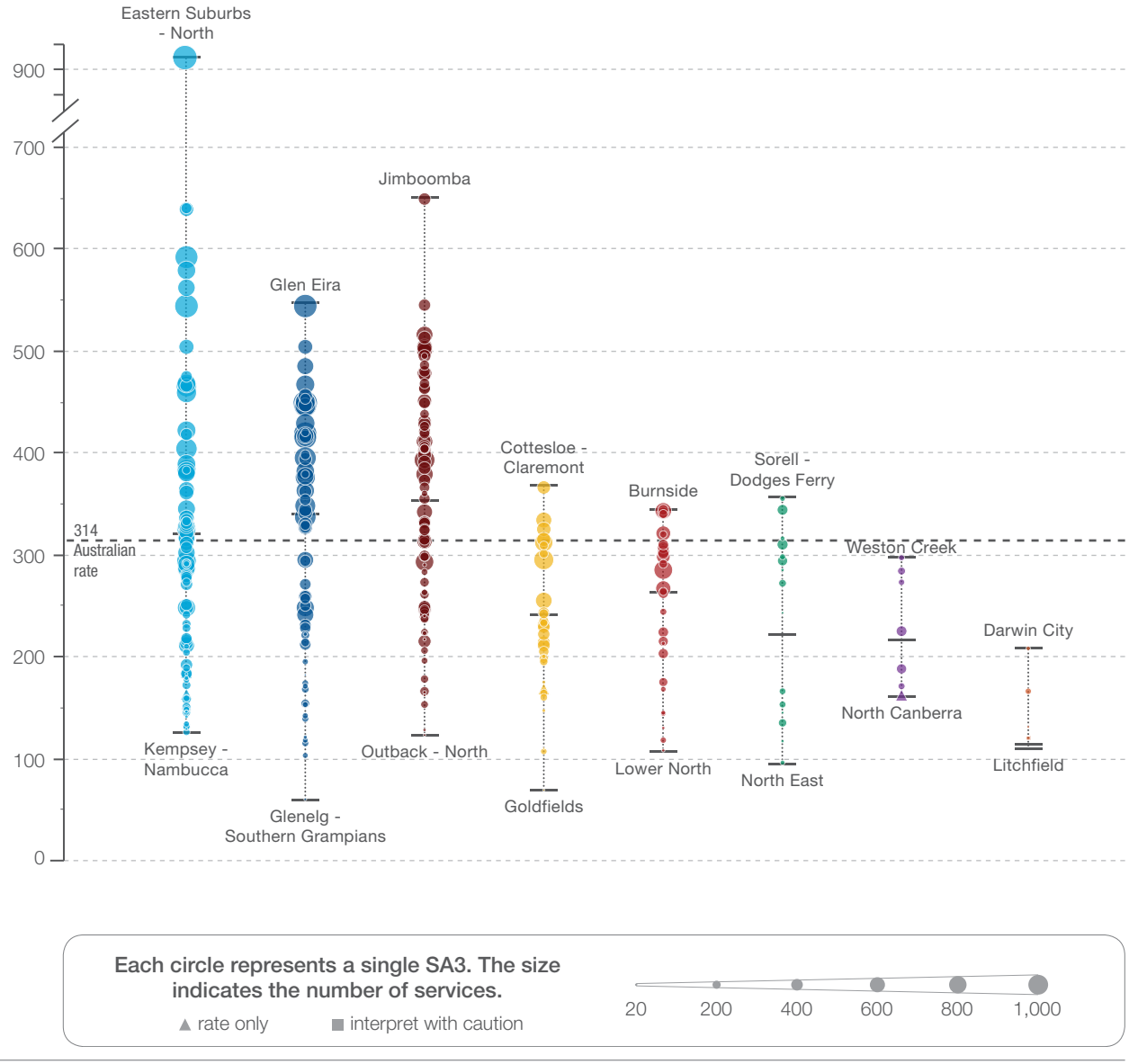
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Repeat gastroscopy MBS services, all ages

Rates by state and territory

Figure 5.23: Number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19

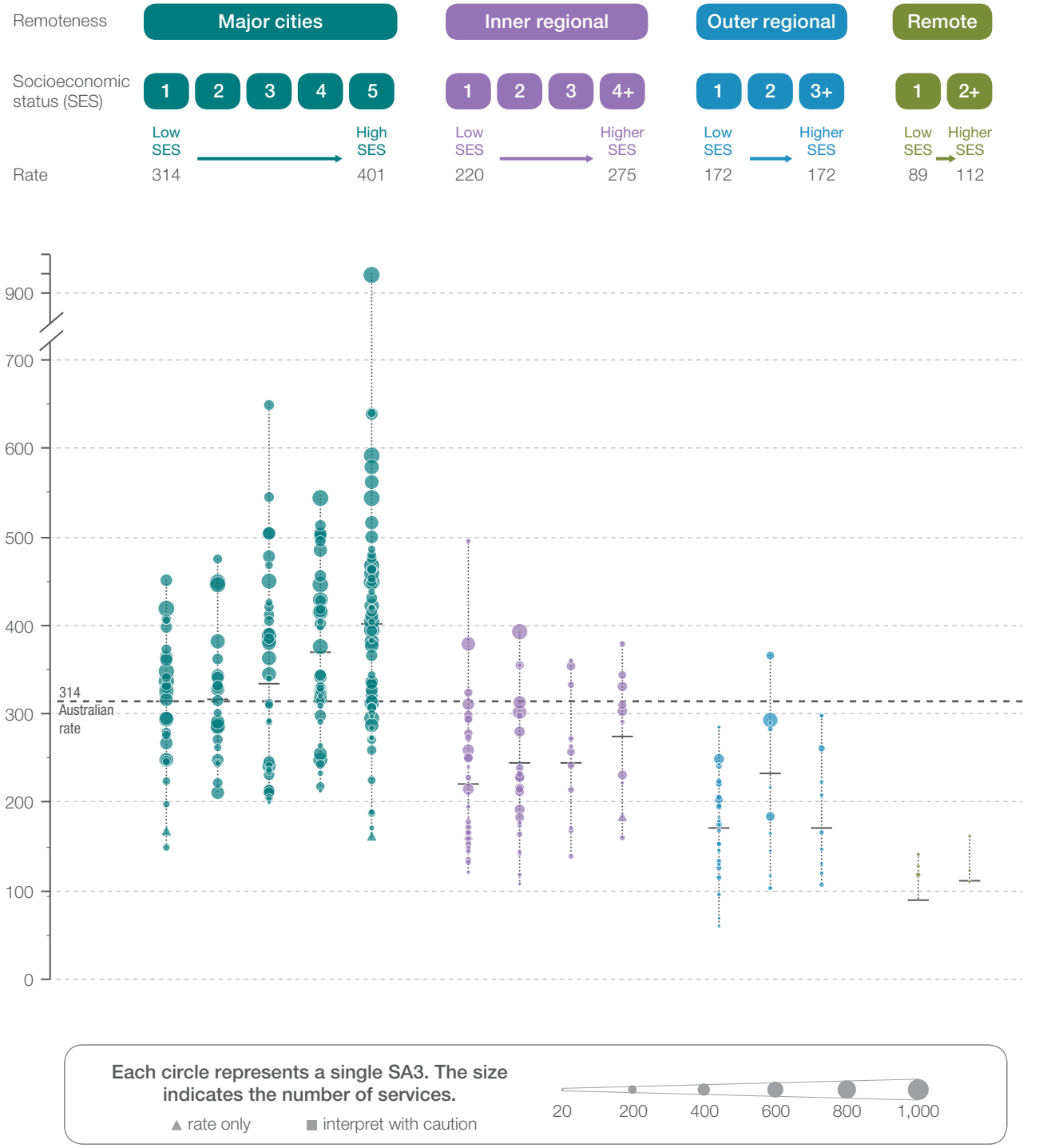
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	908	545	650	367	345	356	298	209
State/territory	321	340	353	241	264	221	216	114
Lowest rate	127	61	124	70	109	97	163	121*
Total services	29,036	24,096	19,829	6,778	5,554	1,497	901	231



Notes:
Squares (■) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published for confidentiality reasons.
For the NT, the territory rate is lower than the minimum SA3 rate as it includes SA3 rates that are not published for reliability and/or confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Rates by remoteness and socioeconomic status

Figure 5.24: Number of MBS-subsidised services for repeat gastroscopy per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Squares (■) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published for confidentiality reasons.
For Remote and SES of 1, the remoteness and SES rate is lower than the minimum SA3 rate as it includes SA3 rates that are not published for reliability and/or confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Repeat gastroscopy MBS services, all ages

Resources

- Australian Institute of Health and Welfare, Cancer summary data visualisations[35], aihw.gov.au/reports/cancer/cancer-data-in-australia/contents/cancer-summary-data-visualisation
- *Gastro-oesophageal Reflux Disease in Adults: Clinical update*[43]
- *Clinical Practice Guideline for the Diagnosis and Management of Barrett's Oesophagus and Early Oesophageal Adenocarcinoma*[3]
- *Therapeutic Guidelines: Gastrointestinal*, version 6[44]
- *Suspected Cancer: Recognition and referral – upper gastrointestinal tract cancers*[45]

Australian initiatives

Information in this chapter will complement work already underway to prevent inappropriate repeat gastroscopy in Australia. At a national level, this work includes:

- Gastroenterological Society of Australia, Choosing Wisely recommendation 5: Do not perform a follow-up endoscopy less than three years after two consecutive findings of no dysplasia from endoscopies with appropriate four quadrant biopsies for patients diagnosed with Barrett's oesophagus.[42]

Many state and territory initiatives are also in place to improve gastroscopy use, including:

- *Upper Gastrointestinal Endoscopy Categorisation Guidelines for Adults*, Victoria[37]
- *Endoscopy Action Plan*, Queensland[46]
- Clinical prioritisation criteria: endoscopy[47] and Clinical prioritisation criteria: gastroenterology[39], Queensland
- *Referral Guidelines: Direct access gastrointestinal endoscopic procedures*, Western Australia[40]
- *Urgency Categorisation and Access Policy for Public Direct Access Adult Gastrointestinal Endoscopy Services*, Western Australia[41]
- State-wide endoscopy care network, which monitors and assesses the quality of endoscopy services, Tasmania.[38]

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Repeat gastroscopy MBS services, all ages

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Chapter 6
Medicines use in older people

At a glance

Polypharmacy is the concurrent use of multiple medicines. It is common in older people because they are more likely to have chronic diseases that are managed with medicines. Although polypharmacy may be appropriate, it can increase the risk of harm from medicines.

The Atlas found that, in 2018–19, the rate of people aged 75 years and over dispensed five or more medicines was about six times higher in the local area with the highest rate than in the area with the lowest.* Almost 40% of people aged 75 years and over were dispensed five or more medicines. Rates of polypharmacy were higher in major cities than elsewhere, and rates increased with socioeconomic disadvantage, except in remote areas.

Residential Medication Management Review (RMMR) and Home Medicines Review (HMR) are two types of medicine reviews available to people living in aged care facilities or at home. The reviews aim to help people to get the maximum benefit from their medicines and prevent medicine-related harm.

The Atlas found that, in 2018–19, the rate of people aged 75 years and over who had at least one Medicare Benefits Schedule–subsidised service for an RMMR or HMR was almost 12 times higher in the local area with the highest rate than in the area with the lowest rate.* About 5.4% of people had a review.

Interventions for identifying people at risk of harm from polypharmacy, such as frail people and those with multiple morbidities, are needed. System changes are needed to improve access to RMMR and HMR services for these at-risk groups. Initiatives to improve uptake of pharmacist recommendations may improve the effectiveness of the review services.

Proton pump inhibitor (PPI) medicines are effective for gastro-oesophageal reflux disease. They are commonly used in older people, often at higher doses or long term without reassessing need. Older people may be especially susceptible to harms from long-term use.

The Atlas found that, in 2018–19, the rate of dispensing of PPI medicines to people aged 75 years and over was about six times higher in the local area with the highest rate than in the area with the lowest.* Almost half people aged 75 years and over had at least one prescription dispensed for a PPI medicine.

Targeted interventions that prompt clinicians to regularly review the need for PPI medicines in older people are needed.

* After standardising to remove age and sex differences between populations.

Recommendations

The Commission consulted widely, but is solely responsible for making the recommendations; as such, the recommendations may not reflect the views of all contributors to the Atlas.

6a. The Commission, in collaboration with the Australian Government Department of Health, the Aged Care Quality and Safety Commission, NPS MedicineWise and relevant groups, to develop nationally consistent:

i. Guidance for people taking multiple medicines

ii. Guidance about the communication of reports to medical practitioners from Residential Medication Management Reviews and Home Medicines Reviews

iii. Measures for aged care homes to compare the percentage of residents who have received Residential Medication Management Reviews and the percentage of pharmacists' recommendations, in line with the Commonwealth's development of the National Aged Care Mandatory Quality Indicator Program

iv. Guidance for the establishment, governance, composition and operation of Medication Advisory Committees within aged care homes.

6b. The Australian Government Department of Health to investigate ways of collecting patient-level data on the supply of Pharmaceutical Benefits Scheme medicines through the S100 Remote Area Aboriginal Health Services Program to gather accurate information about the use of medicines in rural and remote Aboriginal communities.

6.1 Polypharmacy, 75 years and over

Why is this important?

Polypharmacy is defined by the World Health Organization (WHO) as the concurrent use of five or more medicines.[1] Polypharmacy is common in older people because they often have several chronic conditions requiring multiple medicines to prevent or control symptoms. About two-thirds of Australians aged 75 years and over are taking five or more medicines, including over-the-counter and complementary medicines.[2]

Polypharmacy may be necessary and appropriate for some people; however, there are risks associated with multiple medicines use.[1] Older people are more vulnerable to harms from polypharmacy because of increased frailty and age-related changes that alter the way their bodies respond to medicines.[1]

Monitoring polypharmacy is recognised in the WHO's third Global Patient Safety Challenge: Medication without Harm as a way of identifying people at risk of medicine-related harm and who may benefit from a medicines review.[1] The fourth Atlas uses Pharmaceutical Benefits Scheme (PBS) prescription dispensing data to examine rates of polypharmacy for people aged 75 years and over.

What did we find?

In 2018–19, about 40% of people aged 75 years and over were dispensed five or more different medicines. Polypharmacy was **6.4 times as high** in the area with the highest rate as in the area with the lowest rate.

Rates of polypharmacy were higher in major cities than elsewhere. Areas with the most socioeconomic disadvantage had the highest rates of polypharmacy, except for remote areas.

What can be done?

We can:

- Implement interventions to identify people at risk of harm from polypharmacy, such as frail people and those with several chronic conditions, to prompt the timely review of their medicines; this could include increased monitoring of polypharmacy
- Raise awareness among consumers and clinicians about harms associated with multiple medicines use, and about lifestyle changes that can reduce the need for some medicines
- Support older people to keep an up-to-date medicines list
- Include information about deprescribing in medicines product information.

Polypharmacy, 75 years and over

Context

This item examines the rate of polypharmacy for people aged 75 years and over in Australia in 2018–19.

What is polypharmacy?

Polypharmacy is the use of multiple medicines to prevent or treat medical conditions. It is commonly defined as the concurrent use of five of more medicines by the same person. This definition is used by WHO and the Organisation for Economic Co-operation and Development.[1,3] Medicines include prescription, as well as over-the-counter and complementary medicines.[1]

This Atlas examines polypharmacy for people aged 75 years and over using prescription dispensing data from the Pharmaceutical Benefits Scheme (PBS). Over-the-counter and complementary medicines are not in the dataset and so are not counted. This means that Atlas findings are likely to be a conservative measure of polypharmacy in Australia.

Why examine polypharmacy in people aged 75 years and over?

Monitoring polypharmacy is one of the three key actions recommended in the WHO's third Global Patient Safety Challenge: Medication without Harm, to reduce the global burden of harm associated with medicine use.[1,4] Monitoring polypharmacy also underpins recommendations in Australia's Choosing Wisely initiative, which advises to not prescribe additional medicines to people already taking five or more medicines without a comprehensive review of their medicines to ensure all are necessary.[5]

Polypharmacy is common in older people because they are more likely to be living with several chronic conditions, requiring medicines to prevent or control symptoms.[6,7] About 80% of Australia's population aged 65 years and over have one or more chronic conditions, and over half (51%) have two or more.[6] Because people become more sensitive to the effects of medicines as they age, the consequences of polypharmacy tend to be more serious in older people.[8-10]

Polypharmacy is associated with an increased risk of adverse drug reactions, interactions with other medicines and increased likelihood of not taking medicines as prescribed.[1,11-14] Errors associated with prescribing and monitoring medicines are more likely in older people, and the likelihood increases with the number of medicines taken.[1] The more medicines prescribed, the more complex medicine regimens become, which increases the risk of errors such as taking the wrong medicine or dose, missing a dose or taking it at the wrong time.[1,15] Polypharmacy is also associated with harms including delirium and falls[10,12,16], hospitalisation[11], reduced quality of life[17] and premature morbidity and mortality.[12,16]

Polypharmacy may be appropriate when medicines are prescribed according to the best available evidence, and use for that person has been optimised to reduce the risk of medicine-related harm.[1,14,17] For these reasons, definitions of polypharmacy are shifting from numeric thresholds – such as the use of five or more medicines – to emphasise the clinical appropriateness of polypharmacy.[1,17] However, there are risks associated with using multiple medicines, even when each medicine on its own is appropriate.[1,11,18] The benefits gained from each additional medicine are likely to be reduced when people take multiple medicines, and the risk of medicine-related harm increases.[19]

Polypharmacy is associated with an increased use of medicines that are considered potentially inappropriate in older people – where the risks of their use outweigh the benefits.[12,20-23] Medicines considered potentially inappropriate in older people are best avoided or used extremely cautiously, with monitoring to ensure the benefits of taking the medicine outweigh the possible harms.

Examples of medicines considered potentially inappropriate in older people include[24]:

- Medicines that cause sedation, dizziness and confusion, such as opioids, antipsychotics, anticholinergics, antidepressants and medicines for anxiety – these can increase the risk of confusion, falls or delirium
- Long-acting non-steroidal anti-inflammatory drugs – these are associated with increased risk of kidney failure, gastrointestinal bleeding and cardiac effects in older people
- Medicines that are removed from the body by the kidneys – reduced kidney function in older people can allow these to accumulate in the body and cause toxicity.

Prescribing medicines when they are no longer needed is common in older people and contributes to polypharmacy. A study of veterans in the United States found that 60% of people taking five or more medicines were taking one or more medicines that were no longer needed.[25]

A prescribing cascade can exacerbate polypharmacy. This occurs when additional medicines are prescribed to treat the adverse effects caused by other medicines but misinterpreted as symptoms of a new condition.[26] Older people are at higher risk of experiencing prescribing cascades. This is because they often have several medical conditions that are treated by different clinicians. Clinicians may focus on managing a single disease state without considering the patient's other conditions and treatments.

Rates of polypharmacy in older people in Australia

Prevalence of polypharmacy in different Australian healthcare settings has been reported to range between 43% and 95%, with higher estimates for people in hospital and aged care homes.

A national census in 2012, which explored the use of prescription, over-the counter, and complementary medicine use in Australians aged 50 years and over living at home, found that 43% took five or more medicines.[2] The number of people taking five or more medicines increased with age, with two out of three Australians aged 75 years and over taking five or more medicines.

A study of Australians aged 70 years and older (average age 81.3), who had been admitted to hospital between July 2005 and May 2010, found that 75% of people took five or more medicines.[7] In Australian aged care homes, up to 95% of residents are reported to take five or more medicines.[27,28]

An analysis of PBS dispensing data found that, between 2006 and 2017, the prevalence of taking five or more medicines increased by 9% (from 33% to 36%) in Australians aged 70 years an over.[29] The prevalence among those aged 80–84 years and 85–89 years was 44% and 46%, respectively, in 2017.

Although many studies have described polypharmacy in Australia, the maps and graphs in this Atlas provide a novel way of analysing the issue and highlighting the areas and groups that may be more at risk of experiencing harm from polypharmacy.

Polypharmacy, 75 years and over

About the data

Data are sourced from the PBS dataset, which includes all prescriptions dispensed under the PBS and the Repatriation Pharmaceutical Benefits Scheme (RPBS), including under copayment prescriptions.

Data used in this report exclude doctors' bag items and any programs with alternative supply arrangements (section 100 of the *National Health Act 1953*) in which patient-level details are not available, such as direct supply to remote Aboriginal health services.

The PBS and RPBS do not cover medicines supplied to public hospital inpatients, over-the-counter medicines or private prescriptions.

The dataset does not allow analysis by Aboriginal and Torres Strait Islander status.

Rates are based on the number of people dispensed five or more different medicines per 100,000 people aged 75 years and over in 2018–19.

To be counted, a medicine must have had four or more prescriptions dispensed for it in the year. Medicines are counted as distinct if the Anatomical Therapeutic Chemical codes differ at the fourth level.

Patient count analysis reflects the number of unique patients that qualify according to the polypharmacy specification.

The analysis and maps are based on the patient's post code recorded in their Medicare file and not the location of the prescriber or the dispensing pharmacy.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Some data have been suppressed to manage volatility and confidentiality. This process takes into account the Australian Government Department of Health's requirements for reporting PBS data (see the Technical Supplement). Data suppression for this item has been notably marked for remote areas of the Northern Territory. This is indicated on the maps in grey. Reporting for the Northern Territory was possible at a territory level.

What do the data show?

Magnitude of variation

In 2018–19, 690,516 people were dispensed five or more medicines, representing 40,226 people per 100,000 people aged 75 years and over (the Australian rate).

The number of people dispensed five or more medicines across 328* local areas (Statistical Area Level 3 – SA3) ranged from 11,206 to 72,059 per 100,000 people. The rate was **6.4 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of people varied across states and territories, from 25,058 per 100,000 people in the Northern Territory to 41,446 in New South Wales. (Figures 6.2–6.5).

After the highest and lowest 10% of results were excluded and 264 SA3s remained, the number of people dispensed five or more medicines per 100,000 people was 1.4 times as high in the area with the highest rate compared to the area with the lowest rate.

* There are 340 SA3s. For this item, data were suppressed for 12 SA3s due to a small number of prescriptions dispensed and/or population in an area. Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.

Analysis by remoteness and socioeconomic status

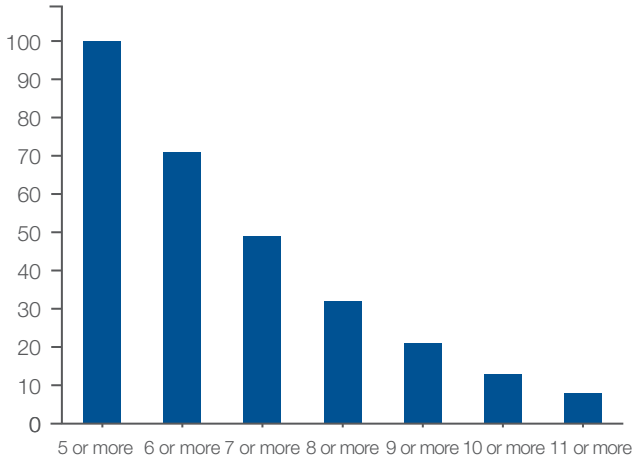
Rates of polypharmacy were higher in major cities and inner regional areas than in outer regional areas and remote areas. With the exception of remote areas, areas with the most disadvantage had the highest rates for polypharmacy compared to all other socioeconomic groups in the same remoteness category (Figure 6.6).

Analysis by number of medicines for people with polypharmacy

In 2018–19, of the 690,516 people with polypharmacy aged 75 years and over, 49% had seven or more medicines dispensed and 8% had 11 or more medicines dispensed (Figure 6.1).

The data and graphs for Figures 6.1, analysis by Primary Health Network (PHN), analysis by PHN and age group, and analysis by numbers of medicines for each age group, are available at safetyandquality.gov.au/atlas

Figure 6.1: Percentage of people by the number of medicines dispensed, for patients with polypharmacy aged 75 years and over, 2018–19



The data for Figure 6.1 are available at safetyandquality.gov.au/atlas

Notes:
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Polypharmacy, 75 years and over

Interpretation

The Atlas findings indicate that about 40% of people aged 75 years and over were taking five or more different medicines on an ongoing basis in 2018–19. The data do not allow assessment of the appropriateness of polypharmacy.

Variation in rates of polypharmacy in people aged 75 years and over are likely to be due to the geographical differences in the factors discussed below.

Variation between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on where people live rather than where they obtain their health care. Patients may travel outside their local area to receive health care.

Possible reasons for variation in rates of polypharmacy

Rates of underlying disease, social determinants of health and lifestyle factors

Areas with higher rates of chronic disease or people living with several chronic conditions are expected to have higher rates of polypharmacy. The higher rates of polypharmacy observed in socioeconomically disadvantaged areas may reflect a higher prevalence of multimorbidities (having several chronic conditions), and lifestyle factors that increase the risk of chronic disease. These factors include obesity, smoking, poor diet and alcohol intake. People living in disadvantaged areas may be restricted in their ability to afford, choose or find healthier lifestyle options, exacerbating rates of polypharmacy.[1]

Number of prescribers and dispensing pharmacies

The number of prescribers involved in a person's care may contribute to variation in rates of polypharmacy. One clinician rarely has oversight of prescribing a person's medicines, because different specialists provide care for different conditions. The number of medicines prescribed is known to increase with the number of prescribers involved in a person's care.[30]

It is unclear whether digital health systems (such as My Health Record) that can sort and centralise a person's medicines information affect rates of polypharmacy.

The number of pharmacies where people obtain their medicines may also contribute to the variation seen. Having medicines dispensed at the same pharmacy gives the pharmacist an awareness of a patient's dispensing history, which may allow pharmacists and pharmacy staff to identify people taking multiple medicines who might benefit from a medicines review.

Age and location of aged care homes

Areas with more aged care homes are likely to have higher rates of polypharmacy because residents of aged care homes generally take more medicines than people of the same age living in their own home.[2,29] Because Atlas data are age and sex standardised – to control for differences in population structures between areas – variation in rates between areas cannot be explained solely by the proportion of older people in an area.

Clinical decision making and access to care

Variation in rates may be influenced by different prescribing practices of clinicians. Many clinical guidelines are based on research in adults aged under 65 years with a single disease state. Application of these guidelines to older people with multimorbidity has been found to exacerbate polypharmacy.[1,18]

The number of clinicians providing services in the area, and the ability to see a specific clinician, may influence the likelihood of people seeking care. The practice styles of individual clinicians may be more likely to affect rates in areas with fewer clinicians, such as rural and regional locations, than in areas with more clinicians.

Promoting appropriate care

Reducing the risk of harms from polypharmacy in older people requires a multifaceted and collaborative approach with a variety of strategies and interventions to support appropriate medicines use.[14,31,32] Strategies should aim to improve health outcomes, increase engagement with consumers, and promote appropriate use of healthcare resources.[1]

Australia's response to the WHO Global Patient Safety Challenge: Medication without Harm, proposes four priority actions to reduce harms from polypharmacy and the use of potentially inappropriate medicines[4]:

- Broad and consistent implementation of evidence-based primary care programs for medication reconciliation and review services
- Consumer communications to raise awareness of programs aimed at improving consumer ability to manage their medicines
- Broad and complete implementation of the National Safety and Quality Health Service (NSQHS) Standards Medication Safety Standard in health service organisations
- Broad implementation of medicines review and promotion of deprescribing best practice throughout Australia's health system.

Initiatives supporting these actions are discussed below.

Medication management review

A comprehensive and structured review of a person's medicines is key to identifying whether polypharmacy is appropriate. Studies examining the appropriateness of polypharmacy in older Australians have found that one in five people are taking a medicine considered potentially inappropriate when use should generally be avoided[33], increasing to half in those living in aged care facilities.[34,35]

Medication management reviews (also known as medicines reviews) are effective in minimising harms from polypharmacy and improving the safe use of medicines.[1] Services in Australia include home medicines review (HMR), residential medication management review (RMMR), in-pharmacy medicine checks (MedsCheck) and medicine reviews as part of multidisciplinary care plans.[36] Further detail about HMR and RMMR are available in Chapter 6.2. There are also specific programs that focus on improving medicines use in the Australian veteran community.[37] Medicines review is also a requirement for all health service organisations under the NSQHS Standards.[38]

Shared decision making

Partnering with consumers and their families or carers in shared decision making and empowering people to have a more active role in their care are key strategies for minimising harms from polypharmacy.[38,39] Discussions between consumers and clinicians about the benefits and risks of medicines before prescriptions are issued, and an assessment of the person's perspective on their health and their need to take multiple medicines, may lead to fewer medicines being prescribed.[16]

Consumers may be more receptive to stopping medicines when they have a greater understanding of the risks of continuing their medicine, particularly if a medicine has limited expected benefit or is no longer of benefit.[40,41] About 90% of Australians have reported they would be willing to stop taking one or more of their medicines if their clinician thought it was appropriate to do so.[42]

Polypharmacy, 75 years and over

Medicines lists

Supporting people to know what medicines they are taking can help minimise harms from polypharmacy.

Tools such as the NPS MedicineWise Medicines List (see 'Australian initiatives' on page 318) can help people to take an active role in managing their medicines and improve communication with their clinicians. Medicines lists can improve a person's understanding and adherence to medicines regimens[12], and are useful at transitions of care for ensuring the accurate transfer of medicines information and minimising unintended medicine changes.[38] Smartphone apps to store a person's medicines information may also be useful, but further evaluation is required to determine their benefits.[16] A limitation of technology-based tools like smartphone apps currently identified is that older people, who are the main target for interventions to reduce harm from polypharmacy, are the least likely to use them.

Digital systems such as My Health Record may also help with maintaining lists and allow better identification of people who may benefit from a medicines review.

Over-the-counter and complementary medicines were not included in the Atlas analysis. However, they are commonly used by older people[2,6,43] and contribute to polypharmacy.[2,44] GPs and pharmacists should routinely ask about use of over-the-counter and complementary medicines and record them as part of a patient's medication history.[2] Patients should be encouraged to record them as part of their medicines list.

Lifestyle factors

Addressing lifestyle factors that increase the risk of chronic disease or experiencing symptoms may reduce the need for medicines use that can contribute to polypharmacy.[1]

Lifestyle factors should be discussed with people when considering medicines use or undertaking a medication review. This is especially important in areas that have a higher prevalence of risk factors for chronic disease, such as areas with higher socioeconomic disadvantage.[19]

Medication reconciliation at transitions of care

More than 50% of medication errors occur at transitions of care – when people move from one healthcare setting to another.[45] The probability of such errors increases with the number of medicines prescribed.[2]

Medication reconciliation is the process of working with patients and their carers to develop an accurate medicines history in order to ensure the accurate transfer of information about their medicines, and is an effective way of minimising harms from polypharmacy.[1,4,38] It can reduce discrepancies and medication errors during transitions of care by 50–94%[38], with most success seen in high-risk populations such as older people experiencing polypharmacy.[1,46] It is a requirement for all Australian health service organisations under the NSQHS Standards.[38]

Guideline adaptation and comorbidities

Developing guidelines that take into account multimorbidity in older people could help reduce complex medicine regimens and minimise harms from polypharmacy.[17] Evidence-based guidelines commonly recommend treatments for a single disease state. Lack of guidance on the management of multimorbidity can be a driver of polypharmacy.[1]

Deprescribing

Deprescribing is the supervised process of reducing or stopping medicines that may no longer be of benefit or may be causing harm.[34,47] Deprescribing can reduce the number of medicines taken by frail older people living in aged care homes with no harm to clinical outcomes.[15] It may also reduce medicine complications such as the number of falls experienced by older people.[34,48]

Initiatives need to address the known barriers to deprescribing. Examples include clinician reluctance to deprescribe because of clinical complexity, incomplete information on the rationale for the medicines, ambiguous or frequently changing care goals, uncertainty about the harms of continuing or stopping medicines, a perception that it is the responsibility of another clinician to deprescribe medicines, and lack of a defined process for deprescribing.[49-53] Patients may be reluctant to stop their medicines because they are worried about their symptoms returning, or they are confused, having been told previously that they needed them. Opinions of their family members or information from other sources, such as the media, may also be influencing factors.[40]

The National Strategic Plan to Improve the Quality Use of Medicines in Older Adults[34] recommends that all Australian Approved Product Information (PI) leaflets for prescribing medicines and all Consumer Medicines Information (CMI) leaflets include information on 'cessation' or 'deprescribing'. An analysis of Australian Approved PI leaflets for the 99 most commonly dispensed medicines in 2015 found that only a quarter provided guidance on how to discontinue use.[54] Consumer testing showed that CMI leaflets with information about stopping medicines have been positively received by Australians aged 65 years and over.[55]

Active ingredient prescribing

Inconsistency in the way medicines are described can cause confusion for patients, who may inadvertently take multiple doses of the same active ingredient if it is prescribed under different brand names. The risk is increased in older people and those who take many medicines.[56] To reduce these risks and support people to better understand their medicines, prescriptions supplied under the PBS from February 2021 must describe the medicine by its active ingredient, and not the brand name.[56]

Electronic decision support tools

Electronic decision support tools may be useful in minimising harms from polypharmacy in older people.[57,58] The Goal-directed Medication review Electronic Decision Support System provides clinical decision support to clinicians conducting medication reviews, and has shown to be useful when conducting an HMR.[58] Research is continuing to examine the effect of the system on clinical outcomes.[59]

Monitoring of polypharmacy

Monitoring rates of polypharmacy can identify people who may have an increased risk of medicine-related harm. It can prompt a medicines review to ensure that prescribed medicines are appropriate for that person.[4] This approach has been used successfully in aged care homes in Victoria, through the development of a quality indicator that reports on the proportion of residents using nine or more medicines.[4]

Australia's National Indicators for Quality Use of Medicines in Australian Hospitals 2014 can be used for monitoring safe and appropriate medicines use.[60] Another set of indicators has been proposed for use in Australian hospitals by the New South Wales Therapeutic Advisory Group. These indicators identify people at high risk of medicine-related harm, including inappropriate polypharmacy.[4]

People are often discharged from hospital with more medicines than they were previously taking; this is especially common in older people.[7,61] Monitoring rates of polypharmacy at the time of hospital discharge could help identify people who may be at risk of medicine-related harm and may benefit from a medication review.

The correlation between rates of polypharmacy and rates of medication management reviews (MMRs, reported in Chapter 6.2) could also be a useful indicator. Areas with high rates of polypharmacy but low rates of MMRs should be further investigated.

Polypharmacy, 75 years and over

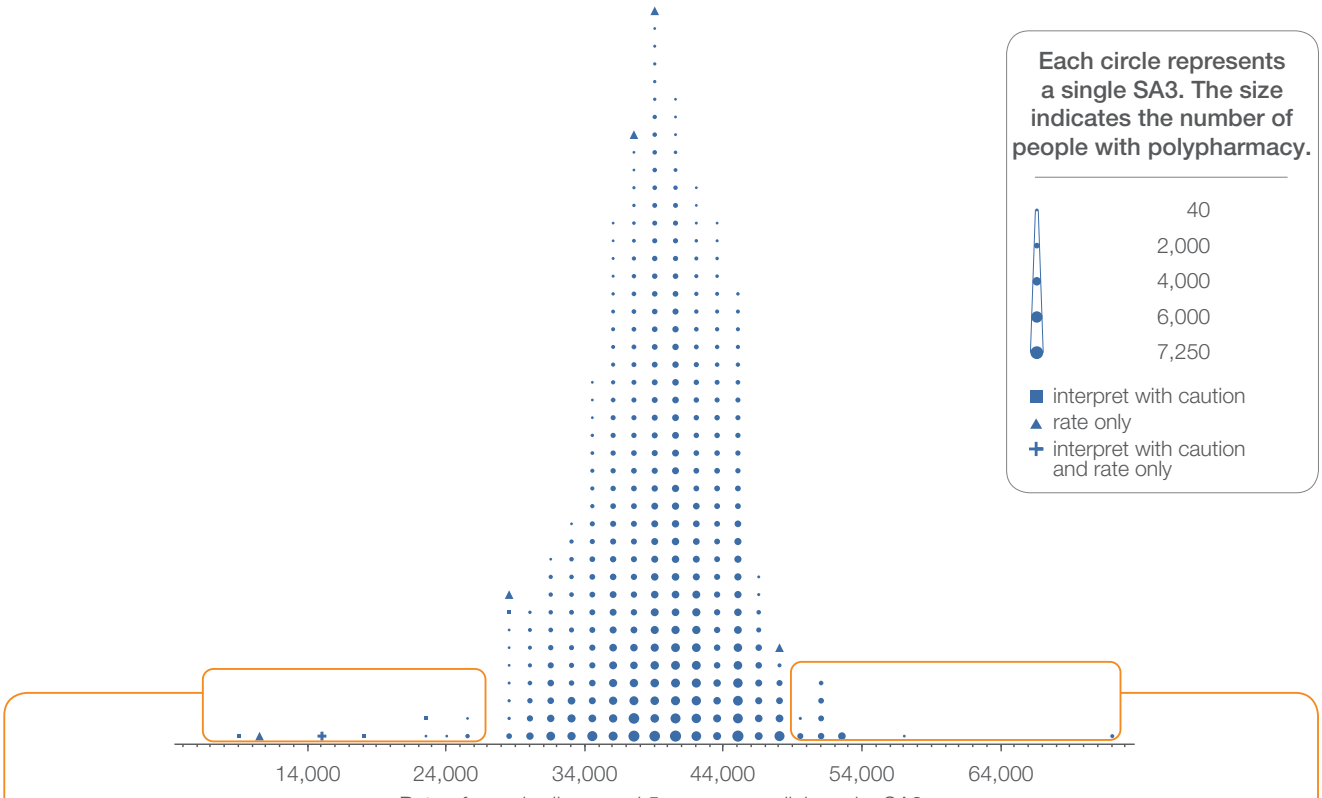
Promoting existing initiatives

Recommendations have been made as part of the Royal Australasian College of Physicians EVOLVE program and Australia's Choosing Wisely initiative to minimise harms associated with polypharmacy. These focus on[5,62]:

- The importance of recognising and avoiding prescribing cascades
- Reducing the use of medicines when more effective non-pharmacological management strategies are available
- Stopping medicines when they are no longer of benefit
- Conducting a comprehensive review of existing medicines before prescribing further medicines in people who are already taking five or more.

Rates by local area

Figure 6.2: Number of people dispensed 5 or more medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Lowest rate areas

SA3	State	Rate	People with polypharmacy
Katherine	NT	**9,458***	43
Kimberley	WA	**11,206**	n.p.
East Pilbara	WA	**16,073***	n.p.
West Pilbara	WA	**18,878***	44
Darwin City	NT	**23,009**	187
Daly - Tiwi - West Arnhem	NT	**23,288***	53
Alice Springs	NT	**24,007**	219
Port Douglas - Daintree	Qld	**25,992**	201
Melbourne City	Vic	**26,280**	1,150

Highest rate areas

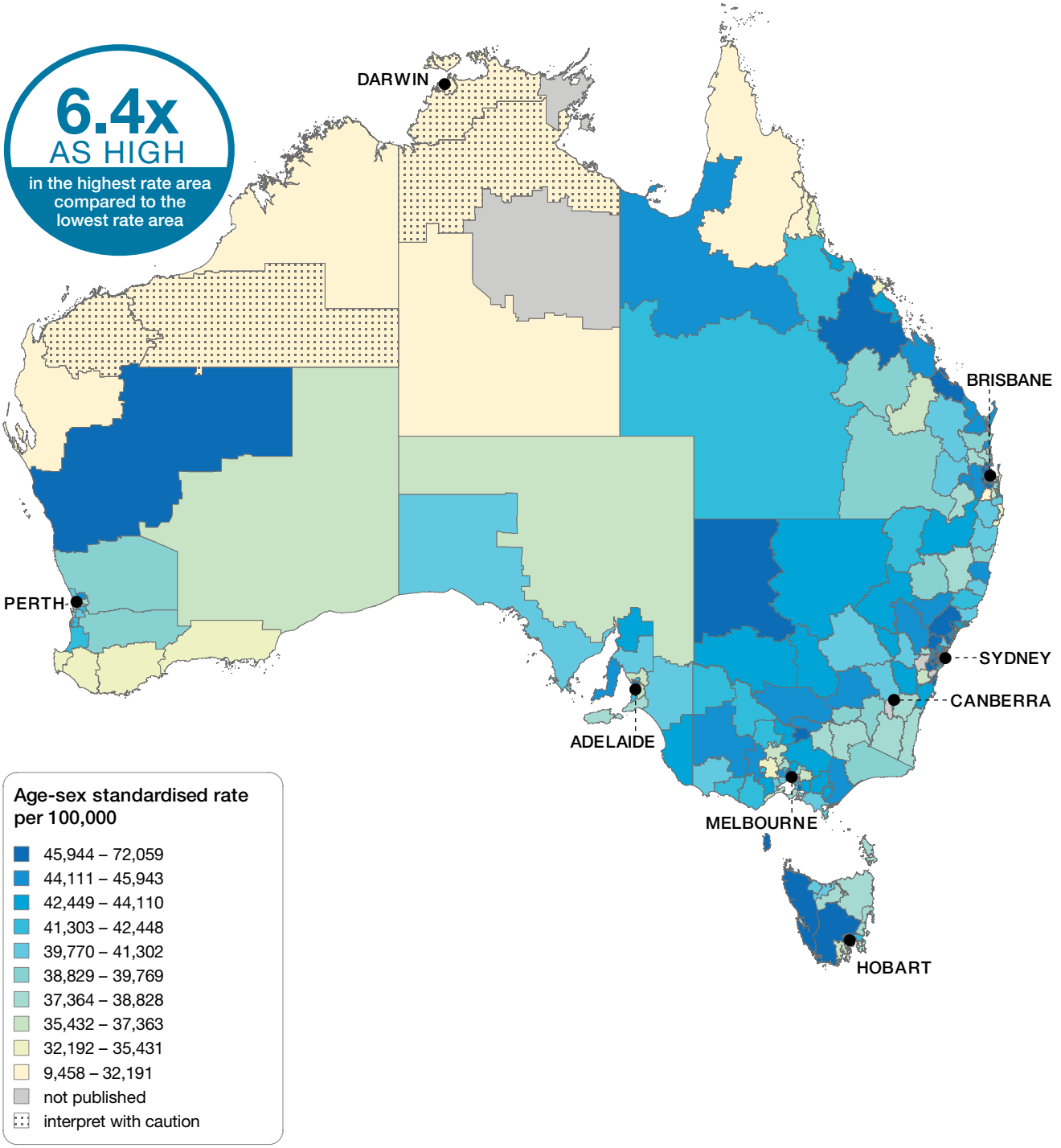
SA3	State	Rate	People with polypharmacy
Jimboomba	Qld	**72,059**	934
Central Highlands (Tas.)	Tas	**58,329**	383
Ipswich Inner	Qld	**52,650**	3,383
The Hills District	Qld	**52,433**	1,927
Wollondilly	NSW	**52,407**	1,241
Maitland	NSW	**51,774**	2,426
Caboolture	Qld	**51,005**	1,988
Bringelly - Green Valley	NSW	**50,991**	2,113
Hawkesbury	NSW	**49,712**	570

Notes:
Squares (■) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of people are not published (n.p.) for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution, and the numbers of people are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Polypharmacy, 75 years and over

Rates across Australia

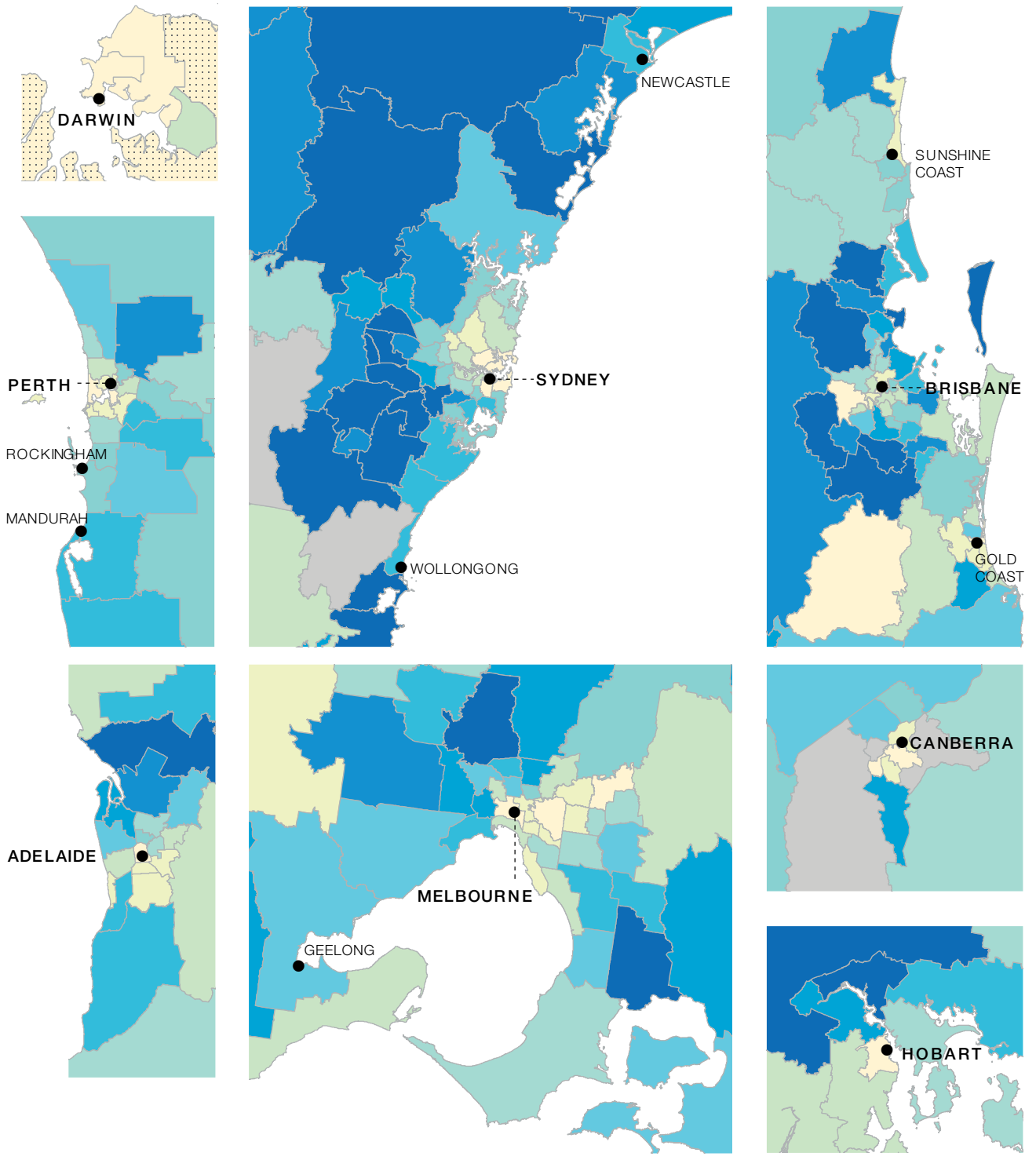
Figure 6.3: Number of people dispensed 5 or more medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Rates across capital city areas

Figure 6.4: Number of people dispensed 5 or more medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



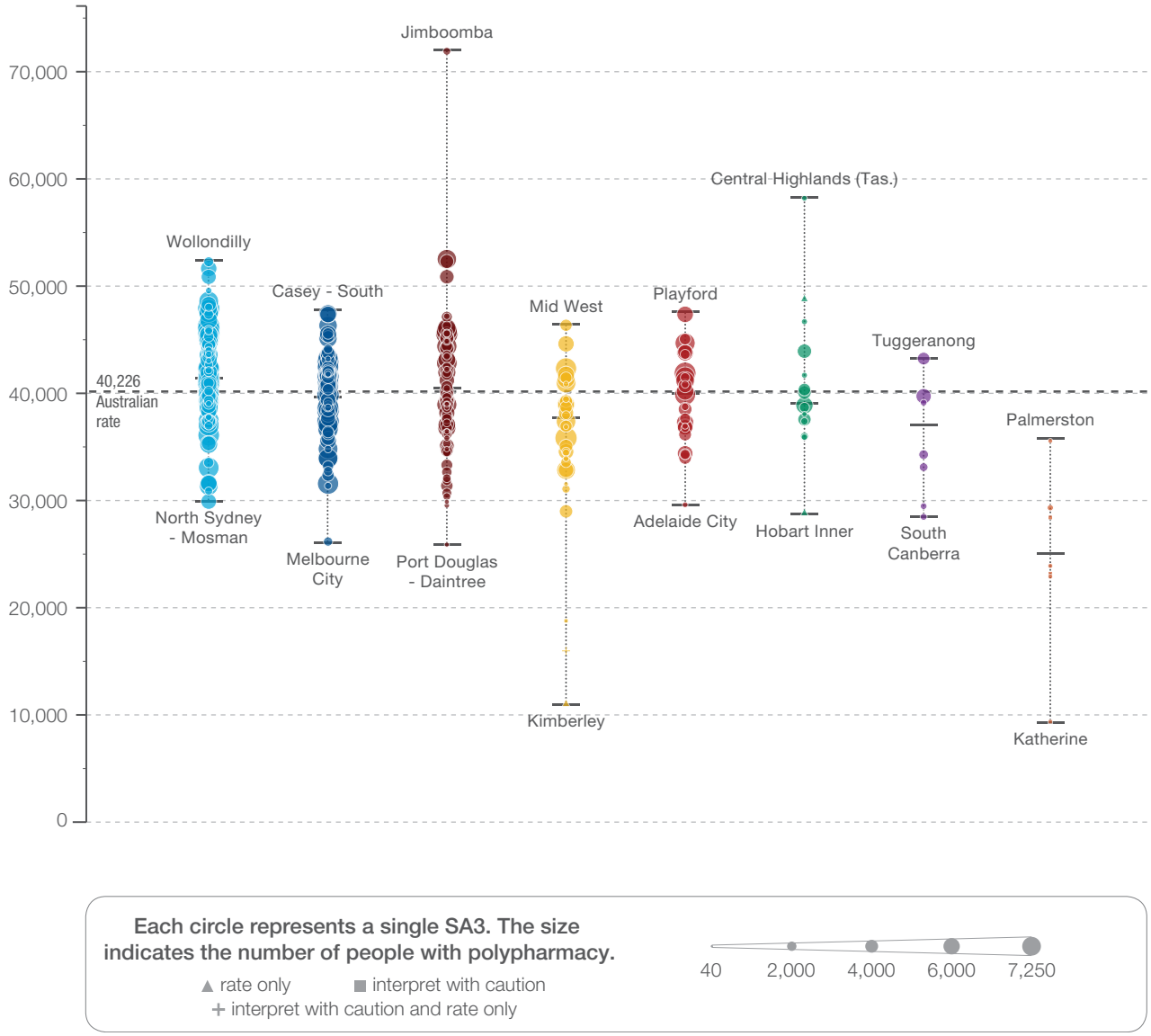
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Polypharmacy, 75 years and over

Rates by state and territory

Figure 6.5: Number of people dispensed 5 or more medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19

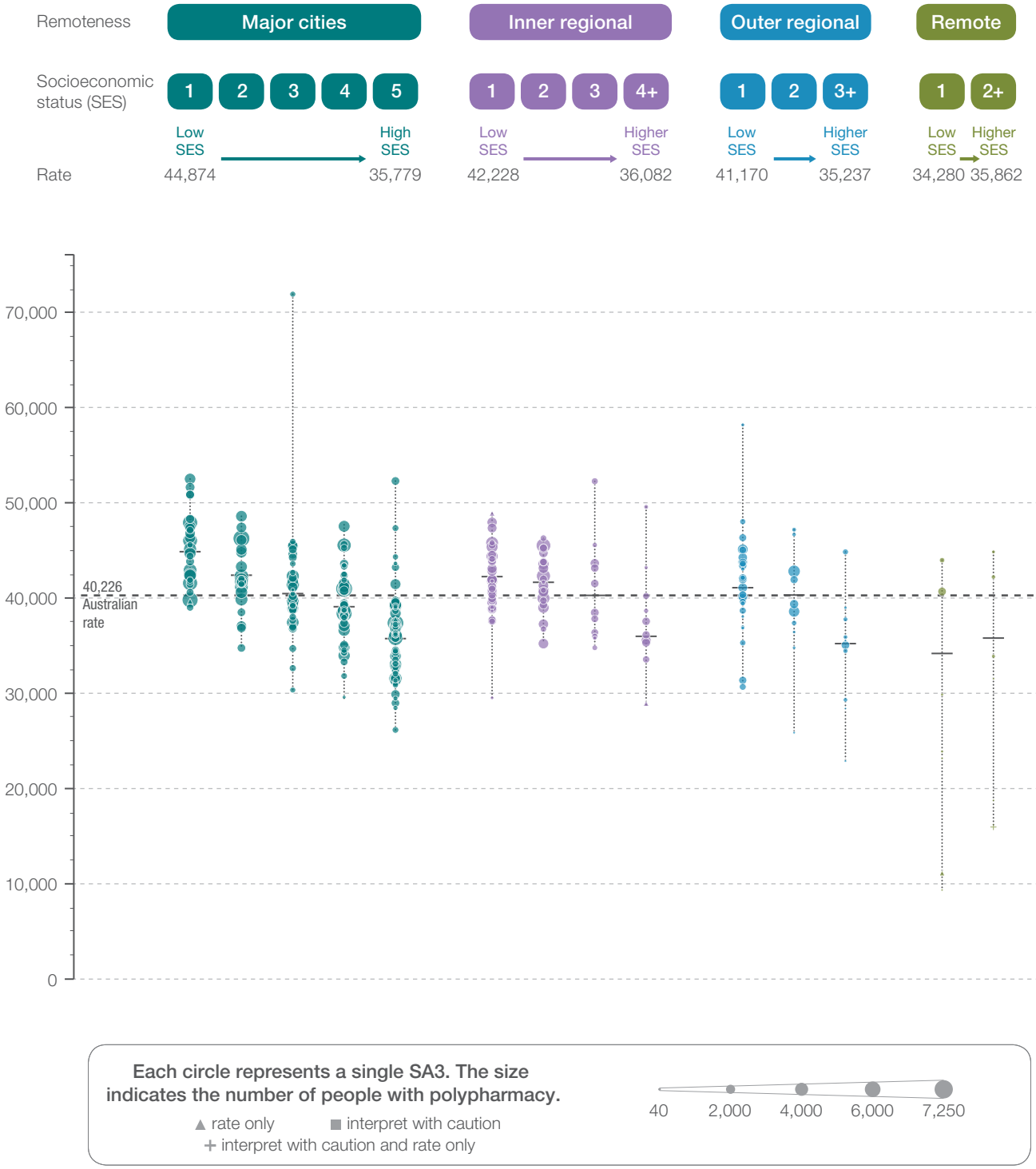
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	52,407	47,550	72,059	46,474	47,492	58,329	43,364	35,675
State/territory	41,446	39,786	40,540	37,814	40,104	38,993	37,189	25,058
Lowest rate	30,025	26,280	25,992	11,206	29,715	29,030	28,588	9,458*
Total patients	238,296	177,272	129,940	60,162	58,214	16,934	8,245	1,379



Notes:
Squares (■) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of people are not published for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution, and the numbers of people are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Rates by remoteness and socioeconomic status

Figure 6.6: Number of people dispensed 5 or more medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Squares (■) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of people are not published for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution, and the numbers of people are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Polypharmacy, 75 years and over

Resources

- Australian Commission on Safety and Quality in Health Care, *Medication safety*[63], safetyandquality.gov.au/our-work/medication-safety
- NSW Clinical Excellence Commission, *A guide to medication reviews for NSW health services 2019*[64], cec.health.nsw.gov.au/keep-patients-safe/medication-safety/continuity-of-medication-management/medication-review
- Pharmaceutical Society of Australia. *Guidelines for comprehensive medication management reviews (2020)*[65], psa.org.au/mmg/
- National Institute for Health and Care Excellence (UK), *Multimorbidity and polypharmacy*[19], nice.org.uk/advice/ktt18/chapter/evidence-context#polypharmacy
- National Institute for Health and Care Excellence (UK), *Multimorbidity: clinical assessment and management*[66], nice.org.uk/guidance/ng56
- National Institute for Health and Care Excellence (UK), *Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes*[67], nice.org.uk/guidance/ng5
- American Geriatrics Society, 2019 Updated AGS Beers criteria® for potentially inappropriate medication use in older adults[24]
- American Geriatrics Society Expert Panel on the Care of Older Adults with Multimorbidity, Guiding principles for the care of older adults with multimorbidity: An approach for clinicians[68]

Australian initiatives

The information in this chapter will complement work already under way to minimise harms from polypharmacy in Australia. At a national level, this work includes:

- NHMRC Cognitive Decline Partnership Centre, University of Sydney, Australian Deprescribing Network, NPS MedicineWise, development of recommendations for a national strategic plan to reduce inappropriate polypharmacy[34]
- NPS MedicineWise, Keeping a medicines list[69], nps.org.au/consumers/keeping-a-medicines-list
- Society of Hospital Pharmacists of Australia, Standard of practice in geriatric medicine for pharmacy services[70]
- The Veterans MATES program, funded by the Australian Government Department of Veteran's Affairs[37], veteransmates.net.au/
- EVOLVE[62] and Choosing Wisely Australia[5] – includes advice about recognising and avoiding prescribing cascades, deprescribing medicines when they are no longer needed, and not prescribe medicines to people already taking five or more medicines without first undertaking a comprehensive review to ensure use of all medicines is necessary
- National Aged Care Mandatory Quality Indicator Program – quality indicator requiring that, from 1 July 2021, all Commonwealth-subsidised residential aged care facilities are to report on polypharmacy as part of optimising medicines use.[71]

Many state and territory initiatives are also in place, including:

- Deprescribing guides and resources for clinicians and consumers, developed by a translational research project team lead by Prof Sarah Hilmer, available from NSW Therapeutic Advisory Group website[72], nswtag.org.au/deprescribing-tools/
- Resource Kit for Measuring Strategies to Reduce Harm from Polypharmacy in Australian Hospitals: QUM Indicators, Patient Reported Experience Measures and Risk Stratification Tools, NSW Therapeutic Advisory Group[73], nswtag.org.au/polypharmacy-qum-indicators-and-resources/
- The Goal-directed Medication review Electronic Decision Support System; tools include the Goals of Care Management Tool, the Drug Burden Index Calculator, and the revised Patients' Attitudes Towards Deprescribing questionnaire[74]
- Polypharmacy in older inpatients elearning module, Health Education and Training Institute, NSW[75], heti.nsw.gov.au/education-and-training/courses-and-programs/polypharmacy-in-older-inpatients-
- The Statewide Frailty Initiative, Agency for Clinical Innovation, NSW[76]
- Managing medicines, Primary Health Tasmania[77], primaryhealthtas.com.au/for-health-professionals/programs/managing-medicines/
- Standardised Care Process for Polypharmacy Management in Residential Aged Care, Department of Health and Human Services, Victoria[56], health.vic.gov.au/ageing-and-aged-care/residential-aged-care/safety-and-quality/improving-resident-care/standardised-care-processes
- Quality indicator to monitor the proportion of residents using nine or more medicines, Department of Health and Human Services, Victoria[78], health.vic.gov.au/about/publications/policiesandguidelines/section-3-indicator-4-use-of-nine-or-more-medicines
- Improving medication reconciliation in community settings pilot, Pharmacy Guild of Victoria.[79]

Polypharmacy, 75 years and over

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6.2 Medication management reviews, 75 years and over

Why is this important?

A medication management review (MMR) is a comprehensive, structured assessment of a person's medicines. It aims to help people get the most benefit from their medicines and minimise their risk of experiencing medicines-related harm.[1,2]

Residential Medication Management Review (RMMR) and Home Medicines Review (HMR) are types of MMR for people living in an aged care facility, or at home, respectively, who are at risk of experiencing a medicines-related problem.

Most people who receive RMMRs and about half of those who receive HMRs are aged 75 years and over.[3] Many older people have several chronic diseases and need to take multiple medicines (polypharmacy) to manage them.[4] However, polypharmacy, frailty and age-related changes in the way the body responds to medicines increase the risk of medicines-related harm in older people.

RMMRs and HMRs are effective at detecting and resolving a variety of medicines-related problems[5,6], but the appropriate rate of MMR services for older people is unclear.

The fourth Atlas examines rates of people aged 75 years and over who had at least one Medicare Benefits Schedule (MBS)-subsidised service for an RMMR or HMR in Australia, in 2018–19.

What did we find?

About 5.4% of people aged 75 years and over had at least one MBS-subsidised service for an RMMR or HMR in 2018–19. The rate was **11.7 times as high** in the area with the highest rate compared to the area with the lowest rate.

Rates were generally higher in major cities than in other areas. Rates generally increased with socioeconomic disadvantage in major cities and outer regional areas. Patterns were similar to those of polypharmacy in many areas, suggesting appropriate targeting of MMRs in some but not in all areas.

What can be done?

RMMRs are recommended for new residents in aged care facilities, and for existing residents after changes in clinical condition or medicines.[7-9] System changes are needed to drive implementation of these recommendations across aged care facilities.[10]

Recent changes to funding arrangements to improve access to RMMR and HMR services in rural and remote areas should be evaluated for their effectiveness.[11]

Initiatives to improve medical practitioner uptake of pharmacist recommendations following MMRs should be a priority. One such initiative is the development of medication review indicators for aged care facilities.

Medication management reviews, 75 years and over

Context

This item examines the rate at which people aged 75 years and over obtained at least one MBS-subsidised service for an MMR (RMMR or HMR) in Australia in 2018–19.

What is a medication review?

An MMR – also known as a medication management review or medicines review – is a comprehensive and structured assessment of a person's medicines. The aim of an MMR is to help people get the maximum benefit from their medicines and to prevent medicine-related harm.[1,2]

This item examines rates of two types of MMR services that are funded under the MBS and dedicated Australian Government programs[12]:

- Residential Medication Management Review (RMMR)* – available to people living in an eligible Australian Government–funded aged care facility
- Home Medicines Review (HMR)†, also known as Domiciliary Medication Management Review – available to people living in their own home.

RMMR and HMR services have been available to Australians since 1997 and 2001 respectively.[13,14] They are effective in detecting medicine-related problems[5,6] and are commonly conducted for older people because older people have high rates of medicine-related problems and are particularly vulnerable to harms from medicines.[15-18] About 86% of all RMMRs and about half of all HMRs were for people aged 75 years and over in 2018–19.[3]

Use of multiple medicines (polypharmacy) is common among older people. This is largely because the prevalence of chronic diseases that are managed with medicines increases with ageing.[4,15,19] About two-thirds of Australians aged 75 years and over living at home are taking five or more medicines.[16] In residential aged care facilities, up to 95% of residents take five or more medicines, with 25% taking 10 or more.[20]

Older people often need to take many medicines, but are very susceptible to harms from medicines because of frailty and age-related changes in the way their bodies respond to medicines.[21] Polypharmacy increases the risk of medication-related harm, and leads to increased hospital admissions.[4] There are also risks associated with specific medicines that can be especially harmful for older people.[4,21] Over half the people living in aged care facilities are prescribed medicines that are considered potentially inappropriate in older people, and for which use should be avoided if possible.[21,22]

Rules and guidelines for conducting RMMR and HMR

RMMR and HMR services are carried out in a collaborative and structured way involving the patient, their medical practitioner (usually a general practitioner [GP]), an accredited pharmacist and sometimes carers and other clinicians. There are three key steps involved in conducting a review[1,23,24]:

1. Based on criteria for a review and risk factors for medicines-related harm, a medical practitioner identifies and assesses whether a patient will benefit from an MMR. With the patient's consent, the practitioner refers them to an accredited pharmacist – that is, a pharmacist who has undergone the required training in this area – to conduct the review.
2. The accredited pharmacist conducts the review together with the patient, and consults with other people such as carers and other members of the healthcare team. The pharmacist assesses the risks and benefits of each medicine, the complexity of the regimen and how the person is managing their medicines. They identify ways to resolve any medicine-related problems, and make recommendations about ongoing therapy in a report, which they send to the referring medical practitioner.
3. The referring practitioner reviews the report with the patient. The report forms the basis of an agreed-upon medicines management plan.

* MBS item numbers 903 and 249
† MBS item numbers 900 and 245

Several rules and guidelines ensure that RMMR and HMR services are appropriately provided to people who may benefit from them while avoiding inappropriate reviews. These rules include the MBS criteria for medical practitioners[7,25], the RMMR and HMR program rules for accredited pharmacists[23,24], and other guidelines.[1,8,26,27] The rules set out how to identify whose medicines to review, and how and how often to perform reviews, which can affect rates of RMMR and HMR services.[5,6]

A person's need for an HMR is assessed according to a variety of risk factors for medicines-related harm or suboptimal use, such as whether they[25]:

- Are taking five or more medicines regularly
- Are taking more than 12 doses of medicine per day
- Are taking medicines that have a small difference between doses that are safe and doses that can be harmful (narrow therapeutic index)
- Are attending different doctors
- Have been discharged from a facility or hospital in the last four weeks
- Have difficulty managing their medication regimens because of literacy or language difficulties, physical difficulties – such as poor dexterity or impaired sight – or cognitive difficulties – such as confusion or dementia
- Are managing significant changes made to their medicines in the last three months
- Are experiencing symptoms suggestive of an adverse drug reaction
- Are displaying suboptimal responses to treatment with their medicines
- Are suspected of having problems with adhering to their medicines or problems managing medicine-related therapeutic devices – for example, inhalers for asthma.

A person's need for an RMMR is based on whether they are[7]:

- A new resident to an aged care facility
- An existing resident who has had a significant change in their medical condition or medicines.

It is recommended that new residents of an aged care facility receive an RMMR as soon as possible after admission, and that it is completed within four weeks.[7] Under the program rules, a patient cannot receive another RMMR or HMR from a pharmacist within 24 months of an initial review. However, they can be referred by a medical practitioner within that period if there is a clinical need – for example, if there has been a change in their clinical condition or their medicines. Since April 2020, a patient can also receive two follow-up services to deal with any medicine-related problems identified at the initial RMMR or HMR.[11,23,24]

Medical practitioners' services are claimed through the MBS item numbers examined in this report. Medical practitioners can refer a person within 12 months of an earlier RMMR or HMR or at any time if there is a clinical need.[7,25] The HMR program had a cap of 20 HMR services per month per accredited pharmacist until March 2020, when the cap was increased to 30; there is no cap for RMMR services.[11,23,24]

Other types of MMRs

RMMRs and HMRs are not the only types of medication reviews that patients may be offered. Medication reviews are conducted by all hospitals and other health services as a requirement under the National Safety and Quality Health Service Standards.[28] Some health services also offer hospital outreach medication review services to improve medicines management during transitions of care to the community following a hospital stay.[29] GPs may conduct a medication review as part of a general consultation or chronic disease management service.[30] Community pharmacists may also conduct medication reviews outside of the HMR and RMMR arrangements. Examples include pharmacist services contracted by aged care facilities, and in-pharmacy MedsCheck and Diabetes MedsCheck services.[2]

Medication management reviews, 75 years and over

Effectiveness of RMMR and HMR

RMMRs and HMRs are effective in detecting medicine-related problems in older people.[5,6,31-33] Up to 98% of older people in Australian studies have at least one medicine-related problem detected at the time of a medicines review, with most having three[20,34-37], and some as many as five.[35] In Australian residential aged care facilities, over 95% of residents have at least one medicine-related problem detected at the time of review.[9,21,38-42] On average, three to four problems are identified per resident at the time of review.[21,43] The problems most commonly identified at the time of an RMMR or HMR are[20,31,32,43]:

- Inappropriate prescribing of medicines
- Prescribing of medicines that are no longer needed
- Not prescribing a medicine that is needed
- Failure to adhere to medicines regimens
- Lack of laboratory monitoring
- Adverse reactions to medicines.

HMRs can reduce the number of medicines prescribed[6,44], improve appropriateness of prescribing[6], and improve a person's understanding and adherence to medicines[6,32] and their confidence in managing their medicines.[6,13] RMMRs are effective in identifying and stopping medicines that are known to cause sedation and increase the risk of falls.[5] Like HMRs, they are effective in improving the appropriateness of prescribing and reducing the number of medicines prescribed.[5]

In studies of Australian war veterans, HMRs delayed hospitalisation in certain patient groups, such as people with heart failure and people taking warfarin.[45,46]

Improvements in management of chronic diseases, such as diabetes, have been shown when other types of medication reviews are conducted by pharmacists in community settings such as GP clinics, community pharmacies, and outpatient and specialist clinics.[47]

More research is needed to find out whether and how RMMRs and HMRs improve quality of life and reduce risk of hospital admissions associated with adverse medicine events – for example, by preventing a drug interaction that could lead to clinical deterioration.[5,6,44,48,49]

Factors influencing effectiveness of RMMR and HMR

GPs' uptake of recommendations to resolve medicine-related problems identified during reviews is variable. For example, the extent of collaboration between the GP and the pharmacist conducting the review affects acceptance and implementation of recommendations.[48,50]

The likelihood of accepting and implementing recommendations from HMRs has been reported to range between 17% and 86%[50], despite recommendations being based on evidence.[1]

Similar variability has been reported in studies examining the impact of RMMR, with 45% to 84% of recommendations accepted by GPs in a recent Australian systematic review.[43]

Rates of RMMR and HMR in Australia

A large-scale study in New South Wales of Pharmaceutical Benefits Scheme concession card holders examined HMR use in people aged 45 years and over between 2009 and 2014.[51] In this study, 5.2% of people aged 75 years and over had at least one HMR. Even in groups associated with high-risk prescribing, rates were still generally below 10%. Rates increased with age, and were higher in people receiving more medicines and in people who had recently been discharged from hospital.[51] Higher rates of HMR were found in smokers, people with obesity, and people with diabetes and broader health issues such as impaired physical functioning.[51] Living in a rural or remote area, having a lower level of education, and lower household income were also associated with higher rates of HMR services.[51]

Earlier studies of HMR conducted in older Australians reported participation rates ranging from 3.6% to 5.5%.[52-54] Rates increased with age and were higher in women, people taking more medicines, people who had more visits to a GP, people who had had a previous review, and people who had had a hospital admission. Rates were lower in people who used more dispensing pharmacies, had more specialist visits, and were at greater socioeconomic advantage.[52]

Studies of Australian aged care facilities found that less than half of residents received a RMMR in 2013–14.[55-56] Less than 22% of new residents received a timely RMMR between 2012–2015 in a study of residents in aged care homes.[57]

Why map rates of RMMR and HMR?

RMMRs and HMRs can detect and resolve medicine-related problems and improve medicines use in older people, but uptake of services has stabilised despite Australia's ageing population.[5,6,51,57] Appropriate rates for RMMR and HMR services are unclear. Mapping rates of MMR is one way of exploring the appropriate use of these services.

About the data

Data are sourced from the MBS dataset. This dataset includes information on MBS claims processed by Services Australia. It covers a wide range of services (attendances, procedures, tests) provided across primary care and hospital settings.

The dataset does not include:

- Services for publicly funded patients in hospital
- Services for patients in hospital outpatient clinics where claims are not made to the MBS
- Services covered under the Department of Veterans' Affairs arrangements.

The dataset does not allow analysis by Aboriginal and Torres Strait Islander status.

The dataset includes the MBS claims for RMMR or HMR services provided by medical practitioners. These claims are made after the accredited pharmacist conducts the review and the medical practitioner discusses it with the patient. Claims made by accredited pharmacists for conducting the review are funded under the Community Pharmacy Agreement, which is a separate dataset.

Rates are based on the number of people who had at least one MBS-subsidised service for a medication management review (RMMR or HMR) per 100,000 people aged 75 years and over in 2018–19. Patient counts reflect the number of unique patients, regardless of the number of services a patient may have received in the year.

The analysis and maps are based on the patient's postcode recorded in their Medicare file and not the location of the service.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Medication management reviews, 75 years and over

For all MBS items in the Atlas, some data have been suppressed to manage volatility and confidentiality. This process takes into account the Australian Government Department of Health's requirements for reporting MBS data (see the Technical Supplement). Data suppression for this item has been extensive, and affects all of the Northern Territory, and remote areas of Western Australia and Queensland. Reporting for the Northern Territory was possible at the territory level. Most local areas (Statistical Area Level 3 – SA3) were suppressed to prevent identification of the provider (practitioner or business entity). This is indicated on the maps in grey.

What do the data show?

Magnitude of variation

In 2018–19, 96,533 people aged 75 years and over had at least one MBS-subsidised service for a medication management review (RMMR or HMR), representing 5,392 people per 100,000 people aged 75 years and over (the Australian rate).

The number of people who had at least one MBS-subsidised service for a medication management review (RMMR or HMR) across 314* local areas (Statistical Area Level 3 – SA3) ranged from 1,618 to 19,006 per 100,000 people aged 75 years and over. The rate was **11.7 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of people varied across states and territories, from 1,224 per 100,000 people in Northern Territory to 7,037 per 100,000 people in Tasmania. (Figures 6.7–6.10).

After the highest and lowest 10% of results were excluded and 252 SA3s remained, the number of people per 100,000 people was 2.0 times as high in the area with the highest rate compared to the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates for medication management reviews were generally higher in major cities than elsewhere. Rates generally increased with socioeconomic disadvantage in major cities and in outer regional areas. There was unclear patterning elsewhere (Figure 6.11).

Analysis by age group

In 2018–19, 45,592 people aged 75–84 years had at least one medication management review, representing 3,896 people per 100,000 people (the Australian rate for this age group).

In 2018–19, 49,665 people aged 85 years and over had at least one medication management review, representing 10,180 people per 100,000 people (the Australian rate for this age group).

Data and graphs for analysis by age group and analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, data were suppressed for 26 SA3s due to one or more of a small number of services or population in an area, or potential identification of individual patients, practitioners or business entities.
Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.

Interpretation

The Atlas found that about 5.4% of people aged 75 years and over had at least one MBS-subsidised MMR in 2018–19. This equates to about 1 in 7 people aged 75 years and over with polypharmacy (people dispensed five or more medicines) receiving an MMR in the year. While not all people with polypharmacy may need an MMR and some people with polypharmacy may receive a medication review that is not counted in MBS data, this ratio may be helpful in monitoring changes in MMR use. MBS statistics for the same period show that 62.5% of MBS-subsidised MMR services processed for people aged 75 years and over were RMMRs and the remaining 37.5% were HMRs.[3]

Rates for medication management reviews were higher in major cities, which raises concern about access in other areas, a finding previously highlighted in HMR program evaluations.[64] Data suppression was extensive in remote areas and must be considered in the interpretation of the findings.

Rates were higher in socioeconomically disadvantaged areas of major cities, which is consistent with previous Australian research and suggests appropriate targeting of MMRs in these areas.[6,52]

Possible reasons for variation in rates of MMR

Variation between areas may not directly reflect the practices of the clinicians who are based in those areas. The analysis is based on where people live rather than where they obtain their health care. Patients may travel outside their local area to receive health care.

Variation in rates is likely to be due to the geographical differences in the factors discussed below.

Patient need

Variation is warranted when it reflects patient need. Nationally, higher rates of MMR were seen in people aged 85 years and over than in people aged 75–84 years, which is consistent with higher polypharmacy rates seen in the older age group.

Because the data are age and sex standardised – to control for differences in population structures between areas – variation in rates cannot be explained by higher proportions of older people. However, areas with aged care homes would be expected to have higher rates than areas without, given the higher numbers of RMMRs compared to HMRs.[3]

Areas with higher rates of underlying chronic disease are expected to have higher rates of polypharmacy. Higher rates of MMR are likely in these areas, given MMRs are recommended for people taking five or more medicine.[7,25] High rates of MMRs observed in some disadvantaged areas may reflect the prevalence of multimorbidities and risk factors for chronic disease in these areas.

Access to services

The number of clinicians providing services in the area, and the ability to see a specific clinician, may influence the likelihood of people seeking care and therefore rates of MMR. The practice styles of individual clinicians may be more likely to affect rates in areas with fewer clinicians, such as rural and regional locations, than in areas with more clinicians.

In particular, the number of accredited pharmacists providing MMRs, and ease of access to them, may affect rates. This may be an issue in rural and remote areas, where there may be fewer accredited pharmacists available to provide services compared to major cities.[6,13,58]

Medication management reviews, 75 years and over

The program rules for MMR services may also affect access.[5,6] The program cap of 20 (now 30) HMR services per month per accredited pharmacist may disproportionately affect participation rates in rural areas because there are fewer accredited pharmacists in these areas.[6] Differences in providers' perceptions of the program rules (for example, that the rules are stringent) could also influence rates in some areas.[5,6] The 24-month restriction on patients receiving another review and introduction of a 30-day deadline to submit claims had an immediate and lasting influence on overall rates of RMMR when introduced in 2014.[5]

Knowledge of MMR processes by clinicians, as well as time taken to generate referrals, previous experience with referrals and the strength of working relationships between medical practitioners and accredited pharmacists may influence rates of MMRs.[51,59]

Rates of MMRs may also be influenced by rates of other medication reviews conducted in the community, such as reviews conducted by GPs (for example, as part of routine consultations, or as part of a health assessment for people aged 75 years and over[30], or as part of a chronic disease management plan), and medication reviews conducted by community nurses and community pharmacists outside the RMMR and HMR programs.

Clinical decision-making

Variation in medical practitioners' views on the benefits of MMRs is a likely contributor to the variation seen.[13,59]

Most GPs are supportive of MMR services[59,60], with general agreement that they reduce inappropriate polypharmacy and potentially improve medicine safety, as well as a person's understanding of and adherence to medicines regimes.[31,60] GPs have also reported that MMRs provide helpful insights into all the medicines a person is taking – including complementary and over-the-counter medicines.[60]

However, not all GPs are convinced of their value.[13,59] Some believe they don't offer any new insights about a person's medicines or provide clinically significant recommendations.[59] The complexity of the process, time constraints, and the volume of paperwork associated with reviews, as well as inconsistencies in the format and quality of reports generated by pharmacists have been cited by GPs as barriers to participation in MMR services.[13,60,61]

Consumer awareness

Consumer awareness of MMR services, their level of comfort in having a pharmacist visit them at home and their attitude towards medication reviews may affect rates.

A study of older people living in regional Australia taking five or more different medicines showed 15% were aware of HMR services.[62] Reasons for lack of awareness included not being informed about the services by GPs or pharmacists, and not seeing leaflets or advertising material relating to HMRs.

Not knowing the pharmacist who is providing the service has been reported by GPs as a barrier for people when deciding whether to participate in an HMR, as they feel uncomfortable having a stranger in their home conducting the review.[60]

The level of concern a person has about their medicine may influence rates. In one Australian study, people aged 75 years and over at high risk of medicine-related harm were least likely to worry about their medicines and participate in an MMR.[63]

A clinician's ability to be clear about the benefits of MMRs may also influence whether a person will have a review.[13,59]

People's attitudes towards MMR may affect rates. Some people associate a sense of independence with managing their own medicines, and so they may perceive an MMR as a sign of losing independence.[13]

Promoting appropriate care

System changes are needed to improve access to MMRs for older people who are at risk of medicine-related harm and likely to benefit from a review.

RMMRs are recommended for new residents on admission to aged care facilities and existing residents after changes in their clinical condition or medicines.[7-9] However, compliance to this recommendation is poor. A national study of 143,676 people aged 65 years and over who first entered permanent residential aged care in Australia between January 2012, and December 2015 found that 21.5% received an RMMR within 90 days. In only 6.2% of the aged care facilities did more than 50% of new residents receive a timely RMMR.[57]

The recommendation for use of RMMR was reiterated in the 2017 review of national aged care quality regulatory processes[9] and in the 2021 final report on the Royal Commission into Aged Care Quality and Safety.[10] More needs to be done to implement the recommendation.

Other priorities to improve the appropriate use of MMRs include:

- Improving access to MMR services in rural and remote areas
- Improving medical practitioner uptake of pharmacist recommendations following MMRs.

To deal with these concerns, regulatory changes to the RMMR and HMR programs were introduced in early 2020.[11,23,24] Key changes included expanding referral of RMMRs and HMRs to medical practitioners other than GPs, increasing the number of HMR services accredited pharmacists can provide from 20 to 30 per month, and allowing up to two services after an initial review for follow-up of recommendations made in the pharmacist's initial report. Improving access to RMMR or HMR following a hospital stay may also reduce medicine-related problems, especially within the first 10 days of discharge from hospital.[13,14] Frameworks have been developed to support medical practitioners in hospital to identify and refer people at high risk of medicine-related harm following a hospital stay for an RMMR or HMR.[64] These changes must be evaluated for their effectiveness.

Audit and monitoring

The development of medication review indicators for aged care facilities could help support the appropriate use of RMMR. Indicators could measure the proportion of people taking five or more medicines who receive a review[9], the percentage of people who receive a timely review on admission to an aged care facility, or the percentage of pharmacist recommendations that are acted on.

Improving collaboration between pharmacists and GPs

Team-based models of general practice that include pharmacists could improve collaboration between GPs and pharmacists and increase the likelihood that a pharmacist's recommendations are acted upon. While these models are well established internationally, more research regarding their effectiveness in the Australian is needed.[65]

Good working relationships between GPs and pharmacists conducting reviews have been found to influence uptake of MMR services by GPs. Some have reported that the role of HMR may be limited in major cities by a lack of opportunity to build relationships between GPs and pharmacists.[59] GPs that interact with pharmacists throughout the review process are more likely to initiate reviews and implement recommendations than those who do not, highlighting the importance of collaboration.[48,50] Australian research has shown that greater collaboration between GPs and pharmacists conducting HMRs can improve management or resolve up to 81% of identified medicine-related problems.[31] Changes to RMMR and HMR programs that allow pharmacists to conduct two follow-up reviews could improve collaboration between GPs and pharmacists.

Medication management reviews, 75 years and over

Use of evidence based-tools to support reviews

Electronic decision support tools have been found to be an important adjunct in clinical decision-making for pharmacists conducting MMRs.[66] However a person's individual needs and preferences for treatment must also be taken into account by the pharmacist or reviewer when assessing recommendations generated by these tools.[67]

The Goal-directed Medication review Electronic Decision Support System provides clinical decision support to clinicians conducting medication reviews, and has been shown to be useful when conducting an HMR.[68] Research is continuing to examine the effect of the tool on clinical outcomes.[69]

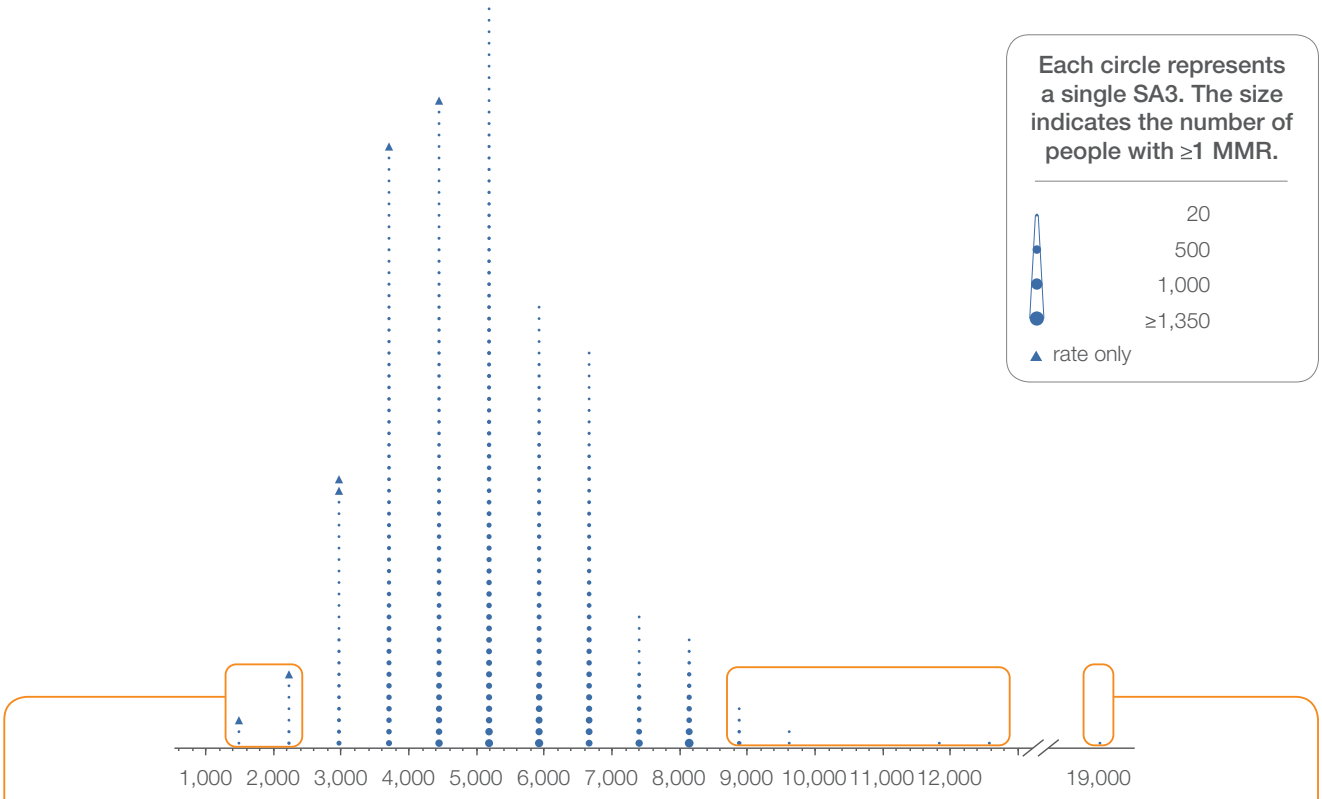
Tools to support simplification of medicine regimens for residents of aged care facilities have also been developed and validated.[70] The MRS GRACE Tool helps pharmacists identify how to reduce the complexity of a resident's regimen. The tool has been shown to be especially useful in those taking five or more medicines a day. In two-thirds of residents, medicines can be taken in a simpler way without changing the goals of therapy. High rates of acceptance and implementation of recommendations have been found, with some recommendations – such as reducing the number of medicine times – implemented in 62% of residents, as well as sustained results 12 months later at follow-up.[71]

Consumer awareness

Improved consumer awareness about programs aimed at improving their ability to manage their medicines and the benefit of MMR services could support uptake[62], particularly of HMRs. Consumer research has found that people are more likely to participate in a review if they understand the reasons for having one, and their GP thinks it will be beneficial.[13,59]

Rates by local area

Figure 6.7: Number of people who had at least one MBS-subsidised service for a medication management review (MMR) per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Lowest rate areas

SA3	State	Rate	People with ≥1 MMR
Esperance	WA	**1,618**	20
Snowy Mountains	NSW	**1,636**	28
Augusta - Margaret River - Busselton	WA	**1,973**	n.p.
Manjimup	WA	**2,232**	43
Albany	WA	**2,351**	129
Tablelands (East) - Kuranda	Qld	**2,400**	93
Bunbury	WA	**2,510**	176
Cottesloe - Claremont	WA	**2,724**	199
Weston Creek	ACT	**2,783**	n.p.
Tumut - Tumbarumba	NSW	**2,843**	41

Highest rate areas

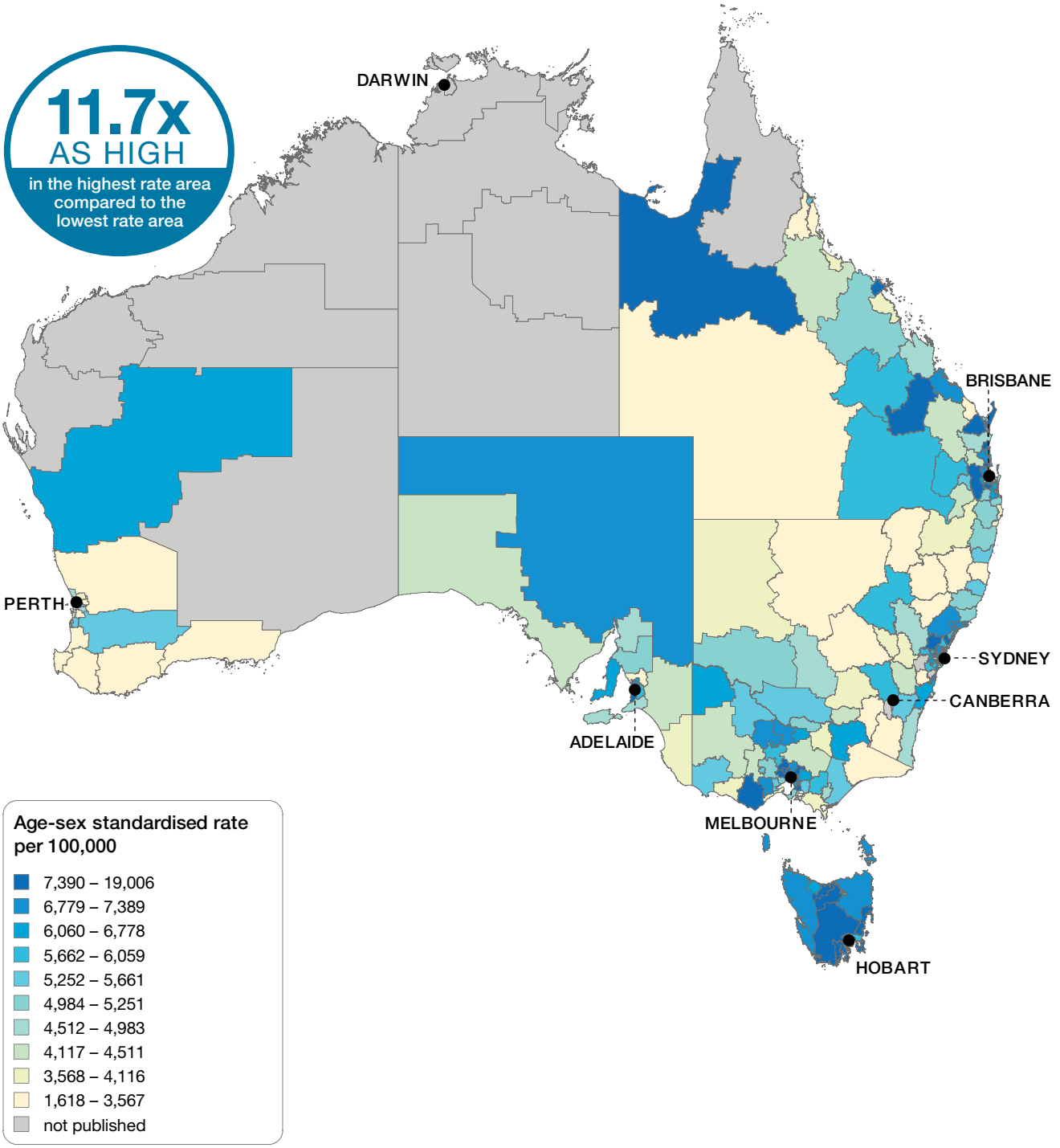
SA3	State	Rate	People with ≥1 MMR
Central Highlands (Tas.)	Tas	**19,006**	116
Jimboomba	Qld	**12,816**	151
South East Coast	Tas	**11,899**	92
Gungahlin	ACT	**9,952**	145
Brighton	Tas	**9,706**	67
Macedon Ranges	Vic	**9,561**	166
Noosa Hinterland	Qld	**9,309**	128
Colac - Corangamite	Vic	**9,158**	348
Sunbury	Vic	**9,028**	216

Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of people are not published (n.p.) for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Medication management reviews, 75 years and over

Rates across Australia

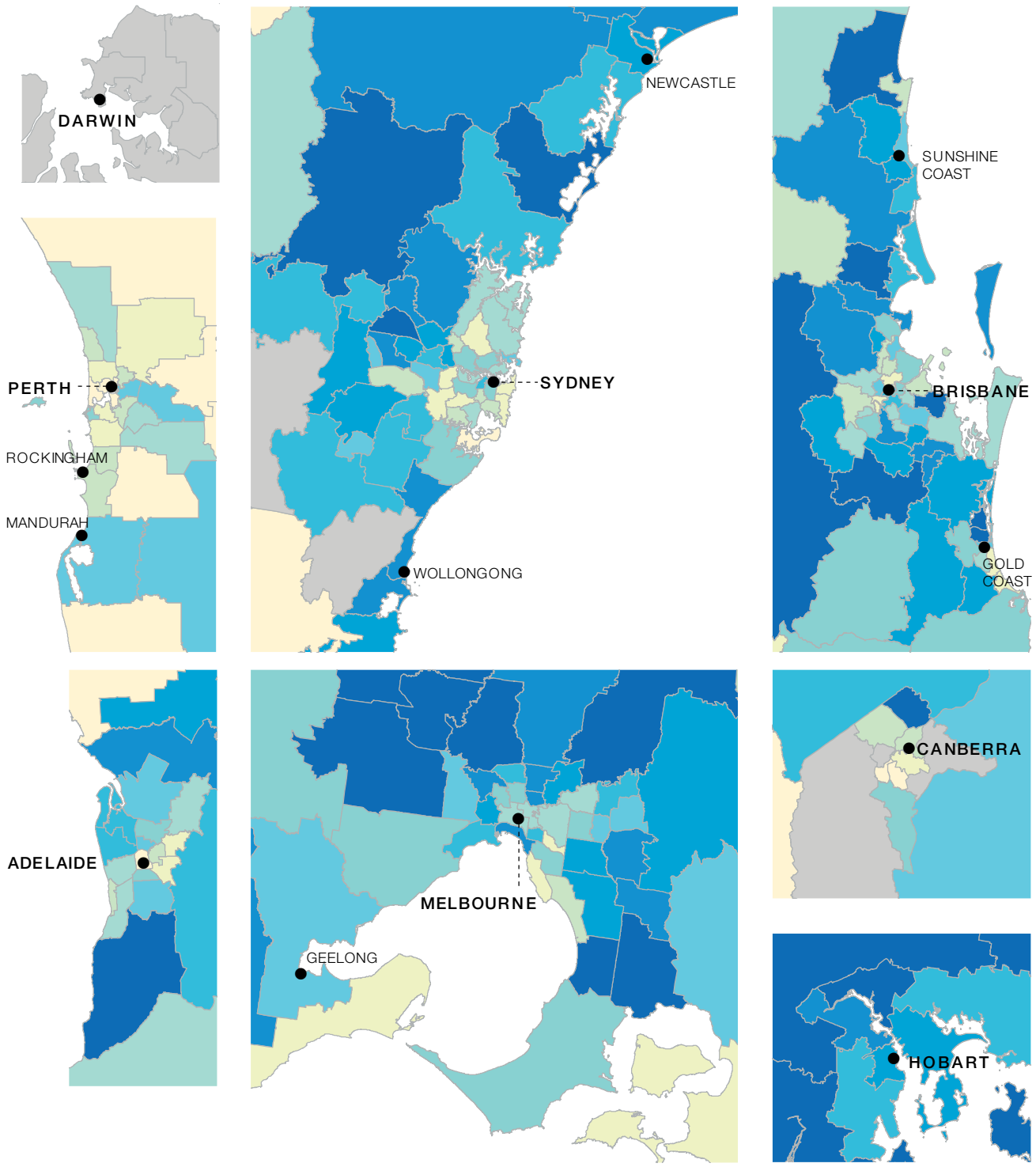
Figure 6.8: Number of people who had at least one MBS-subsidised service for a medication management review per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Rates across capital city areas

Figure 6.9: Number of people who had at least one MBS-subsidised service for a medication management review per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



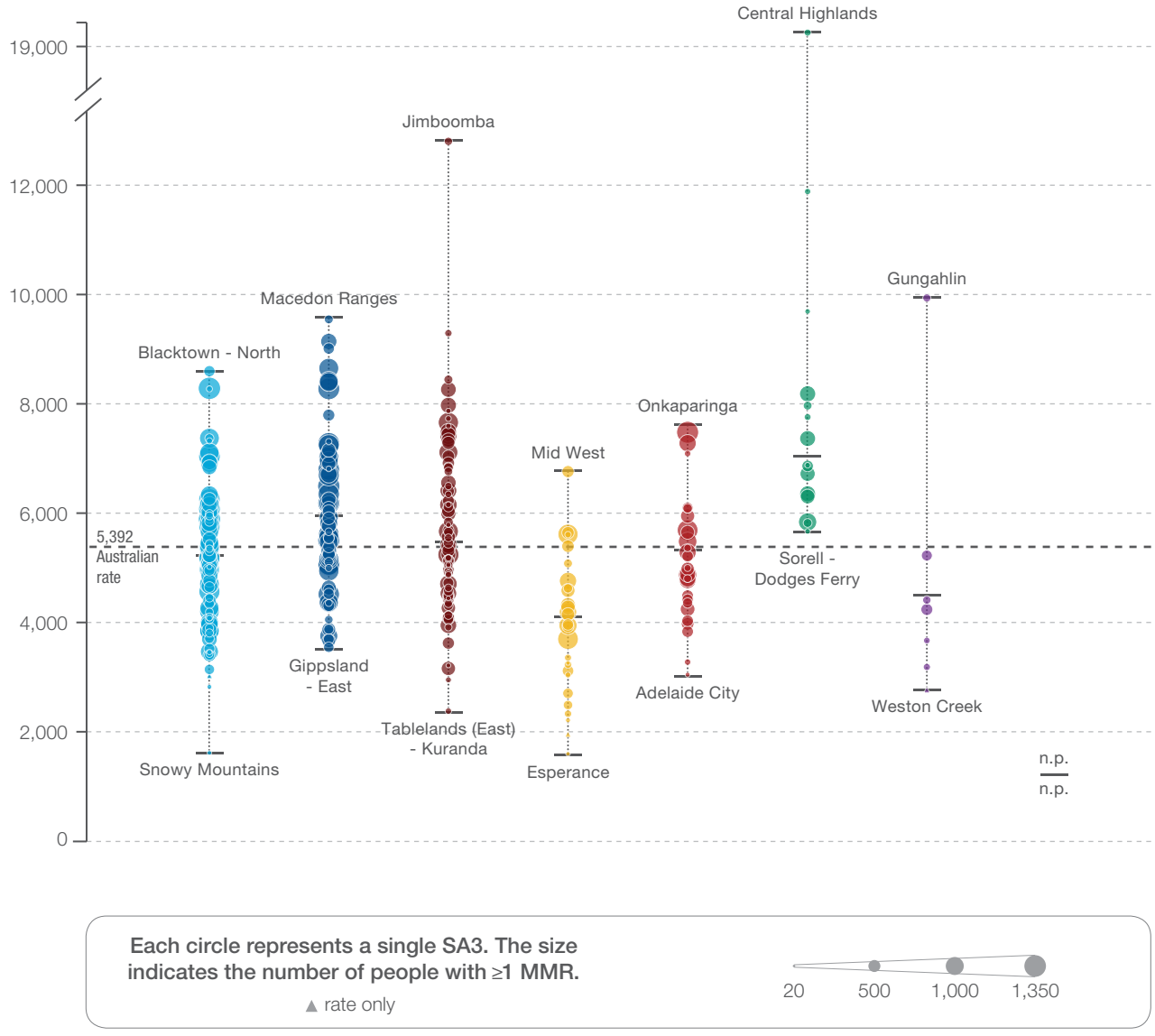
Notes:
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Medication management reviews, 75 years and over

Rates by state and territory

Figure 6.10: Number of people who had at least one MBS-subsidised service for a medication management review (MMR) per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19

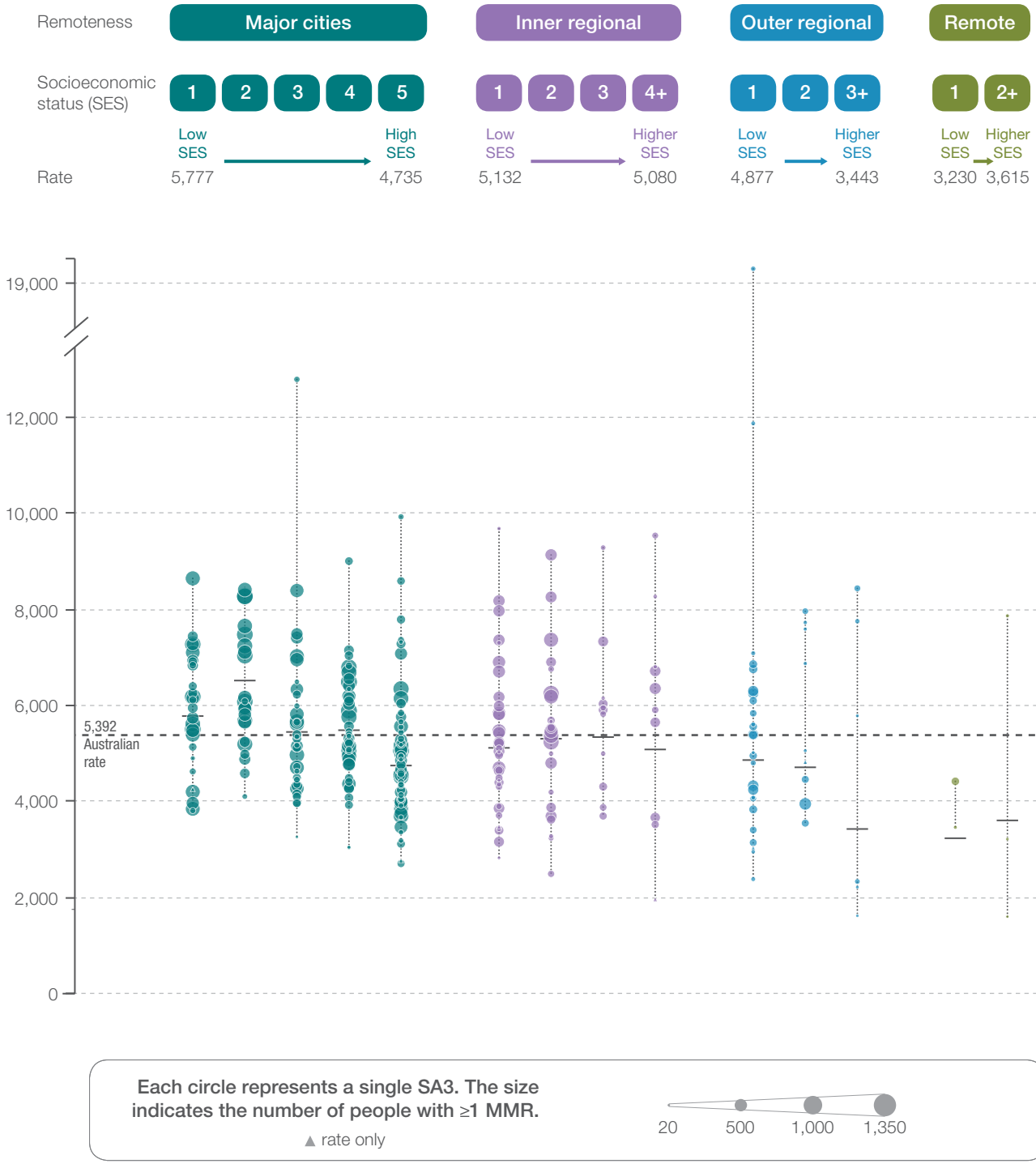
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	8,614	9,561	12,816	6,778	7,497	19,006	9,952	n.p.
State/territory	5,233	5,937	5,481	4,119	5,315	7,037	4,524	1,224
Lowest rate	1,636	3,567	2,400	1,618	3,065	5,684	2,783	n.p.
Total patients	31,667	27,725	18,006	6,728	8,180	3,132	1,030	60



Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of people are not published (n.p.) for confidentiality reasons.
Rates for SA3s in the NT are not published for reliability and/or confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018.

Rates by remoteness and socioeconomic status

Figure 6.11: Number of people who had at least one MBS-subsidised service for a medication management review (MMR) per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Triangles (▲) indicate SA3s where only rates are published. The numbers of people are not published for confidentiality reasons.
For Remote and SES of 1, the remoteness and SES rate is lower than the minimum SA3 rate as it includes SA3 rates that are not published for reliability and/or confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2018

Medication management reviews, 75 years and over

Resources

- Australian Government Department of Health. Medication management reviews[12], health.gov.au/internet/main/Publishing.nsf/Content/medication_management_reviews.htm
- Australian Government Department of Health. *Program Rules: Home Medicines Review*[23], ppaonline.com.au/wp-content/uploads/2019/01/HMR-Program-Rules.pdf
- Australian Government Department of Health. *Program Rules: Residential Medication Management Review and Quality Use of Medicines*[24], ppaonline.com.au/wp-content/uploads/2019/01/RMMR-and-QUM-Program-Rules.pdf
- Pharmaceutical Society of Australia. *Guidelines for Quality Use of Medicines (QUM) Services (2020)*[27], psa.org.au/mmg/
- Pharmaceutical Society of Australia. *Guidelines for Comprehensive Medication Management Reviews (2020)*[1], psa.org.au/mmg/
- Australian Government Department of Health. *Guiding Principles for Medication Management in the Community*[72], health.gov.au/internet/main/publishing.nsf/Content/Publications-16
- Australian Government Department of Health. *Guiding Principles for Medication Management in Residential Aged Care Facilities*[8], health.gov.au/internet/main/publishing.nsf/Content/Publications-16
- Australian Government Department of Health. *Guiding Principles to Achieve Continuity in Medication Management*[73], health.gov.au/internet/main/publishing.nsf/Content/Publications-16
- Australian Government Department of Health. *National Guidelines to Achieve the Continuum of Quality Use of Medicines Between Hospital and Community*[74], health.gov.au/internet/main/publishing.nsf/Content/Publications-16

Australian initiatives

Information in this chapter will complement work already under way in Australia regarding medication review and MMR services. At a national level this work includes:

- NPS MedicineWise, Managing your medicines – includes resources to getting an HMR and supporting patients with keeping a medicines list[75], nps.org.au/consumers/managing-your-medicines
- Society of Hospital Pharmacists of Australia. Hospital-initiated medication reviews (HIMR)[64]
- The Veterans MATES program, funded by the Australian Government Department of Veteran's Affairs[76], veteransmates.net.au/

Many state and territory initiatives are also in place to improve medication review and support uptake of MMR services, including:

- The Goal-directed Medication review Electronic Decision Support System tools include the Goals of Care Management Tool, the Drug Burden Index Calculator, and the revised Patients' Attitudes Towards Deprescribing questionnaire[77]
- Consumer information leaflet – *Rethink your medications*[78], Primary Health Tasmania, primaryhealthtas.com.au/wp-content/uploads/2018/06/Rethinking-Your-Medications-consumer-brochure.pdf
- *Standardised Care Process for Polypharmacy Management in Residential Aged Care*, Department of Health and Human Services, Victoria[54], health.vic.gov.au/ageing-and-aged-care/residential-aged-care/safety-and-quality/improving-resident-care/standardised-care-processes

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6.3 Proton pump inhibitor medicines dispensing, 75 years and over

Why is this important?

Proton pump inhibitor (PPI) medicines are one of the most commonly used medicines in Australia, particularly among older people. PPI medicines are highly effective in managing gastro-oesophageal reflux disease (GORD), but are often used long term without reassessment of need. Older people may be particularly susceptible to harms from long-term use. These harms include unnecessary complexity in medicine regimens, unnecessary costs and possible rare but serious adverse effects.

The *Third Australian Atlas of Healthcare Variation* found substantial variation in rates of PPI medicine use in people aged 18 years and over.

The fourth Atlas examines PPI medicine dispensing in people aged 75 years and over.

What did we find?

In 2018–19, more than 7.1 million Pharmaceutical Benefits Scheme (PBS) prescriptions were dispensed for a PPI medicine for people aged 75 years and over.

The rate was **5.9 times as high** in the area with the highest rate as in the area with the lowest rate.

Almost half (47%) of people aged 75 years and over had at least one PBS prescription dispensed for a PPI medicine; more than one-third (38%) had at least four prescriptions dispensed in the year, suggesting long-term PPI medicine use.

There was substantial variation in rates of dispensing of high-dose PPI medicines between Primary Health Networks (PHNs). The rate was 6.1 times as high for the PHN with the highest rate as for the PHN with the lowest rate.

What can be done?

Increased PBS restrictions for prescribing PPI medicines for GORD, introduced in May 2019, should help to reduce inappropriate long-term use, particularly of high-dose PPI medicines.

Interventions that actively engage clinicians and encourage them to regularly review the need for PPI medicines in older people remain a priority. A greater focus is needed on educating people at every suitable opportunity about lifestyle measures that can be taken to reduce reflux. Improved consumer awareness of the appropriate timing of PPI medicine dosing may also improve the effectiveness of treatment and reduce the need for higher doses or long-term use.

Proton pump inhibitor medicines dispensing, 75 years and over

Context

This item examines PPI medicine dispensing for people aged 75 years and over in Australia in 2018–19.

PPIs are a group of medicines that reduce stomach acid production.[1] They reduce the potential for reflux of stomach acid into the oesophagus, and promote healing of inflammation and ulcers in both the oesophagus and the stomach. PPI medicines available in Australia include omeprazole, pantoprazole, lansoprazole, rabeprazole and esomeprazole.[2,3] They are available by prescription; some are also available as over-the-counter medicines in lower strengths and pack sizes.

PPI medicines are one of the most commonly dispensed medicines for older people.[4] They are most often used to manage GORD.[5] They are also used in people at high risk of gastrointestinal bleeding who need to take medicines such as non-steroidal anti-inflammatory drugs (NSAIDs), which can increase this risk.[3,5,6]

GORD affects about 11% of Australian adults and rates of disease do not significantly change with age.[7,8] People with GORD have frequent symptomatic reflux on two or more days of the week, or reflux that is severe enough to affect their quality of life.[9] PPI medicines, accompanied by lifestyle modifications, are recommended as first-line treatment for GORD because they provide fast symptom relief and are more effective than less potent acid-suppression medicines.[2,3,10,11]

Guidelines for treating GORD recommend starting with a standard-strength PPI medicine for 4–8 weeks. A 'step-up' approach to a higher dose is recommended only if symptoms are severe.[2,3,11] If symptoms are well controlled after initial treatment, treatment can be 'stepped down' to a lower dose or stopping altogether can be tried.[2,3] More than two-thirds of people may be able to stop taking PPI medicines altogether, without their symptoms returning, after an initial course of treatment; gradual tapering of the dose is the most successful, particularly if the initial dose was high.[12,13]

Despite guideline recommendations, research suggests that many older people treated for GORD continue to take a PPI medicine long term without reassessment of need.[14-16] The issue highlights the importance of discussion with people at the time of prescribing PPI medicines about the natural course of GORD, and the role of lifestyle changes in reducing reflux symptoms long term. Lifestyle measures, such as modifying diet, losing weight and stopping smoking, are an essential part of GORD treatment because they reduce reflux and reduce the risk of oesophageal cancer.[3]

Guidelines also recommend PPI medicines for people at high-risk of GI bleeding who need ongoing treatment with NSAIDs, including low-dose aspirin for management of cardiovascular disease.[3,6] Older age is a risk factor for GI bleeding from NSAID use[3], and so PPI medicines are prescribed in older people for the duration of NSAID use to reduce this risk.[3,6] Bleeding risk can also be reduced by taking other measures; for example, using the least potent NSAID for the shortest duration possible, or treating other risk factors such as *Helicobacter pylori (H. pylori)* infection, if present.[17,18]

PPI medicines also have a role in treating mild to intermittent reflux. About 15–20% of adults experience reflux on an intermittent basis.[9] Symptoms can often be managed with the lifestyle modifications described above. If acid suppression treatment is needed, guidelines recommend an antacid or, if needed, a more potent medicine, such as a histamine 2 receptor antagonist (H^2 antagonist) or a PPI medicine.[3,11,19] Over-the-counter PPI medicines are available for treating mild to intermittent reflux, however rates of their use are not readily available.

Previous Atlas findings on PPI medicine use

The *Third Australian Atlas of Healthcare Variation* mapped PBS dispensing of PPI medicines for people aged 18 years and over.[20] More than 21 million PBS prescriptions for PPI medicines were dispensed in Australia in 2016–17. The dispensing rate was 5.0 times as high in the area with the highest rate as in the area with the lowest rate. Dispensing rates were also higher in areas with socioeconomic disadvantage

in major cities, and in inner and outer regional areas. Overall, 15% of the adult population had a least one prescription for a PPI medicine dispensed during the year.

Why revisit this topic for people aged 75 years and over?

Concerns about high rates of PPI medicine dispensing and potentially inappropriate long-term use have been expressed for years.[21] Recent Australian research has shown that older people are substantially higher users of PPI medicines than younger adults.[14] This pattern is also seen in many comparable countries, such as New Zealand, the United Kingdom, the United States and Canada.[22-28] Concerns have also been raised about the long-term use of PPI medicines in older people without a clear indication.[14,29,30]

In a population study, rates of PPI medicine use per 100 people in Australia were 42.2 for people aged 75–84 years and 42.8 for people aged 85 years and over, compared with 12.5 for the whole population, between 2013 and 2016.[14] Of people aged 75 years and over who started treatment with a PPI medicine, 42% continued to take it for longer than 12 weeks, and 31% took it for more than 12 months, either intermittently or continuously. The study also found that a substantial proportion of people who continued to take a PPI medicine after 12 weeks did so at the dose they were started on. PPI medicines were more commonly prescribed in people who were taking more medicines than in those who were taking fewer.

An Australian study of 41,000 veterans (average age of 79 years) prescribed PPI medicines for GORD found that more than two-thirds did not have their therapy reduced or stopped after eight weeks of treatment, as recommended in guidelines. Thirty-eight percent continued PPI medicines for one year.[15]

Similar trends have been observed in Australian aged care homes. Half to three-quarters of residents have been found to take PPI medicines for durations longer than recommended.[16,31,32] Rates of PPI medicine use are also higher among residents who take more medicines than among those taking fewer.[33]

Although PPI medicines have a good safety profile, there are concerns about potential harms associated with long-term use in older people, prompting an increased focus on regularly reviewing the need for these medicines.[6] Long-term use has been linked to an increased risk of hip fracture.[34] PPI medicines alter the gut microbiome, and there is some evidence that this may increase the risk of type 2 diabetes, as well as infections with *Clostridium difficile* and other pathogens.[35,36] PPI medicines can also increase the risk of vitamin B_{12} deficiency and kidney complications.[6,10,37,38]

Older people may be more susceptible to these harms than younger people because of increased frailty and age-related physiological changes that alter the way that their bodies respond to medicines.[31,39] Many older people also have multiple conditions requiring treatment with multiple medicines, which also increases their risk of medicine-related harm.[31] Although the absolute risk of these adverse effects is low, the population impact may be high because of the number of older people taking PPI medicines.[16]

PBS changes

On 1 May 2019, restrictions on PPI medicines came into effect that aim to improve the appropriateness of their use. These changes aim to reduce unwarranted long-term use, particularly high-dose use among older people.[40,41] Key changes include the reclassification of doses, increased restrictions on high-dose and standard-dose PPI medicines for GORD, changes to the number of repeat prescriptions and the addition of new item numbers for standard doses.

Proton pump inhibitor medicines dispensing, 75 years and over

About the data

Data are sourced from the PBS dataset, which includes all prescriptions dispensed under the PBS and the Repatriation Pharmaceutical Benefits Scheme (RPBS), including under co-payment prescriptions.

Data used in this report exclude doctors' bag items and any programs with alternative supply arrangements (section 100 of the *National Health Act 1953*) where patient level details are not available, such as direct supply to remote Aboriginal health services.

The PBS and RPBS do not cover medicines supplied to public hospital inpatients, over-the-counter medicines or private prescriptions.

The dataset does not allow analysis by Aboriginal and Torres Strait Islander status.

Rates are based on the number of prescriptions dispensed for PPI medicines per 100,000 people aged 75 years and over in 2018–19, unless otherwise indicated. For defined daily dose (DDD), the rate is calculated per 1,000 people per day. Patient counts reflect the number or unique patients, regardless of the number of prescriptions the patient may have received in the year.

The data do not include PPI medicines in fixed-dose combinations with antibiotics.

The analysis and maps are based on the patient's postcode recorded in their Medicare file and not the location of the prescriber or the dispensing pharmacy.

Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

Some data have been suppressed to manage volatility and confidentiality. This process takes into account the Australian Government Department of Health's requirements for reporting PBS data (see the Technical Supplement). Data suppression for this item (indicated on the maps in grey) has been particularly marked for remote areas of the Northern Territory.

What do the data show?

Magnitude of variation

In 2018–19, there were 7,114,281 PBS prescriptions dispensed for PPI medicines to people aged 75 years and over, representing 418,360 prescriptions per 100,000 people aged 75 years and over (the Australian rate).

The number of prescriptions dispensed for PPI medicines across 328* local areas (Statistical Area Level 3 – SA3) ranged from 131,393 to 777,098 per 100,000 people aged 75 years and over. The rate was **5.9 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of prescriptions dispensed for PPI medicines varied across states and territories, from 257,216 per 100,000 people aged 75 years and over in the Northern Territory to 462,138 in Tasmania (Figures 6.12–6.15).

After the highest and lowest 10% of results were excluded, 264 SA3s remained. The number of prescriptions per 100,000 people aged 75 years and over was **1.4 times as high** in the SA3 with the highest rate compared with the SA3 with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates for PBS prescriptions for PPI medicines for people aged 75 years and over were higher in inner regional areas than elsewhere. Rates increased with socioeconomic disadvantage (Figure 6.16).

* There are 340 SA3s. For this item, data were suppressed for 12 SA3s due to a small number of prescriptions dispensed and/or population in an area. Some SA3 rates are more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.

Analysis by people dispensed at least one prescription for a PPI medicine by state and territory

In 2018–19, the number of people aged 75 years and over dispensed at least one PPI medicine prescription was 794,861, representing 47% of people aged 75 years and over in Australia.

Analysis by people dispensed at least four prescriptions for a PPI medicine by state and territory

In 2018–19, the number of people aged 75 years and over dispensed at least four prescriptions for a PPI medicine was 639,243, representing an average of 38% of people aged 75 years and over in Australia.

The data and graphs for the following are available at safetyandquality.gov.au/atlas

- Analysis by people dispensed at least one prescription for a PPI medicine
- Analysis by people dispensed at least four prescriptions for a PPI medicine
- Analysis by defined daily dose
- Analysis by Primary Health Network.

Analysis by dose (high, standard and low*) and PHN

The number of prescriptions dispensed for **high-dose** PPI medicines varied across PHNs, from 15,746 per 100,000 people aged 75 years and over in the Northern Territory to 96,557 in Tasmania. The rate was 6.1 times as high for the PHN with the highest rate as for the PHN with the lowest rate.

The number of prescriptions dispensed for **standard-dose** PPI medicines varied across PHNs, from 205,806 per 100,000 people aged 75 years and over in the Northern Territory to 403,499 in Murrumbidgee. The rate was 2.0 times as high for the PHN with the highest rate as for the PHN with the lowest rate.

The number of prescriptions dispensed for **low-dose** PPI medicines varied across PHNs, from 22,303 per 100,000 people aged 75 years and over in South Western Sydney to 55,928 in Western Queensland. The rate was 2.5 times as high for the PHN with the highest rate as for the PHN with the lowest rate. (Figure 6.17).

Interpretation

Variations in rates of PPI medicine dispensing in people aged 75 years and over are likely to be due to the geographical differences in the factors discussed below.

Variation between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based on where people live rather than where they obtain their health care. Patients may travel outside their local area to receive health care.

Rates of underlying disease

Variation is warranted and desirable when it reflects variation in the underlying need for care. The higher PPI medicine dispensing rates seen in socioeconomically disadvantaged areas in the Atlas may reflect the prevalence of GORD and its risk factors (such as obesity, smoking, poor diet and alcohol intake), which are more common among people with lower levels of education and higher socioeconomic disadvantage.[4,42]

The prevalence of arthritis and rates of NSAID use to manage symptoms may also contribute to variation in PPI medicine dispensing.[3] PPI medicines are used to reduce the risk of gastrointestinal bleeding for people who need ongoing treatment with an NSAID and are at high risk of gastrointestinal bleeding. Almost half (49%) of people aged 65 years and over have arthritis, according to self-reported data.[43]

* According to definitions introduced by the Pharmaceutical Benefits Advisory Committee in May 2019.

Proton pump inhibitor medicines dispensing, 75 years and over

Use of low-dose aspirin may also contribute to variation in PPI medicine use. PPI medicines are also often prescribed to prevent gastrointestinal bleeding associated with medicines other than NSAIDs and low-dose aspirin, although this practice is not well supported by evidence.[14]

The prevalence of untreated *H. pylori* infection and rates of peptic ulcer disease may affect rates of PPI medicine dispensing. Infection rates, which increase the risk of peptic ulcer disease, are higher in older people. Rates of people with untreated *H. pylori* infection starting on an NSAID may also affect PPI dispensing. For people taking an NSAID, *H. pylori* infection increases the risk of peptic ulcer disease by up to 3.5 times, compared with no infection.[17]

Clinical decision-making

Variation in adherence to guidelines is likely to influence patterns of use, particularly adherence to recommendations to assess ongoing need for a PPI medicine.

Clinician and consumer willingness to discuss the natural history of reflux, the risks and benefits of treatment, and approaches to addressing lifestyle factors such as obesity and diet may influence PPI medicine use. Some people with uncomplicated GORD may be using PPI medicines long-term without attempting to step down to a lower dose or a less potent medicine, or to cease altogether. This may be due to concerns about symptoms re-emerging, or because the clinician and consumer have not discussed other treatment strategies, so that they may not be aware that it is possible to stop taking PPI medicines.

Taking PPI medicines at an inappropriate time of day may lead to variation in effectiveness of the medicines and how well reflux symptoms are controlled. Some people may not be aware that PPI medicines are most effective after a prolonged fast and should be taken at least half an hour before the first meal of the day.[2,3] Poor packing of PPI medicines in dose administration aids may contribute to this problem.

Variation may also reflect lack of transfer of information when people are discharged from hospital or move between other healthcare settings. Important information includes what a PPI medicine was prescribed for and when it should be reviewed or stopped. Medicines that are continued without clear instructions about when they should be reviewed or stopped can have downstream effects on ongoing prescribing and contribute to unnecessary medicine use.[44]

Access to medical care

Access to general practitioners and gastroenterologists may influence the likelihood of consumers seeking care for GORD, and therefore affect rates of PPI medicine use.

Variation in rates of PPI medicine dispensing between areas may also be influenced by the number of clinicians providing services to people living in the area. The practice styles of individual clinicians may be more likely to affect rates in areas with fewer clinicians, such as rural and regional locations, than in areas with more clinicians.

Uptake of PBS changes

Regulatory changes to the PBS listings for PPI medicines made in May 2019 – at the end of the data collection period for this Atlas – might be expected to have more impact on rates in areas in which adherence to guidelines has been low. However, the effect on findings is probably small because the changes applied only to new PBS prescriptions dispensed from this date.

Over-the-counter use of PPI medicines

Australians are high consumers of over-the-counter medicines.[43] Ability to afford over-the-counter medicines may have contributed to the lower rates of PPI medicine dispensing in areas of socioeconomic advantage. However, most people aged 75 years and over have a concession or pension card, so the effect of this may be small.

Addressing variation

Regulatory changes

Changes to the PBS restrictions, dose classifications and number of repeat prescriptions for PPI medicines came into effect in Australia in May 2019.[40] These changes followed advice from the Drug Utilisation Sub Committee of the Pharmaceutical Benefits Advisory Committee that, given guideline recommendations and the prevalence of GORD in Australia, high-dose PPI medicines appear to be overprescribed for long periods, particularly in older people.[40,41] The changes aim to encourage clinical review of PPI medicines and reduce inappropriate long-term use, particularly of high-dose PPI medicines. The effect of these regulatory changes is yet to be evaluated.

Reviewing the need for PPI use

Australia's National Indicators for Quality Use of Medicines in Australian Hospitals 2014 can be used to monitor safe and appropriate medicines use.[45] An indicator to measure long-term PPI medicine use may be helpful in identifying people who would benefit from ceasing therapy (deprescribing).

Employing pharmacists in general practice clinics as part of a team-based model of care may increase access to medicine review and education services. These models are well established internationally, and further research on their effectiveness in the Australian healthcare system is needed.[46]

Consumer and clinician education

Multifaceted national education campaigns that focus on reviewing the need for PPI medicines and actively stepping down or deprescribing when the medicine is no longer needed appear to have the most success in improving PPI medicine use, particularly in the veteran population.[47-49]

Recent campaigns conducted in the wider Australian population have had limited success, despite being multifaceted and including strategies for actively engaging clinicians.[50]

Interventions that focus on knowledge translation, and engagement of clinicians and consumers are likely to be more successful in improving PPI medicine use than others.[49]

Education and awareness campaigns for health professionals that include reminders to review PPI medicines at the point of care may reduce use by people who do not have a clear reason to be taking a PPI medicine long term.[51]

Lifestyle factors

Educating people about addressing lifestyle factors that may trigger symptoms is an important part of GORD treatment. Having a poor diet – particularly a diet high in fat – as well as smoking and being overweight, can exacerbate symptoms and increase the risk of oesophageal cancer. Weight loss has particularly been shown to reduce the symptoms of GORD.[52,53] In women, a 3.5 kg/m^2 reduction in body mass index can result in nearly a 40% reduction in the risk of having frequent GORD symptoms.[54] Addressing these risk factors for GORD has the added benefit of improving health in general.[3,9,10]

Optimising effectiveness of PPI medicines

Educational and other initiatives that target the importance of taking PPI medicines on an empty stomach may improve medicine effectiveness and reduce dose increases. Strategies that improve clinician uptake of guideline recommendations for *H. pylori* testing and treatment may help reduce variation in PPI medicine use. Routine *H. pylori* testing and, if needed, treatment, before prescription of NSAIDs may also reduce the risk of peptic ulcer.[17]

Proton pump inhibitor medicines dispensing, 75 years and over

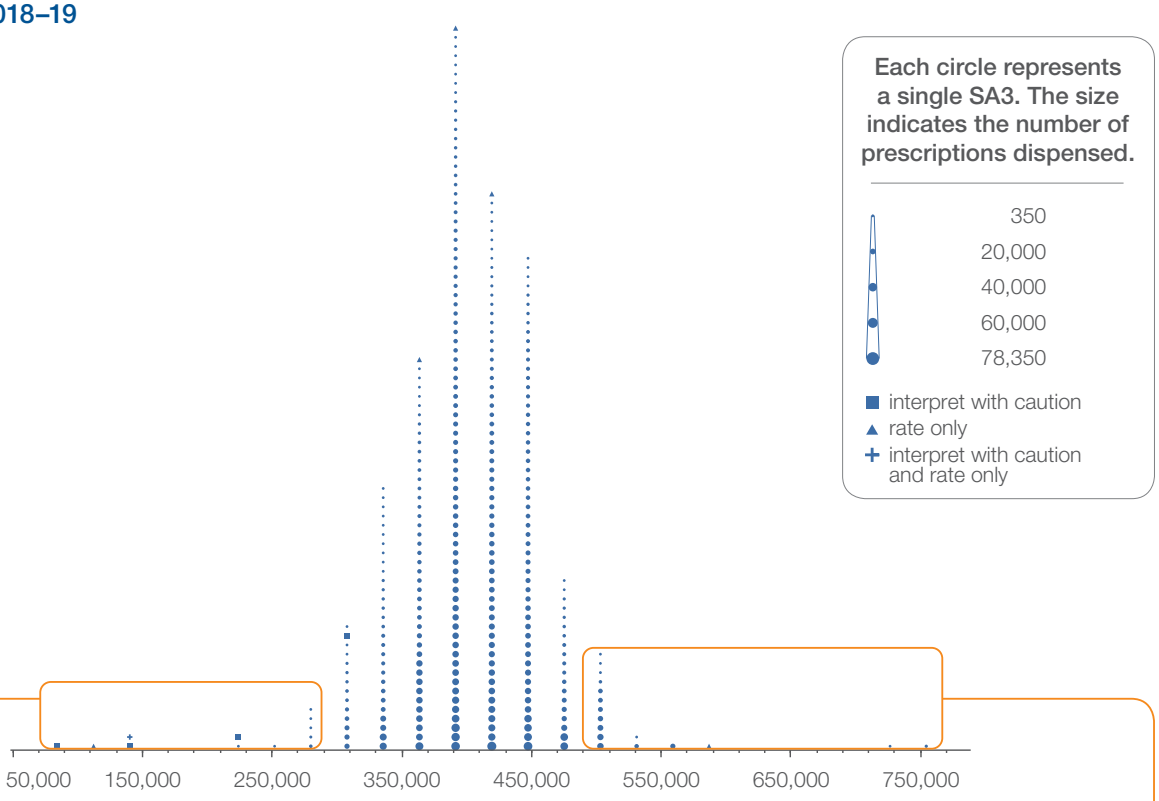
Other initiatives

As part of the Choosing Wisely Australian initiative[55], the Gastroenterological Society of Australia (GESA) and the Royal Australian College of General Practitioners (RACGP) made two recommendations in 2015 and 2016, to promote appropriate PPI medicine prescribing:

- Do not use PPI medicines long term in people with uncomplicated disease without regular attempts at reducing dose or ceasing therapy
- Do not continue prescribing long-term PPI medicines to people without attempting to reduce the medicine to the lowest effective dose or cease the therapy altogether.

Rates by local area

Figure 6.12: Number of PBS prescriptions dispensed for proton pump inhibitor medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Lowest rate areas

SA3	State	Rate	Prescriptions dispensed
Katherine	NT	**106,100***	475
Kimberley	WA	**131,393**	n.p.
East Pilbara	WA	**149,341***	n.p.
West Pilbara	WA	**162,344***	355
Alice Springs	NT	**233,646**	2,122
Daly - Tiwi - West Arnhem	NT	**245,314***	521
Darwin City	NT	**270,448**	2,112
Melbourne City	Vic	**284,627**	12,412
Brisbane Inner	Qld	**289,469**	8,729
Darwin Suburbs	NT	**293,260**	5,211
Port Douglas - Daintree	Qld	**293,729**	2,279
Far North	Qld	**304,805**	2,527

Highest rate areas

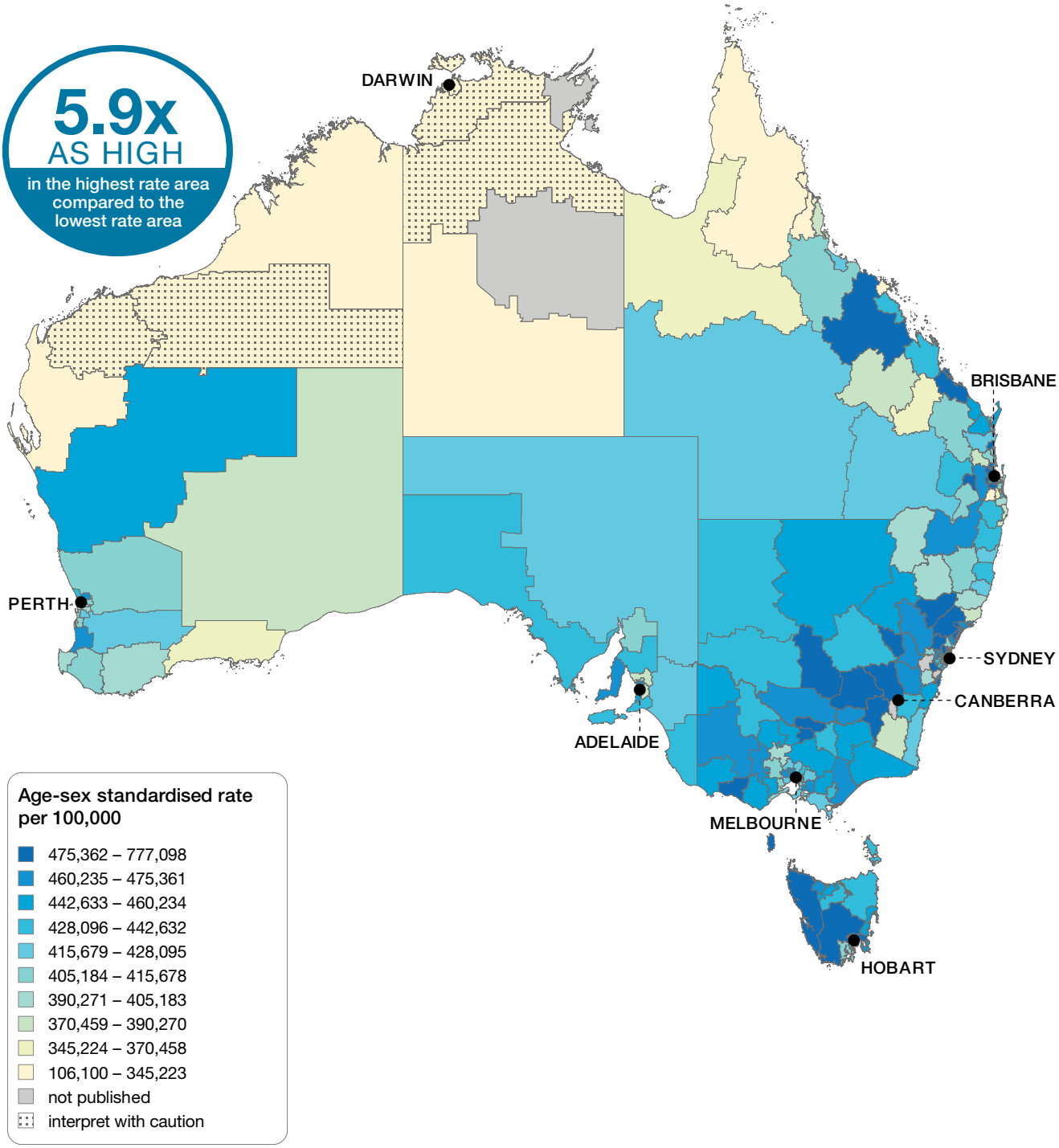
SA3	State	Rate	Prescriptions dispensed
Jimboomba	Qld	**777,098**	10,066
Central Highlands (Tas.)	Tas	**726,246**	4,632
Brighton	Tas	**598,583**	n.p.
Maitland	NSW	**559,602**	25,965
West Coast	Tas	**537,876**	5,807
The Hills District	Qld	**537,319**	19,590
Sorell - Dodges Ferry	Tas	**526,825**	6,208
Wagga Wagga	NSW	**526,558**	40,659
Hobart - North West	Tas	**525,873**	23,611
Griffith - Murrumbidgee (West)	NSW	**523,781**	21,194
Warrnambool	Vic	**519,105**	22,489
Wollondilly	NSW	**510,907**	11,883
Kiama - Shellharbour	NSW	**509,413**	38,373
Lower Hunter	NSW	**505,689**	28,244
Ipswich Inner	Qld	**504,188**	32,336
Noosa Hinterland	Qld	**504,130**	7,970
Hawkesbury	NSW	**503,831**	5,820

Notes:
Squares (■) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of prescriptions are not published (n.p.) for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution, and the numbers of prescriptions are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Proton pump inhibitor medicines dispensing, 75 years and over

Rates across Australia

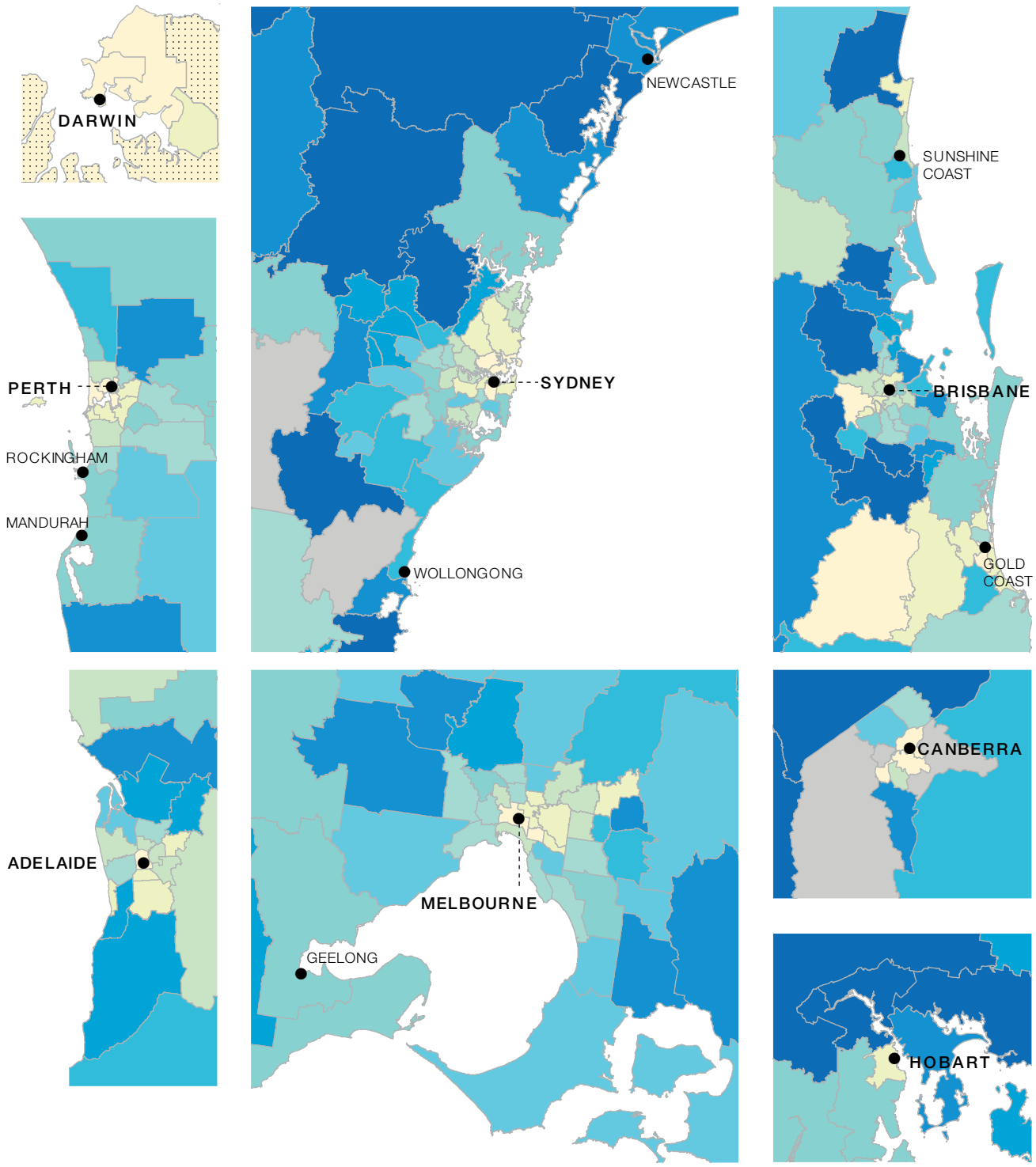
Figure 6.13: Number of PBS prescriptions dispensed for proton pump inhibitor medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Rates across capital city areas

Figure 6.14: Number of PBS prescriptions dispensed for proton pump inhibitor medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



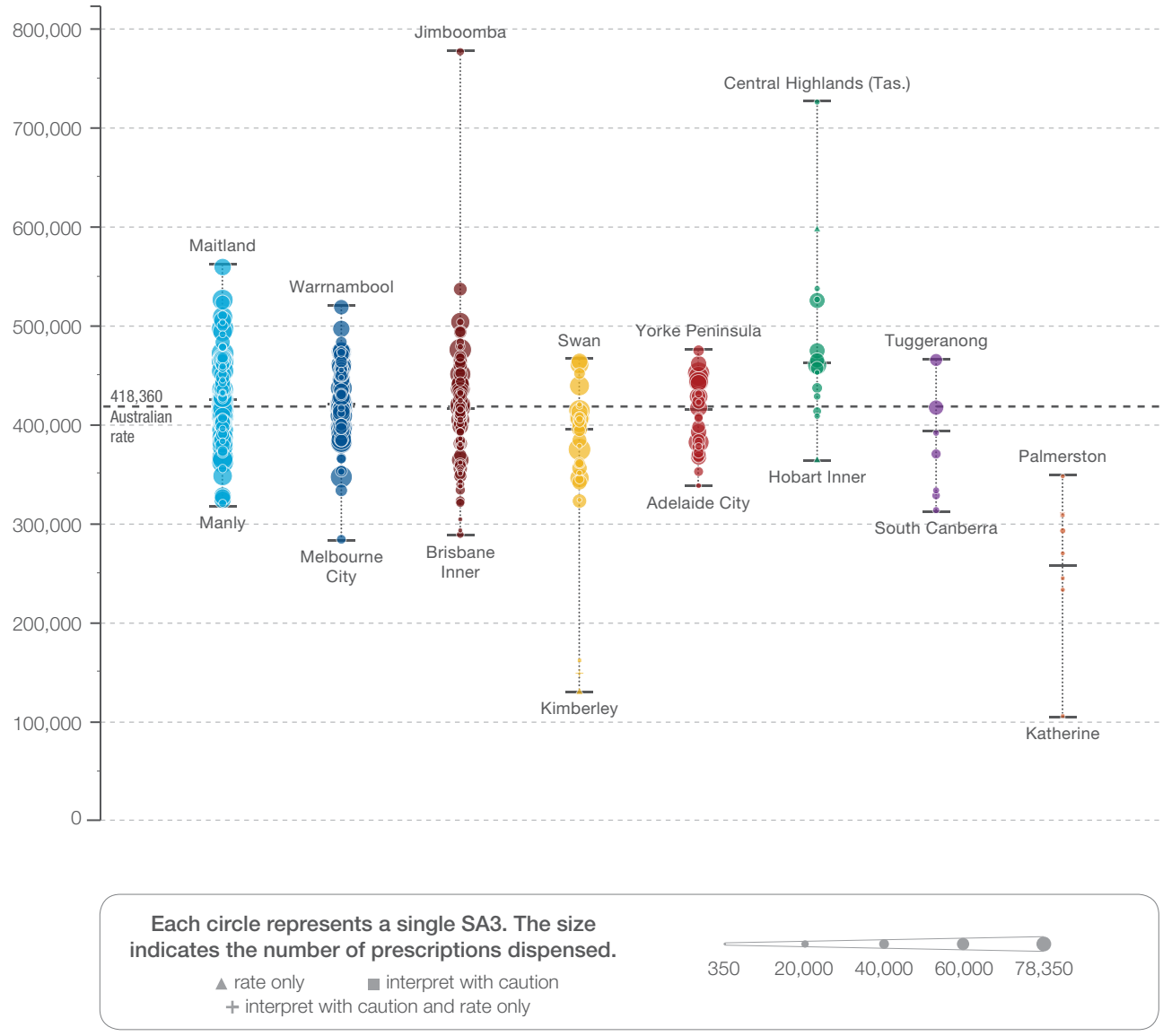
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Proton pump inhibitor medicines dispensing, 75 years and over

Rates by state and territory

Figure 6.15: Number of PBS prescriptions dispensed for proton pump inhibitor medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19

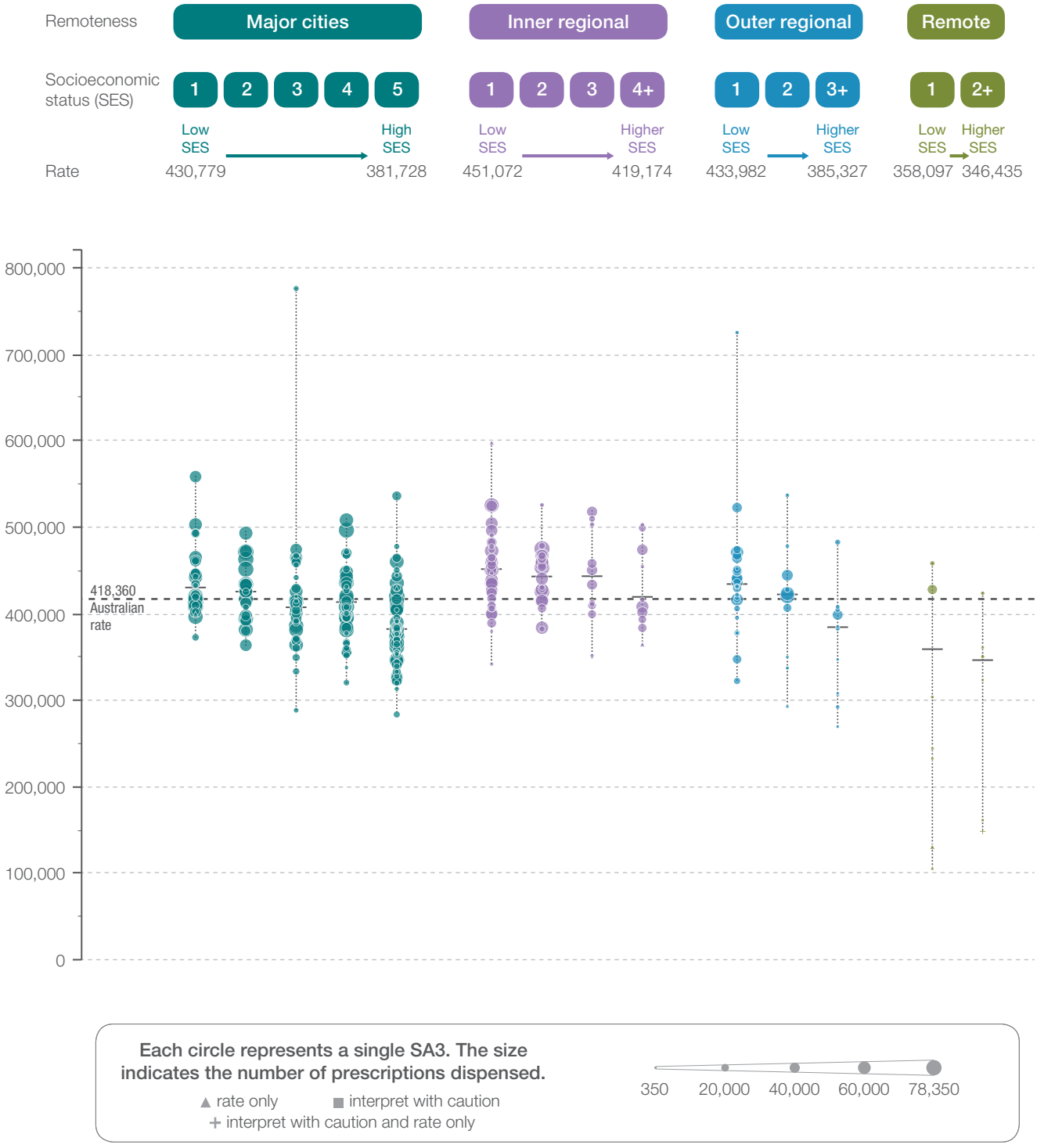
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	559,602	519,105	777,098	464,260	475,170	726,246	465,765	348,205
State/territory	424,793	420,340	415,710	394,763	415,103	462,138	394,152	257,216
Lowest rate	321,014	284,627	289,469	131,393	338,869	365,462	314,176	106,100*
Total prescriptions	2,417,560	1,856,172	1,321,085	622,289	596,202	199,766	86,503	13,875



Notes:
Squares (■) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of prescriptions are not published for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution, and the numbers of prescriptions are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Rates by remoteness and socioeconomic status

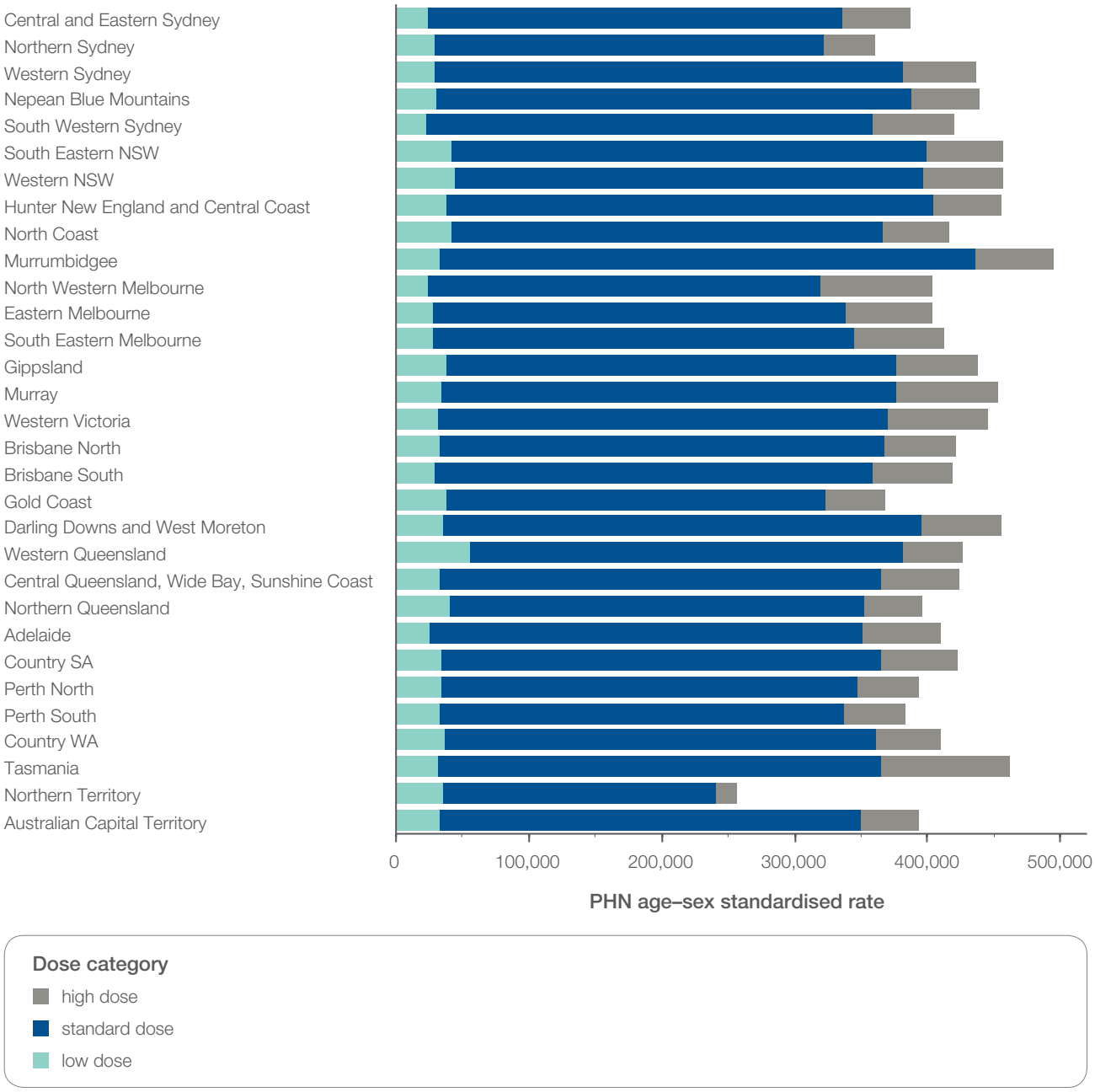
Figure 6.16: Number of PBS prescriptions dispensed for proton pump inhibitor medicines per 100,000 people aged 75 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2018–19



Notes:
Squares (■) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of prescriptions are not published for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be interpreted with caution, and the numbers of prescriptions are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Proton pump inhibitor medicines dispensing, 75 years and over

Figure 6.17: Number of PBS prescriptions dispensed for proton pump inhibitor medicines per 100,000 people aged 75 years and over, age and sex standardised, by Primary Health Network (PHN) of patient residence, by dose category, 2018–19



Notes:
Dose categories: high dose includes esomeprazole 40 mg; standard dose includes esoemprazole 20 mg, lansoprazole 30 mg, omeprazole 20 mg, pantoprazole 40 mg and rabeprazole 20 mg; low dose includes lansoprazole 15 mg, omeprazole 10 mg, pantoprazole 20 mg and rabeprazole 10 mg
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Pharmaceutical Benefits Scheme data and ABS Estimated Resident Population 30 June 2018.

Resources

- *Gastro-oesophageal Reflux Disease in Adults*[9]
- Heartburn and reflux: manage your medicine[1]
- Veterans' MATES (Medicines Advice and Therapeutics Education Services)[56]
- *Helicobacter pylori* eradication: an update on the latest therapies[57]
- Educational visiting program on managing GORD with PPIs in primary care and associated resources, NPS MedicineWise
- *Managing your Medicine for Reflux and Heartburn*, patient action plan, NPS MedicineWise, nps.org.au/assets/50240b737233cd47-a615f8d13d0c-NPS1993_SSDSM_PAP_v5.1.pdf
- *Therapeutic Guidelines: Gastrointestinal* (available by subscription at tg.org.au)
- *Australian Medicines Handbook* (available by subscription at: shop.amh.net.au/)
- Guidance for provision of a Pharmacist Only medicine: proton pump inhibitors, Pharmaceutical Society of Australia (available by subscription at: my.psa.org.au/s/article/Proton-pump-inhibitors-S3-guidance-document)

Australian initiatives

Information in this chapter will complement work already underway to improve PPI medicine use. At a national level this work includes:

- Veterans' MATES, Australian Government Department of Veterans' Affairs, initiatives to improve PPI medicine use[56]
- RACGP and Choosing Wisely Australia, Recommendation 1: Do not use proton pump inhibitors (PPIs) long term in patients with uncomplicated disease without regular attempts at reducing dose or ceasing[58]
- GESA and Choosing Wisely Australia, Recommendation 3: Do not continue prescribing long-term proton pump inhibitor (PPI) medication to patients without attempting to reduce the medication down to the lowest effective dose or cease the therapy altogether.[55]

Many state and territory initiatives are also in place to improve appropriateness of prescribing PPI medicines, including:

- *A Guide to Deprescribing Proton Pump Inhibitors*[18], Tasmania
- Deprescribing resources for clinicians and consumers, developed by a translational research project team lead by Professor Sarah Hilmer, to support deprescribing in older hospital patients, New South Wales.[59]

Proton pump inhibitor medicines dispensing, 75 years and over

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Technical supplement

Introduction

This is the *Fourth Australian Atlas of Healthcare Variation* in a series providing statistics at a local level identifying variation across Australia for a number of health indicators. Statistics in the Atlas are presented in the form of maps, graphs and tables. This technical supplement provides information on the methods used for data extraction and analysis, for presentation in the maps and graphs. Activity rates are presented by local areas using Statistical Area Level 3 (SA3) geography defined by the Australian Bureau of Statistics (ABS), as well as Primary Health Network (PHN) areas defined by the Australian Government Department of Health, at state and territory, and national levels.

The Australian Commission on Safety and Quality in Health Care and the Australian Institute of Health and Welfare (AIHW) developed the specifications for each indicator. These can be found on the AIHW Metadata Online Registry (METeOR) at meteor.aihw.gov.au/content/index.phtml/itemId/723541

The specifications include details such as:

- The data source
- The relevant population
- Inclusions and exclusions (description of items included and excluded, and relevant data source codes)
- The numerator (what is being measured) and denominator (in what population)
- Computation (the calculation that shows how the numerator and denominator relate)
- Disaggregation (the way the data are analysed and presented)
- Data suppression rules (rules that set out what cannot be presented for reasons of confidentiality and/or reliability).

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Four data sources were used in the Atlas:

- Medicare Benefits Schedule (MBS)
- National Hospital Morbidity Database (NHMD)
- National Perinatal Data Collection (NPDC)
- Pharmaceutical Benefits Scheme (PBS).

Analyses are based on the place of usual residence of the patient (patient residence) and not the location of the hospital, clinic or pharmacy where the service was provided. If the patient residence was unknown or invalid, or could not be allocated to an SA3, PHN, or state or territory, the record was included in the total for Australia only.

For MBS and PBS data, the Medicare enrolment postcode is used as a proxy for the patient residence because it corresponds to most people's usual residence. The postcode of the dispensing pharmacy was substituted if the enrolment postcode was unknown or invalid.

Records with unknown or invalid age or sex were excluded from NHMD, MBS and PBS data because they could not be age and sex standardised (see 'Analysis methods'). NPDC data are not standardised, as a result of small numbers.

The AIHW conducted the data extraction and analysis, and presentation of the data in maps and graphs. Analyses in this report have not been adjusted to account for the under-identification of Aboriginal and Torres Strait Islander people in the data sources used. Data by Aboriginal and Torres Strait Islander status should be interpreted with caution because Aboriginal and Torres Strait Islander people are under-enumerated in health data, and there is variation in the under-enumeration among states and territories, and among datasets.

1. Medicare Benefits Schedule data

MBS data are a by-product of the assessment of claims for Medicare benefits by Services Australia, and are provided to the Australian Government Department of Health. The MBS data in this report comprise hospital and non-hospital services provided in financial year 2018–19 for claims processed up to and including 29 February 2020. A service includes any claims resulting in the payment of a Medicare benefit. Bulk-billing incentives and 'top-up' services are excluded from service counts as they are not attendances or procedures in their own right.

MBS data do not include:

- Services provided free of charge to public patients in hospitals
- Services that qualify for a benefit under the Department of Veterans' Affairs National Treatment Account
- Services provided under an entitlement, such as services covered by third-party or workers compensation, where an interim benefit has not been paid, or services provided to repatriation beneficiaries or defence personnel
- Services provided for insurance or employment purposes
- Health screening services, except for services as directed by the minister.

Some Australian residents may access medical services through other arrangements, such as salaried doctor arrangements. As a result, MBS data may underestimate the use of services by some members of the community.

Under Medicare, 'eligible persons' are persons who reside permanently in Australia. This includes New Zealand citizens and holders of permanent residence visas. Applicants for permanent residency may also be eligible, depending on their circumstances. In addition, overseas visitors from countries with which Australia has a reciprocal healthcare agreement might also be entitled to benefits under MBS arrangements.

For some patients, the total count for the services in question may be zero or negative (for example, due to cheque cancellations; see meteor.aihw.gov.au/content/index.phtml/itemId/601800). In these cases, all records of the patient are excluded from the analyses.

A patient's age calculated in MBS data is their age in years on the date the service was provided to them.

2. National Hospital Morbidity Database

The NHMD is a comprehensive dataset containing records for all episodes of admitted patient care from almost all hospitals in Australia. This includes all public and private acute and psychiatric hospitals, freestanding day hospital facilities, and alcohol and drug treatment centres. Hospitals operated by the Australian Defence Force and corrections authorities, and hospitals in Australia's offshore territories are not in scope, but some are included. The data elements included in the NHMD are based on the Admitted Patient Care National Minimum Data Set (APC NMDS). The NHMD includes episodes for admitted patients discharged (separated) between 1 July and 30 June for each financial year.

Data are collected at each hospital from patient administrative and clinical record systems, and forwarded to the relevant state or territory health authorities. The data are provided to the AIHW for national collation annually.

The counting unit for the NHMD is a 'separation'. Separation refers to an episode of admitted patient care, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay, beginning or ending in a change in the type of care (for example, from acute care to rehabilitation). In this report, separations are referred to as 'hospitalisations'.

A record is included for each hospitalisation, not for each patient. Patients hospitalised more than once in the financial year have more than one record in the NHMD.

The NHMD does not include non-admitted patient care provided in outpatient clinics or emergency departments. If patients in these settings are admitted to hospital subsequently, the care provided to them as admitted patients is included in the NHMD.

Records for which the overall nature of care was 'newborn care with unqualified days only', 'posthumous organ procurement' or 'hospital boarder' were excluded from the analysis.

A patient's age calculated in NHMD data is their age in years on the date they were admitted to hospital.

NHMD data in this report comprise hospitalisations in:

- 2014–15 to 2017–18 for potentially preventable hospitalisations
- 2012–13 to 2017–18 for lumbar spinal surgery
- 2012–13, 2015–16 and 2017–18 for tonsillectomy and myringotomy.

The specifications developed for the potentially preventable hospitalisations are based on the nationally agreed specification, National Healthcare Agreement: PI 18 – Selected potentially preventable hospitalisations, 2021 (meteor.aihw.gov.au/content/index.phtml/itemId/725793).

For potentially preventable hospitalisations, data for New South Wales for 2017–18 in this report may not align with the data published by New South Wales because of changes in admission practices in New South Wales public hospitals in 2017.

For lumbar spinal surgery, the annual number of hospitalisations is not sufficient for reliable reporting at a local level. Three years of data (2012–13 to 2014–15 and 2015–16 to 2017–18) are combined. In this case, rates are based on the number of hospitalisations over three years and the summed population over three years. This method differs from the calculation of an average annual rate. However, the rates from both methods will generally be the same, or very similar, particularly for areas with low proportional population change between years.

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For lumbar spinal surgery, tonsillectomy and myringotomy, some private hospitals in Tasmania admit public patients under a contractual arrangement. There is a small over-count of hospitalisations for these procedures in Tasmania because hospitalisations were recorded by both contracting hospital and contracted hospital.

More information on the APC NMDS for 2012–13 to 2017–18 is available at:

- meteor.aihw.gov.au/content/index.phtml/itemId/466132 (2012–13)
- meteor.aihw.gov.au/content/index.phtml/itemId/491555 (2013–14)
- meteor.aihw.gov.au/content/index.phtml/itemId/535047 (2014–15)
- meteor.aihw.gov.au/content/index.phtml/itemId/588909 (2015–16)
- meteor.aihw.gov.au/content/index.phtml/itemId/612171 (2016–17)
- meteor.aihw.gov.au/content/index.phtml/itemId/641349 (2017–18).

The data quality statements for the NHMD for 2012–13 to 2017–18 are available at:

- meteor.aihw.gov.au/content/index.phtml/itemId/568730 (2012–13)
- meteor.aihw.gov.au/content/index.phtml/itemId/611030 (2013-14)
- meteor.aihw.gov.au/content/index.phtml/itemId/638202 (2014-15)
- meteor.aihw.gov.au/content/index.phtml/itemId/723825 (2015–16)
- meteor.aihw.gov.au/content/index.phtml/itemId/724186 (2016–17)
- meteor.aihw.gov.au/content/index.phtml/itemId/724188 (2017–18).

Components of NHMD analysis

Diagnoses and procedures

Hospital diagnosis and procedure data in this report were reported to the NHMD by states and territories using several editions of the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification* (ICD-10-AM), incorporating the *Australian Classification of Health Interventions* (seventh edition for 2012–13, eighth edition for 2013–14 and 2014–15, ninth edition for 2015–16 and 2016–17, and 10th edition for 2017–18).

The comparability of the coded diagnosis and procedure data can be affected by variations in the quality of the coding, and by state-specific coding standards. This should be taken into account when comparing across states and territories.

Aboriginal and Torres Strait Islander status

For NHMD data, hospitalisations for Aboriginal and Torres Strait Islander people are compared with hospitalisations for other Australians. Other Australians comprise people who were reported as not of Aboriginal and/or Torres Strait Islander origin, and people for whom information on Aboriginal and Torres Strait Islander status was not reported.

In 2011–12, an estimated 88% of Aboriginal and Torres Strait Islander patients were correctly identified in public hospital admission records. The estimated completeness of Aboriginal and Torres Strait Islander identification (with 95% confidence intervals) for public hospitals was 80% (76–83%) in New South Wales, 78% (71–84%) in Victoria, 87% (84–91%) in Queensland, 91% (85–95%) in South Australia, 96% (92–98%) in Western Australia, 64% (53–74%) in Tasmania, 98% (96–99%) in the Northern Territory and 58% (46–69%) in the Australian Capital Territory. It is not known to what extent Aboriginal and Torres Strait Islander patients might be under-identified in private hospital admission records.

There were wide variations in correct identification of Aboriginal and Torres Strait Islander patients by remoteness: estimates ranged from 77% (72–81%) in major cities to 99% (96–100%) in very remote areas. For more information, see *Indigenous Identification in Hospital Separations Data: Quality report* at aihw.gov.au/publication-detail/?id=60129543215

Patient funding status

Apart from potentially preventable hospitalisations, NHMD data are presented separately for hospitalisations according to the funding status of the patient. This reflects the funding arrangements for the patient's hospitalisation, not the sector of the hospital to which they were admitted. Hospitalisations were categorised by funding status of patients – public or private – based on three data elements:

- 'Source of funding' (meteor.aihw.gov.au/content/index.phtml/itemId/649391)
- 'Patient election status' (meteor.aihw.gov.au/content/index.phtml/itemId/326619)
- 'Hospital sector' (meteor.aihw.gov.au/content/index.phtml/itemId/269977).

Hospitalisations for publicly funded patients comprise those for whom the patient funding source was:

- Health service budget (not covered elsewhere)
- Health service budget (due to eligibility under a reciprocal healthcare agreement)
- Health service budget (no charge raised as a result of a hospital decision) AND in a public hospital
- Other hospital or public authority (contracted care) AND a patient election status of 'public' (regardless of hospital sector).

Hospitalisations for privately funded patients comprise those for whom the patient funding source was:

- Health service budget (no charge raised as a result of a hospital decision) AND in a private hospital
- Other hospital or public authority (contracted care) AND a patient election status of 'private' (or not reported)
- Department of Veterans' Affairs
- Department of Defence
- Correctional facility
- Private health insurance
- Workers compensation
- Motor vehicle third-party personal claim
- Other compensation (for example, public liability, common law, medical negligence)
- Self-funded
- Other funding source
- Not known.

For 2016–17, there were data quality issues relating to the recording of patient funding source for patients admitted to private hospitals in the Australian Capital Territory. Data for these private hospitals for 2016–17 were excluded from analysis by patient funding status for the lumbar spinal surgery indicators.

Condition onset flag

For the lumbar spinal surgery indicators, records with infections not noted as arising during the episode of admitted patient care are excluded. There is some variation between states and territories in the overall proportion of records for which a condition was reported as arising during the episode of care. Differences in the types of patients treated by states and territories may account for some of this variation. However, the variation may indicate that there are differences in the allocation of condition onset flag values (meteor.aihw.gov.au/content/index.phtml/itemId/651997). There are also differences in the quality of the provided condition onset flag data has improved since 2013–14, particularly for private hospitals.

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Further information on the quality of the coded diagnosis and procedure data, Aboriginal and Torres Strait Islander status data, and condition onset flag data at the state and territory level is available in *Australian Hospital Statistics 2012–13* at aihw.gov.au/reports/hospitals/australian-hospital-statistics-2012-13 and *Admitted Patient Care: Australian hospital statistics* reports at aihw.gov.au/reports/hospitals/admitted-patient-care-2017-18/report-editions (2013–14 to 2017–18).

3. National Perinatal Data Collection

The NPDC collects data about births in Australia, including births in hospitals, birth centres and the community (such as home births). All live births and stillbirths of at least 20 weeks gestation or at least 400 grams birth weight are included, except in Victoria and Western Australia, where births are included if gestational age is at least 20 weeks or, if gestation is unknown, birth weight is at least 400 grams. NPDC data in this report relate to births that occurred in the calendar year 2017.

NPDC data are based on births reported to the perinatal data collection in each state and territory. Midwives and other birth attendants, using information obtained from mothers and from hospital or other records, complete notification forms for each birth. Each state or territory provides a standard de-identified extract to the AIHW annually to form the NPDC. The data elements in the NPDC include the Perinatal National Minimum Data Set (Perinatal NMDS), the Perinatal National Best Endeavours Data Set (Perinatal NBEDS) and additional data elements. More information on the Perinatal NMDS and NBEDS for 2017 is available at meteor.aihw.gov.au/content/index.phtml/itemId/517456 and meteor.aihw.gov.au/content/index.phtml/itemId/654975, respectively.

Additional data elements are at different stages of standardisation. Some have national data standards but have not been implemented in the Perinatal NMDS or NBEDS, while others do not have common definitions for collecting the data.

The data quality statement for the NPDC for 2017 is available at meteor.aihw.gov.au/content/index.phtml/itemId/716326

Both 'main indication for caesarean section' (meteor.aihw.gov.au/content/index.phtml/itemId/695698) and 'main indication for induction of labour' (meteor.aihw.gov.au/content/index.phtml/itemId/655515) have been collected as voluntary non-standard data elements in the NPDC. Indication for caesarean section was revised and added to the Perinatal NBEDS from 2014 onwards, and indication for induction from 2015 onwards. There are differences in definitions and methods used for data collection of these data elements across states and territories; for this reason, data are not comparable across states and territories.

The reason for a method of birth (caesarean section or induction of labour) is not necessarily related to the reason for early birth. Data on the latter are not available.

In Australia:

- Clinical indications for early birth, such as fetal compromise, were not always recorded as the main indication for caesarean section when the decision to perform a caesarean section was pre-planned in the antenatal period
- Clinical events such as pre-labour rupture of membranes, which may lead to an unplanned early caesarean section, were not always recorded when the decision to perform a caesarean section was pre-planned in the antenatal period.

'Without medical or obstetric indication' includes the following reasons for caesarean section:

- Previous caesarean section
- Previous severe perineal trauma
- Previous shoulder dystocia
- Maternal choice in the absence of any obstetric, medical, surgical or psychological indication.

'Without medical or obstetric indication' includes the following reasons for induction of labour:

- Administrative or geographical indication
- Maternal choice in the absence of any obstetric, medical, fetal, administrative or geographical indication.

In the case of multiple births, gestational age and method of birth are based on the first-born baby.

Analysis was by place of usual residence of the mother and excluded Australian non-residents, residents of external territories, and records in which place of usual residence was not stated.

Components of NPDC analysis

Aboriginal and Torres Strait Islander status

For NPDC data, data for Aboriginal and Torres Strait Islander women are compared with data for non-Indigenous Australian women. Non-Indigenous Australian women comprise women who were reported as not of Aboriginal and/or Torres Strait Islander origin. Women for whom information on Aboriginal and Torres Strait Islander status was not reported were excluded from the analysis.

Data collection methods for Aboriginal and Torres Strait Islander status of the mother may vary between states and territories. In 2017, information on Aboriginal and Torres Strait Islander status was provided for nearly all mothers (99.7%) who gave birth. However, no formal assessment of the quality of Aboriginal and Torres Strait Islander identification in NPDC data has been undertaken. For more information, see *Australia's Mothers and Babies 2017: In brief*, available at aihw.gov.au/reports/mothers-babies/australias-mothers-and-babies-2017-in-brief

Patient funding status

For NPDC data, patient funding status was determined using the additional data element 'admitted patient elected accommodation status'. Public patients are those for whom the admitted patient's (mother's) elected accommodation status was 'public'. Private patients are those for whom the admitted patient's elected accommodation status was 'private'.

Women who gave birth at home or in birth centres attached to hospitals were excluded from the analysis. The specification for this data element is only for births in hospitals.

Some private hospitals in Western Australia admit public patients. The number of women who elected private status might be lower than the number of women admitted to private hospitals. For some records, mainly those related to giving birth before admission, admitted patient elected accommodation status was missing.

For Tasmania, the majority of private hospitals were unable to collect data for indication for caesarean section and indication for induction according to revised specifications introduced from 1 July 2015; this may affect women with an admitted patient elected accommodation status of both public and private. Data have been mapped to the new specifications where possible. Data for public hospitals were collected according to the new specifications.

Caution must be exercised when interpreting these data for Western Australia and Tasmania.

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4. Pharmaceutical Benefits Scheme data

The Australian Government subsidises the cost of a wide range of prescription medicines through two separate schemes: the PBS and the Repatriation Pharmaceutical Benefits Scheme (RPBS). Claims for reimbursement for the supply of PBS- or RPBS-subsidised medicines are submitted by pharmacies through Services Australia for processing, and are provided to the Australian Government Department of Health. Subsidies for prescription medicines are available to all Australian residents who hold a current Medicare card, and overseas visitors from countries with which Australia has a reciprocal healthcare agreement. Patients pay a contribution to the cost of the medicine (co-payment), and the Australian Government covers the remaining cost.

The PBS data in this report are from records of prescriptions dispensed in 2018–19 under the two schemes, where either:

- The Australian Government paid a subsidy
- The prescription was dispensed at a price less than the relevant patient co-payment (under co-payment prescriptions) and did not attract a subsidy.

The PBS data cover all prescriptions dispensed by approved suppliers, including community pharmacies, public and private hospital pharmacies, and dispensing doctors.

The PBS does not cover:

- Over-the-counter purchases (non-prescription)
- Private prescriptions (prescriptions that are not eligible for subsidy under the PBS – for example, prescriptions for medicines that are not listed on the PBS)
- Medicines supplied to admitted patients in public hospitals; however, prescriptions to patients on discharge and non-admitted patients in most states and territories are in scope, except in New South Wales and the Australian Capital Territory.

Patient categories of 'general', 'concessional', 'repatriation' and 'unknown' are included (meteor.aihw.gov.au/content/index.phtml/itemId/604103). Doctor's bag medicines (supply of medicines free to patients for emergency use) and medicines dispensed through alternative arrangements where the patient cannot be identified, such as direct supply to Aboriginal health services, are excluded.

Provision of some medicines may be under-represented in remote areas, particularly in the Northern Territory, that have a high proportion of Aboriginal and Torres Strait Islander people who access medicines through Aboriginal health services.

The number of prescriptions represents the total number of times that a prescribed medicine is supplied to a patient. Prescriptions can be written either as one-off (original with no repeats) or original with repeats. When an original prescription and all the repeats were supplied at the one time, the total number of prescriptions (original and repeats) was counted.

For individual prescriptions where the quantity dispensed varied from the listed maximum quantity, no adjustment was made for increased or reduced quantity supplied. The supply was counted as one prescription.

A patient's age calculated in PBS data is their age in years on the date the medicine was supplied to them.

Polypharmacy is based on PBS prescriptions. It is defined as five or more prescriptions for medicines with different Anatomical Therapeutic Chemical (ATC) codes at the fourth level (for example, A10BA), with each medicine dispensed at least four times in the year. Combination medicines (for example, amiloride/hydrochlorothiazide) are counted as one medicine.

The ATC classification is a classification system for medicines maintained by the World Health Organization (WHO). The ATC classification groups medicines according to the body organ or system on which they act, and their therapeutic and chemical characteristics. More information on the ATC classification system can be found at whocc.no/atc/structure_and_principles

For proton pump inhibitor medicines, medicines that are purchased over the counter without a prescription are out of scope. On 1 May 2019, changes were made to improve the appropriate prescribing of prescription medicines. Medicines were changed from dose category of highest, high and low, to high, standard and low. Esomeprazole 40 mg is in the high dose category; esomeprazole 20 mg, lansoprazole 30 mg, omeprazole 20 mg, pantoprazole 40 mg and rabeprazole 20 mg are in the standard dose category; and lansoprazole 15 mg, omeprazole 10 mg, pantoprazole 20 mg and rabeprazole 10 mg are in the low dose category. More information on the changes is available at nps.org.au/radar/articles/proton-pump-inhibitors-pbs-changes-may-2019

Defined daily dose

Defined daily dose (DDD) is the average maintenance dose per day for a medicine used for its main indication in adults, defined by the WHO. DDDs are assigned to medicines by the WHO Collaborating Centre for Drug Statistics Methodology. Using DDDs allows comparisons of medicine dispensing independent of price, preparation and quantity per prescription. Medicine dispensing expressed in DDDs per thousand people per day (DDDs/1,000/day) allows data for medicines with differing daily doses to be aggregated. However, the DDD is only a unit of measurement and does not necessarily reflect the recommended or average prescribed dose. DDDs are not established for all medicines. More information on DDD is available at who.int/medicines/regulation/medicines-safety/toolkit_ddd/en

Combination medicines

Combination medicines are medicines with multiple active ingredients. The Australian Government Department of Health and WHO differ in their methods for assigning DDDs. The WHO method takes account of the main ingredient only (whocc.no/ddd/definition_and_general_considera/#DDDs), whereas the Department of Health method takes account of each ingredient. The WHO method is used for this report to allow international comparisons, and DDDs/1,000/day in this report may not align with those in the *Australian Statistics on Medicines* report, available at pbs.gov.au/info/statistics/asm/australian-statistics-on-medicines

DDDs are the WHO-assigned DDDs as at January 2019. Information on DDD assignment to medicines is available at whocc.no/atc_ddd_index

5. Analysis methods

Australian population

Most indicators use an estimated resident population from the ABS in the denominator. The exception is early planned births, for which the denominator is number of women who gave birth, from the NPDC.

The ABS produces estimates for the overall Australian population for two time points each year – 30 June and 31 December – at state and territory level. Estimates at 31 December are not available for lower geography levels (such as SA3), and Aboriginal and Torres Strait Islander people. Estimates as at 30 June are appropriate for use when calculating rates based on calendar year data, but they are not appropriate for use when calculating rates based on financial year data. In such instances, estimates for 31 December (the midpoint of the financial year) are needed.

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Population estimates as at 31 December in the relevant year were used as the denominator for indicators based on NHMD data for 2012–13 to 2017–18. For example, population estimates as at 31 December 2017 were used for 2017–18. Where three years of data were combined (for example, 2015–16, 2016–17 and 2017–18), the denominator was the sum of the population estimates as at 31 December 2015, 31 December 2016 and 31 December 2017. Population estimates as at 31 December were calculated as the average of the 30 June population estimates before and after the relevant December.

Population estimates as at 30 June 2018 were used as the denominator for indicators based on MBS and PBS data for 2018–19. ABS population estimates as at 30 June 2019 were not available for calculation of the 31 December population estimates in 2018 at the time the analysis was done.

Aboriginal and Torres Strait Islander status

The population estimates for Aboriginal and Torres Strait Islander people were based on the population estimates from the 2016 Census. For 2016 and earlier, population estimates (2016) and backcast estimates were used. For 2017 onwards, series B population projections were used. More information on series B is available at abs.gov.au/statistics/people/aboriginal-and-torres-strait-islander-peoples/estimates-and-projections-aboriginal-and-torres-strait-islander-australians/latest-release#frequently-asked-questions

The population estimates for non-Indigenous people (other Australians) were derived by subtracting the population estimates for Aboriginal and Torres Strait Islander people from the Australian population estimates.

Derived populations

The population estimates for the tonsillectomy and myringotomy (17 years and under) and lumbar spinal surgery (18 years and over) indicators require separate male and female estimates for Aboriginal and Torres Strait Islander people in the two age groups 15–17 years and 18–19 years. These have not been published by the ABS and were derived based on the combined-sex population estimates for Aboriginal and Torres Strait Islander people, and the 2016 Census counts of Aboriginal and Torres Strait Islander males and females:

- The sex ratios for Aboriginal and Torres Strait Islander people were calculated using the 2016 Census counts of Aboriginal and Torres Strait Islander males and females for each age between 15 and 19, in each state and territory
- The sex ratios were applied to the population estimates for Aboriginal and Torres Strait Islander people to calculate Aboriginal and Torres Strait Islander males and females for each age between 15 and 19, in each state and territory
- The corresponding population estimates for non-Indigenous people were calculated by subtracting the population estimates for Aboriginal and Torres Strait Islander people from the Australian population estimates.

People aged 15–17 years were placed in their own age group, and people aged 18–19 years were placed in the 18–24-year age group.

Age and sex standardisation

This report presents age- and sex-standardised rates, except for the early planned birth indicator, which is presented with percentages. Age and sex standardisation is a method to remove the influence of age and sex when comparing populations with different age and sex structures. For this report, the Australian estimated resident population as at 30 June 2001 was used as the standard population. Some indicators used specific age ranges. In these cases, only the relevant age groups were included in age- and sex-standardisation calculations. Standardised rates based on different age groups and/or standard populations are not directly comparable.

Five-year age groups were used (except for the special cases of the 15–17-year and 18–24-year age groups described above). The age group of 65 years and over was the highest used in standardisation for Aboriginal and Torres Strait Islander status analysis, and 85 years and over was the highest age group used in other analyses. These age groups were adjusted for specific age ranges.

The age and sex standardisation method was adapted from the general age standardisation formula for populations, available at meteor.aihw.gov.au/content/index.phtml/itemId/327276

Geography levels

This report presents data based on the ABS Australian Statistical Geography Standard (ASGS) 2016 SA3 geography, which incorporates the Territory of Norfolk Island for the first time. There are 340 spatial SA3s, covering Australia without gaps or overlaps. SA3s generally have a population of 30,000–130,000 people, and comprise clusters of whole SA2s (meteor.aihw.gov.au/content/index.phtml/itemId/659727). These areas were grouped by PHN area, state or territory, remoteness and socioeconomic status to assist comparisons. For more information on ASGS 2016, see meteor.aihw.gov.au/content/index.phtml/itemId/659352

Allocation to an SA3 was based on the patient's residence, not the place where they received the service. The geographical data that were used to allocate the number of events (hospitalisations, services, prescriptions, DDDs and patients) to an SA3 level varied depending on the data source (Table 1).

Table 1: Geographical data used to allocate an SA3

Data source	Data on geographic location
MBS data	Postcode
NHMD	SA2, when available; otherwise, SA2 was derived from Statistical Local Area* (SLA) or postcode. Between 2012–13 and 2016–17, New South Wales provided SLA instead of SA2, and all other states and territories provided SA2 for most records. In 2017–18, all states and territories provided SA2 for all records. SA2s were derived as follows. For 2012–13: • SA2 was mapped from SLA for all New South Wales records • SA2 was mapped from postcode for some South Australian and some Northern Territory records. For 2013–14: • SA2 was mapped from SLA for all New South Wales records • SA2 was mapped from postcode for some Victorian records. For 2014–15: • SA2 was mapped from SLA for all New South Wales records and some Victorian records. For 2015–16 and 2016–17: • SA2 was mapped from SLA for all New South Wales records and some Victorian records; where mapping could not be undertaken on SLA, postcode was used.
NPDC	Not applicable; data are presented by state or territory of mother's residence
PBS data	Postcode

* This is the geographic area defined in the ABS Australian Standard Geographical Classification (the classification used before the ASGS).

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NHMD

For 2012–13 to 2016–17, SA2s in the NHMD were collected using the ASGS 2011. For 2017–18, the ASGS 2016 was used. The accuracy of the information on geography (SA2 or other) could vary across and within states and territories, depending on the methods of allocation used by the hospital and the level of detail on the patient's address captured at the service level.

When Statistical Local Area (SLA) or postcode was used, ABS correspondences were used to identify the corresponding SA2 2011 (2012–13 to 2016–17) or SA2 2016 (2017–18). Where a geographic unit overlapped SA2 boundaries, records were randomly allocated to the SA2s, according to the proportion of the unit (postcode or SLA) population in the SA2s. This is standard practice for the NHMD. Because of the random allocation, individual records in SA2s might not be accurate or reliable; however, the overall distribution of records by SA2 is considered useful.

For 2012–13 to 2016–17, the SA2 2011 was aggregated to SA3 2011. The number of hospitalisations at SA3 2011 was mapped to SA3 2016 using an ABS correspondence. Where an SA3 2011 overlapped SA3 2016 boundaries, the number of hospitalisations was apportioned across the SA3s 2016, according to the proportion of the population of SA3 2011 in the SA3s 2016.

Time series

Data were re-run for selected hospitalisation indicators presented in the first and second Atlases for the time-series analyses in this Atlas to allow robust comparison of rates over time. Since the first Atlas was published, in November 2015, there have been a number of minor changes to data specifications, updates to NHMD datasets and changes to improve data analysis, as listed in Table 2. This means that some fourth Atlas results for a given year may differ from those reported in previous Atlases. The results reported in this Atlas should be used for monitoring change over time.

MBS and PBS data

For the MBS and PBS data, an ABS correspondence was used to map postcode to SA3 2016. Where a postcode overlapped SA3 boundaries, the number of events was apportioned across the SA3s, according to the proportion of the postcode population in the SA3s. The overall distribution of events by SA3 is considered to be statistically representative of the split population.

The number of patients was determined at the Australian level. In some cases, patients can have multiple records, with different postcodes recorded. Where this occurred, the patient count was apportioned across the postcodes, according to the proportion of the patient's services or prescriptions in that postcode. The number of patients at postcode level was mapped to SA3 2016 using the same process as above.

Table 2: Changes in analysis methods for time series of hospitalisation indicators

Atlas	Age standardised	Age and sex standardised	Postcode to SA3	SA2 to SA3	ASGS 2011	ASGS 2016	Population estimate
1	✔		✔		✔		30 June
2		✔		✔	✔		30 June
3		✔		✔		✔	30 June
4		✔		✔		✔	31 December*

* Estimated from average of 30 June estimated residential populations from the relevant years.

Primary Health Network areas

PHNs connect health services across a specific geographic area so that patients, particularly those needing coordinated care, have access to a range of services, including primary healthcare services, secondary healthcare services and hospital services. There are 31 PHN areas that cover the whole of Australia.

The number of events at SA3 2016 level was mapped to a PHN area (2017) using an ABS correspondence. The correspondence reflects the reconstructed PHN boundaries based on the ASGS 2016 and the 2011 Census population data (as the weighting unit). Where an SA3 overlapped PHN boundaries, the number of events was apportioned across the PHN areas, according to the proportion of the SA3 population in the PHN areas.

Tasmania, the Australian Capital Territory and the Northern Territory have only one PHN area each. PHN rates may differ from state or territory rates because:

- For the MBS and PBS data, populations are sourced from different data
- For the NHMD, populations and hospitalisations are sourced from different data – PHN hospitalisations are based on SA3 of patient residence, whereas state or territory hospitalisations are based on state or territory of patient residence, including records where the SA3 may not be known.

Post office boxes

For indicators based on MBS and PBS data, six post office box postcodes in major cities were excluded from analyses by SA3, PHN area, remoteness and socioeconomic status. This is because it is difficult to estimate the place of patient residence in these cases. However, these post office box postcodes were included in analyses by state and territory, and at national level.

The following post office box postcodes were excluded:

- 2001 Sydney
- 2124 Parramatta
- 3001 Melbourne
- 4001 Brisbane
- 5001 Adelaide
- 6843 Perth.

Remoteness and socioeconomic analysis

SA3s were grouped into remoteness categories and socioeconomic quintiles based on the ASGS 2016 and the ABS Socio-Economic Indexes for Areas (SEIFA) 2016, respectively. Data by SA3 were assigned to remoteness and socioeconomic groups using this method of grouping. As a result of the method used, national data by remoteness and socioeconomic status in this report may differ slightly from equivalent data calculated using the geographic unit (postcode, SLA or SA2) recorded on the individual records. However, it is expected that the overall patterns would be similar. For more information on SEIFA 2016, see meteor.aihw.gov.au/content/index.phtml/itemId/695778

Derived remoteness categories

The ASGS 2016 remoteness categories divide Australia into broad geographic regions that share common characteristics of remoteness for statistical purposes. These categories divide each state and territory into several regions based on their relative access to services.

The following remoteness categories are used:

- Major cities
- Inner regional
- Outer regional
- Remote
- Very remote.

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The ABS publishes a remoteness category for each SA1, available at abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1270.0.55.005July%202016?OpenDocument. SA1 population was allocated to a remoteness category using the correspondence SA1 to remoteness area, and remoteness category was allocated to an SA3 using the hierarchy of SA1 to SA3 (meteor.aihw.gov.au/content/index.phtml/itemId/659750). The total population in each remoteness category was calculated for each SA3. The remoteness category with the largest population was selected for the SA3.

Derived socioeconomic quintiles

There are four indexes in SEIFA 2016, and the Index of Relative Socio-Economic Disadvantage (IRSD) 2016 was used for socioeconomic analysis. IRSD 2016 ranks areas in Australia according to relative socioeconomic disadvantage. The index is based on information collected in the 2016 Census on different aspects of disadvantage, such as low income, low educational attainment and high unemployment.

A low score indicates a high proportion of relatively disadvantaged people in an area. For example, an area could have a high proportion of people without educational qualifications or working in low-skill occupations. In contrast, a high score indicates a low proportion of relatively disadvantaged people in an area. It is important to note that the index reflects the overall socioeconomic position of the population in an area, and that the socioeconomic position of individuals in that area may vary.

The ABS publishes an index value for each SA1, available at abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2033.0.55.0012016?OpenDocument. SA1s are ranked according to their level of disadvantage (index value) and grouped into 10 equally populated categories (deciles), with the lowest category reflecting the 10% of areas with the greatest overall level of disadvantage. For each SA3, the deciles were combined to form quintiles, and the number of SA1s in each quintile was calculated. The quintile with the largest number of SA1s was selected as the quintile for the SA3.

Table 3: Number* of SA3s by combined remoteness categories and socioeconomic quintiles

Remoteness	Socioeconomic quintile				
	1 (Low)	2	3	4	5 (High)
Major cities	29	22	35	41	63
Inner regional	37	23	11	11†	
Outer regional	27	10	10†		
Remote and very remote	10	9†			

* Two SA3s (Blue Mountains – South, and Illawarra Catchment Reserve) were not included because the population in these areas was too small for them to be assigned a socioeconomic quintile.
† Numbers are between columns where adjacent socioeconomic quintiles were combined.

Combining remoteness and socioeconomic quintiles

When remoteness categories and socioeconomic quintiles are combined, there are 25 combinations to which SA3s can be assigned. Some categories and quintiles were combined to ensure that each of the final 14 combinations contained at least six SA3s for comparison purposes (Table 3).

In this report, the SA3s in the combined 'remote' and 'very remote' areas are labelled 'remote'. The SA3s with the most overall disadvantage are labelled 'low SES (1)', and the SA3s with the least overall disadvantage are labelled 'high SES (5)'. Where socioeconomic quintiles are combined (for example, quintiles 4 and 5), the SA3s with the least overall disadvantage are labelled 'higher SES' (for example, 4+).

Suppression protocol

Rates based on small numbers of events and/or very small populations are more susceptible to random fluctuations and may not provide a reliable representation of activity in that area. For reliability reasons, areas with volatile rates were suppressed (Table 4). Data that could lead to the identification of individual patients, providers or prescribers were also suppressed. If applicable, consequential suppression was applied to manage confidentiality.

Suppressed SA3s were marked as not published and coloured grey in maps. Data from these suppressions were included in analyses for larger geographic areas – for example, analysis by state and territory, remoteness and socioeconomic status.

Sensitivity analysis

Most data were age and sex standardised. Several SA3s in the Northern Territory were consistently suppressed because the population in one or more age and sex groups for standardisation was less than 30. The Northern Territory requested that consideration be given to relaxing this suppression rule. The AIHW developed a sensitivity analysis to investigate the volatility of the rates for the affected SA3s. For consistency, the sensitivity analysis was applied to all affected SA3s, not just those in the Northern Territory. The procedure to conduct the sensitivity analysis is summarised in Box 1.

Table 4: Rules for suppression of an area of patient residence

Data source	Numerator	Denominator	Denominator for age and sex groups
MBS data	• Fewer than 20 • Fewer than 6 services* • Fewer than 6 patients* • Fewer than 6 providers* • One provider provided more than 85% of services* • Two providers provided more than 90% of services*	• Fewer than 200 (medication management reviews) • Fewer than 1,000 (otherwise)	Fewer than 30
NHMD†	• Fewer than 20 (single year of data) • Fewer than 10 (3 years of data)	Fewer than 1,000	Fewer than 30
NPDC	Fewer than 5*	Fewer than 100	Not applicable; data are not standardised
PBS data	Fewer than 20	Fewer than 200	Fewer than 30

* Suppression rules relate to protecting confidentiality. Suppression rules not marked with an asterisk relate to volatility.
† Additional suppression rules may apply if required by state or territory data custodians.

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Box 1: Summary of sensitivity analysis

For each SA3 that was suppressed because of a small (below-threshold) denominator for one or more age and sex groups (affected SA3), the following analysis was undertaken:

1. The numerator was increased by 1 in each group with a small denominator, to generate a simulated rate
2. All rates, including the simulated rates, were rounded to whole numbers
3. All publishable rates for non-affected SA3s and the simulated rates for affected SA3s were ranked from lowest to highest and split into 10 categories (deciles)
4. All publishable rates for non-affected SA3s and the actual rates for affected SA3s were ranked from lowest to highest and split into deciles
5. The decile of the simulated rate (step 3) was compared with the decile of the actual rate (step 4)
6. Steps 1 to 5 were repeated with a decrease in the relevant numerators by 1. Negative numerators were reset to zero before generating a simulated rate.

All affected SA3s were included in the simulation simultaneously, to generate maximum differences between the deciles calculated using the simulated rates and the deciles calculated using the actual rates (the most extreme scenario). This was a conservative method compared with simulation conducted for one affected SA3 at a time.

The volatility of the actual rate for an affected SA3 was not considered to have a material impact on its decile if either of the following conditions was met in each simulation (increasing or decreasing the relevant numerators by 1):

- There was no difference in the decile for the simulated and actual rates; for example, both simulated and actual rates were in the lowest decile
- There was a difference of one decile, and the simulated rate was not on the cusp of the next decile (the decile that would make the difference become two deciles); for example, the actual rate was in the lowest decile and the simulated rate was in the second decile, and not on the cusp of the third decile.

Where the decile for an affected SA3 was considered to be robust against the volatility of the rate, the rate was published with caution, although it was considered potentially more volatile than other published rates. The rates with caution were not included in the calculation of the national magnitude of variation, and were presented with an asterisk (tables), or as squares or red rectangles (graphs) and dotted areas (maps).

Presentation of rates in Australia maps, capital city area maps and time-series graphs

Rates for SA3s were rounded to whole numbers. Rounded rates were ranked from lowest to highest and split into 10 categories (deciles). The deciles are displayed using various shades of colour, where darker colours represent higher rates and lighter colours represent lower rates. Each decile may not have the same number of SA3s if the number of publishable SA3s is not a multiple of 10. Furthermore, if there was more than one SA3 with the same rate at the boundary of a decile, SA3s with the same rate were assigned to the same decile.

Identification of areas with the highest and lowest rates

SA3s with the highest and lowest rates have been identified for all indicators with data presented by SA3. Having regard to the overall distribution of the rates, selection of SA3s was made from the histogram column by column, with the aim of identifying at least the 10 highest and lowest rate areas for SA3s. The selection of SA3s was also dependent on the width of the column in the histogram, and the choice of what width to use was somewhat arbitrary. For some indicators, fewer than 10 SA3s are listed because inclusion of the next column of the histogram would result in a list of SA3s too long for publication.

Identification of areas with consistently high and low rates

SA3s with consistently high or consistently low rates have been identified. Consistently high or consistently low is defined as those SA3s that fall in the top 10% or bottom 10% of all SA3s for all reporting years.

Glossary

Aboriginal Community Controlled Health Service	A primary healthcare service initiated and operated by the local Aboriginal community to deliver holistic, comprehensive and culturally appropriate health care to the community that controls it.
age and sex standardisation	The removal of the influence of age and sex when comparing rates between populations with different age and sex structures. The current standard population is the Australian estimated resident population as at 30 June 2001. Rates in the Atlas are expressed per 100,000 people.
best possible medication history	A list of all the medicines a patient is using at presentation. The list includes the name, dose, route and frequency of the medicine, and is documented on a specific form or in a specific place. All prescribed, over-the-counter and complementary medicines should be included. This history is obtained by a trained clinician interviewing the patient (and/or their carer) and is confirmed, where appropriate, by using other sources of medicines information.
carer	A person who provides unpaid care and support to a family member or friend who has a disability, chronic condition, terminal illness or general frailty. Includes parents and guardians caring for children.
Clinical Care Standard	A small number of quality statements that describe the care patients should be offered by health professionals and health services for a specific clinical condition or defined clinical pathway in line with current best evidence. Clinical Care Standards play an important role in delivering appropriate care and reducing unwarranted variation because they identify and define the care people should expect to be offered or receive, regardless of where they are treated in Australia. Further information is available at safetyandquality.gov.au/our-work/clinical-care-standards
clinician	A healthcare provider trained as a health professional. Includes registered and non-registered practitioners, and teams of health professionals who spend most of their time providing direct clinical care.
consumer	A person who has used, or may potentially use, health services, or is a carer for a patient using health services.
data linkage	Used synonymously with ‘data integration’ and ‘record matching’, data linking or linkage refers to the bringing together of information from more than one source that relates to the same individual or institution.

Glossary

defined daily dose (DDD)	A measurement unit created by the World Health Organization. The DDD is defined as the assumed average maintenance dose per day for a medicine used for its main indication in adults, and does not necessarily correspond to the recommended or prescribed daily dose. Therapeutic doses for individual patients and patient groups will often differ from the DDD because they will be based on individual characteristics such as age, weight, ethnic differences, type and severity of disease, and pharmacokinetic considerations. Use of DDDs allows comparisons of medicine dispensing independent of differences in price, preparation and quality per prescription. Expressing medicine dispensing in DDDs per thousand people per day (DDDs/1,000/day) allows the aggregation of data for medicines that have differing daily doses.
episode of care	A period of care in a hospital. This can be a total hospital stay (from admission to discharge, transfer or death), or a portion of a hospital stay beginning or ending in a change in type of care (for example, from acute care to rehabilitation).
health literacy	The Commission separates health literacy into two components: individual health literacy and the health literacy environment. Individual health literacy is the skills, knowledge, motivation and capacity of a person to access, understand, appraise and apply information to make effective decisions about health and health care, and take appropriate action. The health literacy environment is the infrastructure, policies, processes, materials, people and relationships that make up the health system, and affect the way in which people access, understand, appraise and apply health-related information and services. It reflects the demands and complexity of the health system and society at large.
HealthPathways	An online manual used by clinicians to help make assessment, management and specialist request decisions. Rather than being traditional guidelines, each pathway is an agreement between primary and specialist services on how patients with particular conditions will be managed in the local context.
health services	Services delivering health care, such as general practices, community health centres, medical specialists, nursing services, allied health services, public and private hospitals (including outpatient services), day procedure services, Aboriginal Community Controlled Health Services, community nursing and Hospital in the Home.
hospital	All public and private acute and psychiatric hospitals, freestanding day hospital facilities, and alcohol and drug treatment centres. Includes hospitals specialising in dentistry, ophthalmology, and other acute medical or surgical care. May also include hospitals run by the Australian Defence Force and correctional authorities, and those in Australia's offshore territories. Excludes outpatient clinics and emergency departments.
hospital admission	The administrative process of becoming a patient in a hospital.
Local Hospital Network	States and territories each have different descriptions of the governance structure providing health services. These include local health networks, Local Hospital Networks, local health districts, boards and area health services. Where the term 'Local Hospital Network' is used, it refers to the description of any of these terms as relevant to states and territories (see meteor.aihw.gov.au/content/index.phtml/itemId/491016).
Medicare Benefits Schedule (MBS)	A listing of the Medicare services subsidised by the Australian Government.
medicine	A chemical substance given with the intention of preventing, curing, controlling or alleviating disease, or otherwise improving the physical or mental welfare of people. Includes prescription, non-prescription and complementary medicines, regardless of administration route (for example, oral, intravenous, intra-articular, transdermal or intra-uterine).
My Health Record	A secure online summary of an individual's health information. Individuals can control what goes into it, and who is allowed to access it. They can choose to share their health information with doctors, hospitals and other healthcare providers.

National Hospital Morbidity Database (NHMD)	The AIHW NHMD is a compilation of episode-level records from admitted patient morbidity data collection systems in Australian hospitals. The database collects information about care provided to admitted patients in all public and private acute and psychiatric hospitals, freestanding day hospital facilities, and alcohol and drug treatment centres in Australia. Hospitals operated by the Australian Defence Force and correctional authorities, and hospitals in Australia's offshore territories are not in scope but may be included. More information is available in the Technical Supplement.
National Perinatal Data Collection (NPDC)	The AIHW NPDC is a national collection of data on pregnancy and childbirth. The data are based on births reported to the perinatal data collection in each state and territory in Australia. A standard de-identified extract is provided to the AIHW each year to form the NPDC. More information is available in the Technical Supplement.
National Safety and Quality Health Service (NSQHS) Standards	Evidence-based standards that address the major safety and quality issues that affect a large number of patients in areas where there is variation and it is known that practices can be improved. The primary aims of the NSQHS Standards are to protect the public from harm and to improve the quality of health care. They were developed by the Commission in collaboration with states and territories, technical experts, clinicians, patients and carers, and a range of other stakeholders. The NSQHS Standards (first edition) were released in 2011, and the second edition was released in 2017.
Pharmaceutical Benefits Scheme (PBS)	An Australian Government program that subsidises medicines.
population	The Atlas uses population estimates as at 31 December of a reporting year for indicators based on NHMD data. The estimates are calculated as the average of the Australian Bureau of Statistics (ABS) estimated resident population (ERP) at 30 June before and after the relevant December. The ERPs for 30 June 2016 and previous time points are calculated by the ABS using a combination of census counts and other information, such as births and deaths. The ERPs for time points after 30 June 2016 are calculated by the ABS using the 30 June 2016 ERP and other information, such as births and deaths. The population estimates for Aboriginal and Torres Strait Islander people for 30 June 2016 were based on the 2016 Census and Census Post Enumeration Survey. Aboriginal and Torres Strait Islander population estimates for time points prior to 30 June 2016 were calculated by the ABS by applying assumed levels of mortality to the base 30 June 2016 Aboriginal and Torres Strait Islander population. Aboriginal and Torres Strait Islander projected populations for the period 2017–2031 were calculated by applying assumed levels of fertility, mortality and migration to the base 30 June 2016 Aboriginal and Torres Strait Islander population. The Atlas uses population estimates as at 30 June of a reporting year for indicators based on MBS and PBS data. The estimates are based on the ABS estimated resident population.
primary care	The first level of care or entry point to the healthcare system, such as general practice clinics, community health practice (for example, clinics, outreach or home visiting services), ambulance services, pharmacists or services for specific populations (for example, Aboriginal or refugee health services).
Primary Health Network	Primary Health Networks connect health services across local communities so that patients, particularly those needing coordinated care, have the best access to a range of healthcare providers, including practitioners, community health services and hospitals. They work directly with general practitioners, other primary care providers, secondary care providers and hospitals. Primary Health Networks began to operate on 1 July 2015 to replace Medicare Locals.

Glossary

principal diagnosis	The diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care, an episode of residential care or an attendance at the healthcare establishment, as represented by a code.
remoteness categories	Categories of geographical remoteness are based on the ABS Australian Statistical Geography Standard (ASGS) 2016. The ABS ASGS 2016 remoteness categories divide Australia into broad geographic regions that share common characteristics of remoteness for statistical purposes. More information is available in the Technical Supplement.
same-day hospitalisation	Occurs when a patient is admitted and separated from hospital on the same date.
secondary care	Health care for patients referred from primary health care (for example, by general practitioners). Includes care provided by hospitals and medical specialists.
separation	An episode of admitted patient care, which can be a total hospital stay (from admission to discharge, transfer or death), or a portion of a hospital stay beginning or ending in a change in type of care (for example, from acute care to rehabilitation). In the Atlas, a separation is referred to as a hospitalisation.
socioeconomic disadvantage	Local areas are grouped into socioeconomic quintiles based on the 2016 Index of Relative Socio-Economic Disadvantage (IRSD) at the Statistical Area Level 1 (SA1) level. The IRSD is derived from census variables relating to disadvantage, such as low income, low educational attainment, unemployment and dwellings without motor vehicles. Information from the ABS Socio-Economic Indexes for Areas (SEIFA) and the IRSD was used to calculate the socioeconomic status at the SA3 level in the Atlas. SEIFA includes four summary measures created from 2016 Census information. The indexes can be used to explore different aspects of socioeconomic conditions by geographic areas. For each index, every geographic area in Australia is given a SEIFA number that shows how disadvantaged that area is compared with other areas. Each index summarises a different aspect of the socioeconomic conditions of people living in an area. For example, they provide more general measures of socioeconomic status than are given by measuring income or unemployment alone.
Statistical Area Level 3 (SA3)	A geographical area built from a whole SA2 and designed for the output of regional data, including 2016 Census data. As defined in the ABS Australian Statistical Geography Standard 2016, SA3 geography includes the territories of Jervis Bay, Cocos (Keeling) Islands, Christmas Island and Norfolk Island. The aim of SA3s is to create a standard framework for analysing ABS data at the regional level through clustering groups of SA2s that have similar regional characteristics. There are 340 spatial SA3s, covering the whole of Australia without gaps or overlaps. SA3s usually have a population of between 30,000 and 130,000 people. At 30 June 2016, some SA3s had populations below 30,000 and above 130,000. In the major cities, SA3s represent areas serviced by major transport and commercial hubs. They often closely align with large urban local government areas (for example, Gladstone, Geelong). In regional areas, they represent areas serviced by cities with populations of more than 20,000 people, or clusters of related suburbs around urban commercial and transport hubs within the major urban areas. In outer regional and remote areas, SA3s represent areas that are widely recognised as having a distinct identity, and similar social and economic characteristics. A small number of SA3s are termed ‘zero SA3s’. These have small effective design populations and represent very large national parks close to the outskirts of major cities.
telehealth	Health services delivered using information and communication technologies, such as videoconferencing.

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