AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

Australian Government
Australian Institute of
Health and Welfare

The Second Australian Atlas of Healthcare Variation

2017

Published by the Australian Commission on Safety and Quality in Health Care
Level 5, 255 Elizabeth Street, Sydney NSW 2000

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Email: mail@safetyandquality.gov.au
Website: www.safetyandquality.gov.au

ISBN: 978-1-925224-82-5

The Commission's preference is that you attribute this publication (and any material sourced from it) using the following citation:

> Australian Commission on Safety and Quality in Health Care and Australian Institute of Health and Welfare. The Second Australian Atlas of Healthcare Variation. Sydney: ACSQHC; 2017

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Acknowledgements

Although the Atlas has been created in consultation with many individuals and organisations, the Commission is responsible for developing the key findings and recommendations.

The Commission has consulted with more than 30 colleges and organisations, and gratefully acknowledges their contributions.

The Commission wishes to acknowledge the significant contribution of its advisory groups and other experts to the development of the Atlas. The Commission also acknowledges members of the intensive care community, and the Australian and New Zealand Intensive Care Society.

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Contents

Foreword

The first *Australian Atlas of Healthcare Variation*, released in 2015, brought discussions in Australia about variation in healthcare provision fully into the mainstream. In response to the data and findings presented in the first Atlas, we have seen state and territory governments working to understand unwarranted variation by further analysing the data, and working with clinicians to change models of care and the thresholds for interventions. Clinical colleges and societies are further investigating clinical variation within their specialties. The Australian Commission on Safety and Quality in Health Care (the Commission) itself has produced clinical care standards for several of the healthcare interventions that, as the first Atlas showed, vary substantially in their use around the country.

The international focus on measuring and responding to healthcare variation is also gathering momentum. The pioneering work of Professor John Wennberg on the Dartmouth Atlas, which, for more than 20 years, has analysed variation in how medical resources are distributed and used in the United States, has led the way in this field. Atlases of healthcare variation have now been produced by healthcare organisations in many other countries, including England, New Zealand, Canada, the Netherlands and Norway, stimulating debate and prompting improvements in healthcare delivery.

The recommendations in this *Second Australian Atlas of Healthcare Variation* require action from many parts of the healthcare system and beyond. These goals are ambitious, but the recommended changes have the potential to result in meaningful progress in defining and delivering appropriate care – and improving patient outcomes.

I would like to thank the many expert groups and individuals who have assisted the Commission with this important work: clinicians, consumers, policymakers from all Australian governments, and professional colleges and societies. This in-depth consultation has been instrumental in allowing us to begin to understand the observed variation, and forming the basis for achievable and important recommendations.

Professor Villis Marshall AC
Chair

Australian Commission on Safety and Quality in Health Care

7 June 2017

Overview

Mapping variation is an invaluable tool for understanding how our healthcare system is providing care, but gathering the data is only the first step. Understanding the underlying reasons for marked differences in the use of some health services across Australia, and considering how we can improve, are key for translating this work into better outcomes for patients.

Sometimes variation is expected, and even a good thing – for instance, when it reflects a response to differences in patient needs or choice of treatment options. When a difference in the use of health services does not reflect these factors, it is unwarranted variation and represents an opportunity for the health system to improve. This improvement may involve increasing access to treatment options that produce better outcomes for patients, or reducing treatment with little or uncertain benefit.

This *Second Australian Atlas of Healthcare Variation* examines variation in 18 clinical items. It paints a picture of variation in the use of a number of interventions not covered in the first Atlas, such as hospitalisations for appendicectomy and caesarean section in younger women. Some interventions are investigated in this Atlas to build on the findings from the first Atlas – for example, examining hysterectomy and endometrial ablation separately, and examining rates of cataract surgery using a more comprehensive dataset.

The Australian Commission on Safety and Quality in Health Care (the Commission) has consulted widely to interpret the data in the second Atlas. Clinicians, policymakers, epidemiologists, researchers and consumers have helped us identify the likely drivers of variation for each type of hospitalisation examined and, most importantly, what needs to be done to improve care. The Atlas contains a number of clear recommendations based on the best available evidence. We have aimed not simply to identify an issue, but to identify specific and achievable paths for improvement and further exploration.

What are the reasons for variation?

System factors that favour particular treatment options may explain variation in use of some procedures. For example, higher rates of hysterectomy in some areas of Australia and a higher rate in Australia than in other comparable countries could be due in part to lower uptake of less invasive alternatives, such as the levonorgestrel intrauterine system and endometrial ablation to manage heavy menstrual bleeding. Awareness and availability of less invasive treatments could see more women deciding to receive more conservative evidence-based treatments as an alternative to hysterectomy.

Variation can also stem from 'indication creep', where the use of a procedure or treatment grows beyond the original patient group in which it was trialled and shown to be valuable. A lack of evidence in this new patient group can then lead to clinicians having widely different beliefs about which patients are most likely to benefit from the procedure. For example, lumbar spinal fusion was initially used to treat spinal deformities and fractures, but the use of this operation has extended; it is now also used in some instances when people have symptoms arising from degenerative disease. The variation in use now may reflect differences in clinician opinions on the efficacy of the procedure in this newer patient group.

For other items in the Atlas, the major contributors to variation are clear, although the specific factors may differ between areas. Higher rates of hospitalisation for conditions such as chronic obstructive pulmonary disease (COPD) and diabetes can be explained partly by higher rates of the conditions in some areas of Australia. Differences in the implementation of integrated care, which can help prevent people with chronic diseases deteriorating, are also likely to contribute to the variation in hospitalisations for these conditions. Some hospitalisations for chronic diseases are inevitable. However, the magnitude of the difference between areas of Australia and the sheer number of patients hospitalised highlight the need to do better – in both preventing the underlying conditions and enabling people with chronic diseases to stay as well as they can be.

The patterns in the Atlas also tell a story about inequity. Three often overlapping groups had higher rates of hospitalisations for the chronic diseases examined: people living in remote areas, people living in areas of socioeconomic disadvantage, and Aboriginal and Torres Strait Islander Australians. A whole-of-health-sector approach, and indeed a whole-of-government approach, is needed to make changes that ensure that all Australians have an equal chance for good health.

Where to from here?

More effective models of care

Suboptimal health care in the community can contribute to conditions worsening to the point where hospitalisation is necessary. For example, if diabetes is not well managed, patients risk developing diabetic foot disease. In the most severe cases, this can lead to hospitalisation and amputation of the affected toes, foot or lower leg.

A fundamental component of system changes to reduce these potentially preventable hospitalisations must be a shift to a better integrated primary care system, with a stronger role in coordinating care.[1] Critically, health systems also need to better support patients with chronic disease to reduce the progression of conditions such as COPD, diabetes and heart failure, to minimise disability and improve patients' quality of life.

The implementation of a Health Care Home model, currently being trialled by the Australian Government Department of Health, could greatly improve appropriateness and coordination of care for patients with multiple chronic and complex conditions.[1] The Health Care Home model supports integrated and coordinated team care, and targets the most intensive health services to those with the greatest needs.[2] The model allows better sharing of information between patients and members of the healthcare team using My Health Record. Evidence-based planning tools created for Health Care Homes further support high-quality care. Trials of similar models in the United States have shown reductions in hospitalisations, as well as reduced costs.[3]

Overview

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 unwarranted 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:

- 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 accessible evidence for 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 Australians 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.

What is appropriate care?

Appropriate care means offering patients care that optimises benefits and minimises harms, and is based on the best available evidence.

In the management of specific conditions, we can learn from examples of things going right – the Atlas contains many such positive stories, where clinical teams are leading the delivery of best achievable care. For example, an Australian multidisciplinary, integrated primary and secondary care diabetes service in Brisbane has approximately halved the rate of hospitalisations due to diabetes complications.[4] The success of this model is particularly encouraging given that the patients had complex type 2 diabetes and were from socioeconomically disadvantaged areas.

Making health care truly accessible for Aboriginal and Torres Strait Islander Australians

Much higher rates of the potentially preventable hospitalisations examined in the Atlas among Aboriginal and Torres Strait Islander Australians compared with other Australians point to poor access to appropriate care in the community, as well as a higher burden of the factors causing chronic diseases, such as social disadvantage, smoking and obesity. Conversely, for some procedures, such as cataract surgery, the substantially lower rates of treatment despite a higher prevalence of poor sight due to cataract indicate inadequate service delivery, which is not tailored to the population's needs.

For Aboriginal and Torres Strait Islander Australians, availability of health services in urban and regional centres does not necessarily equate to accessibility.[5] Services need to be not only affordable and physically accessible, but also culturally safe. For Aboriginal and Torres Strait Islander Australians living in remote areas, physical distances compound the challenges to accessing culturally safe health care.

The National Safety and Quality Health Service (NSQHS) Standards, developed by the Commission, provide a nationally consistent statement about the level of care consumers can expect from health service organisations. Accreditation to the NSQHS Standards is mandatory for all hospitals and day procedure facilities. The NSQHS Standards (second edition) include a number of actions that focus specifically on providing care for Aboriginal and Torres Strait Islander Australians. These include strategies to improve the cultural competency and cultural awareness of the health workforce to meet the needs of Aboriginal and Torres Strait Islander patients, and health services working in partnership with Aboriginal and Torres Strait Islander Australians from local communities to meet their healthcare needs. Aboriginal and Torres Strait Islander staff are key to engaging with Aboriginal and Torres Strait Islander patients, and a sufficient number of trained Aboriginal and Torres Strait Islander health workers is essential for service success.

Several innovative models of care have reduced hospitalisations and improved health outcomes among Aboriginal and Torres Strait Islander Australians. For example, a model of out-of-hospital health care has produced encouraging reductions in hospitalisations among Aboriginal and Torres Strait Islander children in both urban and remote areas of Western Australia. The program is based on nurse-led coordination of care, and partnerships with Aboriginal Community Controlled Health Services, general practitioners, allied health professionals, specialist doctors and other community health workers.[6] Significant decreases in hospitalisations and emergency department presentations, and improved attendance at out-of-hospital appointments were seen during the four-year evaluation of the program.

Outreach services are also showing promise. For example, a home-based outreach case management program that provides holistic, multidisciplinary care for Aboriginal and Torres Strait Islander Australians with diabetes has achieved significant improvements in blood pressure and diabetes control.[7]

Preventing chronic conditions

Smoking is a contributor to many of the chronic conditions examined in the Atlas. The smoking rate among Aboriginal and Torres Strait Islander Australians was 41% in 2014–15, more than twice the rate among non-Indigenous Australians.[8] Addressing smoking, particularly among Aboriginal and Torres Strait Islander Australians, people at socioeconomic disadvantage and people living in remote areas, could help reduce the disparity in potentially preventable hospitalisations seen in these groups and the hospitalisation rate for smoking-related conditions overall.[9]

Supporting healthy eating and physical activity through prevention programs and supportive environments also has great potential to prevent obesity and reduce rates of many conditions highlighted in the Atlas, particularly type 2 diabetes and coronary heart disease. Reducing rates of obesity would also have a substantial impact on the prevalence of osteoarthritis of the knee and the demand for knee replacement.

Greater use of health technology

Technology is part of the solution for improving access to health care in remote areas. Telehealth is being used effectively in some parts of Australia.[10] However, this technology has the potential for much wider use to improve access to health care in regional and remote areas. For example, a trial of telephone support for people with heart failure in rural and regional areas has shown a 30% reduction in rates of death or hospitalisation compared with usual care.[11]

Patients as active partners in their care

So much in health is about self-care. The huge potential for lifelong good health depends on individual understanding of the importance of good food, a healthy weight and regular exercise. People also need to be able – and motivated – to eat well and exercise. When illness occurs, 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.

Overview

Supporting patients to be active and effective partners in their health care has the potential to greatly improve health outcomes.[12,13]

Addressing health literacy is vital to ensure that patients understand health information and have the confidence to act on it. Improving health literacy and the quality of health information will also help patients evaluate treatment options through understanding their risks and likely benefits. This is particularly important for procedures with uncertain benefits and risks of long-lasting consequences.

Better use of data

Collecting data through clinical quality registries on symptoms before treatment and clinical outcomes, including patient-reported outcomes, will fill gaps in knowledge where the evidence on benefits is unclear. This is particularly important for new surgical techniques and devices, and use of established procedures in new patient groups that are likely to have a major impact on patient outcomes or health system use.

One of the issues with health data collection in Australia and elsewhere is that information about the health care that patients receive is split across multiple collections, such as hospital statistics, Medicare Benefits Schedule and Pharmaceutical Benefits Scheme datasets. It is difficult to form an accurate picture of healthcare quality without tracking experiences across these data divides, but this has proved difficult. Linking data from different sources can let us drill down more deeply into the patterns of healthcare use, and gives a more detailed picture of the investigation and treatment of health problems. For example, linked data could show whether someone who has a heart attack in a regional area of Australia has the same chance of having the recommended investigations and treatment as someone in the city. The data could also show whether, following a heart attack, people have equal access to good secondary preventive care, regardless of where they live. Better access to linked data in the future will allow this kind of detailed analysis on a national scale.

Data are also a tool for health services to examine their practice at a local level. The data in the Atlas allow comparison of rates of particular interventions in local areas, and should prompt reflection on the underlying reasons where large variation is found.

Conclusion

The patterns shown in the maps in this Atlas and the accompanying commentaries show that there are many opportunities for making meaningful changes in Australia's delivery of health care. Our recommendations highlight that action is needed at all levels – from addressing the social determinants of health through to better data collection, system changes and providing the best supports for individual clinician–patient interactions.

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7 June 2017

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Key findings and recommendations

This Atlas provides a fascinating insight into health care use across Australia. Sometimes variation in health care use reflects differences in the clinical needs of a population or differences in patient preferences and values. Yet variation can also be a sign that some people are missing out on the care they need or not receiving appropriate care. This represents unwarranted variation.

Addressing unwarranted variation can help ensure that more people receive appropriate care. Measurement of variation is the first step. Acting to improve the appropriateness of care where indicated is the next step.

This section presents the key findings and the Commission's recommendations for action.

1. Chronic disease and infection: potentially preventable hospitalisations

Almost half (47%) of the potentially preventable hospitalisations in Australia in 2014–15 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. Substantial variation was observed between local areas (Statistical Area 3 – SA3) in the rates of hospitalisation for each condition. Variation was greatest for COPD (16-fold difference), diabetes complications and cellulitis (approximately 12-fold difference for both). Rates of hospitalisation for heart failure and UTIs varied seven-fold and six-fold, respectively.

The high hospitalisation rates and substantial variation reported for the chronic diseases in this chapter show that recommended care is not always provided for people with these conditions. Even with the significant funding provided through Medicare to better coordinate primary care for people with complex chronic disease, fragmented health services contribute 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 consult health providers. For all the conditions examined in this chapter, hospitalisation rates were higher among Aboriginal and Torres Strait Islander Australians, people living in areas of relative socioeconomic disadvantage, and those living in remote areas.

A fundamental component of system changes to reduce potentially preventable hospitalisations must be a shift to a better integrated primary care system, with a stronger focus on coordinating care. Critically, health systems also need to become better at managing disease where it already exists, to reduce the progression of chronic disease, minimise negative impacts and improve patients' quality of life.

Patients live with their chronic disease all day, every day. They have to be put at the centre of prevention and management, particularly in primary care. The implementation of a Health Care Home model will greatly improve appropriateness and coordination of care for patients with multiple chronic and complex conditions.

Data item	Range across local areas^ per 100,000	Times difference	Times difference excluding top and bottom 10%	Number over one year
1.1 Chronic obstructive pulmonary disease Hospitalisations, all ages	63 to 990	15.7	3.3	66,250
1.2 Heart failure Hospitalisations, all ages	90 to 632	7.0	2.1	55,511
1.3 Cellulitis Hospitalisations, all ages	102 to 1,262	12.4	2.9	59,466
1.4 Kidney and urinary tract infections Hospitalisations, all ages	140 to 899	6.4	2.2	73,277
1.5 Diabetes complications Hospitalisations, all ages	52 to 601	11.6	2.8	43,737

^ Statistical Area 3

Key findings and recommendations

1. Chronic disease and infection: potentially preventable hospitalisations

Recommendations

1a. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to follow the following principles in developing chronic disease management programs, as described in the report of the Primary Health Care Advisory Group *Better Outcomes for People with Chronic and Complex Health Conditions* and consistent with the National Strategic Framework for Chronic Conditions:

- i. Voluntary patient enrolment with a practice or healthcare provider to provide a clinical 'home base' for coordination of, management of, and ongoing support for, the patient's care
- ii. 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
- iii. A risk stratification approach that supports identification of patients with high coordination and multiple provider needs, to ensure personalisation of service provision
- iv. Enhanced access by patients to care provided by their Health Care Home; this may include in-hours support by telephone, email or videoconferencing, and effective access to after-hours advice or care
- v. Nomination by patients of a preferred clinician, who is aware of their problems, priorities and wishes, and is responsible for their care coordination
- vi. 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
- vii. 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
- viii. Data collection and sharing by patients and their healthcare teams to measure patient health outcomes and improve performance.

Many patients will recognise features of the Health Care Home in their existing general practices.

Chronic obstructive pulmonary disease

1b. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to promote appropriate care for the management of people with chronic obstructive pulmonary disease (COPD) using:

- i. *The COPD-X Plan: Australian and New Zealand Guidelines for the Management of Chronic Obstructive Pulmonary Disease 2016* as the routine model of care
- ii. Targeted anti-smoking programs in populations with high smoking rates, including areas with a high proportion of the population who are Aboriginal and Torres Strait Islander Australians, rural and remote areas, and areas of socioeconomic disadvantage.

1c. State and territory health departments to develop culturally appropriate pulmonary rehabilitation programs for Aboriginal and Torres Strait Islander Australians with COPD.

Heart failure

1d. 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

1e. 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 using:

  i. The guidelines *General Practice Management of Type 2 Diabetes 2016–18* as the routine model of care

  ii. The *Australian National Diabetes Strategy 2016–2020* to ensure the provision of integrated models of care

  iii. Performance management frameworks to assess compliance of care with relevant diabetes treatment guidelines.

All conditions associated with potentially preventable hospitalisations

1f. The Commission, in collaboration with Aboriginal and Torres Strait Islander Australians and relevant organisations, to produce resources for addressing health literacy.

1g. State and territory health departments, in collaboration with Aboriginal and Torres Strait Islander Australians, and Australian Government health agencies, to continue to invest in whole-of-government approaches for addressing the social determinants of health for Aboriginal and Torres Strait Islander Australians, people in areas of socioeconomic disadvantage, and people living in outer regional and remote areas.

1h. State and territory health departments to investigate funding and pricing strategies within the activity-based funding framework to promote appropriate care for people with conditions associated with potentially preventable hospitalisations, with a particular focus on potentially avoidable hospital readmissions.

1i. Australian, and state and territory health departments to develop appropriate service specifications, evidence-based education and training, and other tools to enable providers, patients, practice managers and the broader healthcare sector to engage with chronic disease management programs, such as Health Care Homes.

1j. Primary Health Networks to use HealthPathways, where practicable, to improve the coordination of care across providers for chronic conditions.

Key findings and recommendations

2. Cardiovascular conditions

Analysis of Statistical Area Level 3 (SA3) rates showed a nine-fold variation in hospitalisations for MI and a four-fold variation for hospitalisations for atrial fibrillation as a primary diagnosis.

In Australia, cardiovascular conditions are the leading cause of death and are responsible for 13% of hospitalisations. To address rates of cardiovascular hospitalisations, risk factors must be reduced through public health initiatives. System changes are needed to improve access to primary health care for high-risk groups, and primary and secondary prevention for individuals needs to improve. Increasing the health literacy of high-risk groups and their ability to self-manage risk factors is a vital component of any strategy to reduce hospitalisations due to cardiovascular diseases.

Hospitalisation rates for MI were three times higher among Aboriginal and Torres Strait Islander Australians than other Australians. Higher rates of hospitalisation for MI were also found in areas of socioeconomic disadvantage. Reducing smoking rates could decrease the number of hospitalisations for MI and atrial fibrillation significantly. Addressing the higher rates of smoking among Aboriginal and Torres Strait Islander Australians, people at socioeconomic disadvantage, and people living in remote areas could reduce cardiovascular hospitalisations in these groups, in particular.

Currently, routinely collected data are not sufficiently detailed to allow measurement of variations in outcomes after cardiovascular events, and to relate these to the appropriateness and effectiveness of care. Linking routine datasets would provide more information about patterns of cardiac care in Australia. Collecting more detailed data on cardiac care, ideally through a clinical quality registry, would enable more intensive analysis of treatments and outcomes, helping to guide future improvements in care. Routine review of benchmarked clinical performance and outcomes data through clinical quality registries could also improve cardiac care.

The original intent of this chapter was to examine patterns of use of many more investigations and therapies for cardiovascular disease. However, the available data would not have produced reliable results. For example, difficulties in tracking the care of patients transferred between hospitals meant that accurate pictures of variation in the use of interventions for MI could not be produced. Developing capabilities to use linked data will enable variation in care for patients with cardiac disease to be explored.

Data item	Range across local areas^ per 100,000	Times difference	Times difference excluding top and bottom 10%	Number over one year
2.1 Acute myocardial infarction Hospitalisations, people aged 35–84 years	105 to 905	8.6	2.6	32,388
2.2 Atrial fibrillation Hospitalisations, people aged 35 years and over	192 to 740	3.9	1.7	58,608

^ Statistical Area 3

Recommendations

2a. State and territory health departments to examine variation in the timeliness and access of patients to appropriate investigations and interventions for suspected acute myocardial infarction.

2b. The Commission to develop a clinical care standard on the management of atrial fibrillation.

Key findings and recommendations

3. Women's health and maternity

This Atlas examined variation in three women's healthcare interventions and two maternity care items. Analysis by Statistical Area Level 3 (SA3) showed marked rate differences across Australia in hysterectomy, endometrial ablation, cervical loop excision and cervical laser ablation, and third- and fourth-degree perineal tears.

Hysterectomy (surgical removal of the uterus – womb) and endometrial ablation (surgical removal of the inner lining of the uterus) are commonly used to treat heavy menstrual bleeding. The hysterectomy rate in Australia is one of the highest reported in the Organisation for Economic Co-operation and Development (OECD), and there is concern that hysterectomy may be overused to treat benign conditions.

This Atlas observed a seven-fold difference between the lowest and highest rates of hysterectomy and a 21-fold difference in rates of endometrial ablation. This finding extends understanding of variation from the first Atlas, and confirms there is marked variation in use of each procedure across Australia. Higher rates of hysterectomy in some areas could be due, in part, to lower use of less invasive treatments for heavy menstrual bleeding. Although hysterectomy stops menstrual bleeding in all women, it is a major surgical procedure. Pharmaceutical treatment is recommended as the first-line treatment for heavy menstrual bleeding, and endometrial ablation as the first surgical option, if appropriate and the woman prefers it. Improving access to these effective treatments may help some women avoid the need for hysterectomy.

This Atlas observed an 18-fold variation in rates of cervical loop excision or cervical laser ablation. Expanding availability of these precancer treatments in outpatient settings and ensuring use consistent with guidelines may reduce this variation.

In selected women aged 20–34 years, the Atlas observed a three-fold variation in caesarean section rates. Australia has a higher rate of caesarean section than the OECD reported average. Ensuring that young women with uncomplicated pregnancies have information and access to services that support their choices for first birth will help ensure the appropriate use of caesarean section.

In all women giving birth vaginally, the Atlas observed a 12-fold variation in rates of third- and fourth-degree perineal tears. Developing an agreed national standard of care to minimise the risk of perineal trauma in childbirth is a priority.

Data item	Range across local areas^ per 100,000	Times difference	Times difference excluding top and bottom 10%	Number over one year
3.1 Hysterectomy Hospitalisations, women aged 15 years and over	115 to 763	6.6	2.1	27,586

Data item	Range across local areas^ per 100,000	Times difference	Times difference excluding top and bottom 10%	Number over three years
3.2 Endometrial ablation Hospitalisations, women aged 15 years and over	19 to 390	20.5	4.2	28,606
3.3 Cervical loop excision cervical laser ablation Hospitalisations, women aged 15 years and over	23 to 408	17.7	2.1	43,920

Data item	Range across local areas^ per 1,000 selected women	Times difference	Times difference excluding top and bottom 10%	Number over three years
3.4 Caesarean section, selected women aged 20–34 years	147 to 438	3.0	1.5	75,018

Data item	Range across local areas^ per 1,000 vaginal births	Times difference	Times difference excluding top and bottom 10%	Number over three years
3.5 Third- and fourth-degree perineal tears, all vaginal births	6 to 71	11.8	2.9	18,463

^ Statistical Area 3

Key findings and recommendations

3. Women's health and maternity

Recommendations

Hysterectomy and endometrial ablation

3a. The Medicare Benefits Schedule (MBS) Review Taskforce to ensure that MBS item descriptors relating to treatments for heavy menstrual bleeding are aligned with the care described in the Heavy Menstrual Bleeding Clinical Care Standard.

3b. State and territory health departments to ensure that women who have heavy menstrual bleeding have been offered clinically appropriate treatment options, as described in the Heavy Menstrual Bleeding Clinical Care Standard, before they are placed on a waiting list for hysterectomy.

3c. Relevant professional colleges to include intrauterine device insertion within their advanced training programs. They should also review incentives for clinicians to participate in continuing professional development training programs on intrauterine device insertion, and access to such programs, to increase the number of clinicians skilled in insertion of the levonorgestrel intrauterine system.

Cervical loop excision and cervical laser ablation

3d. State and territory health departments to implement outpatient models of care for cervical loop excision and cervical laser ablation to ensure that, if clinically appropriate, patients can be offered treatment in outpatient settings.

Caesarean section

3e. The Commission to work with relevant colleges and specialist societies to develop decision support tools on birth options for pregnant women aged 34 years and under without complications for birth.

3f. Maternity health services to ensure regular clinical review of perinatal data (National Core Maternity Indicators and additional data from perinatal datasets) by a multidisciplinary team that includes neonatologists.

3g. The Australian Institute of Health and Welfare, in collaboration with data providers and other stakeholders, to investigate ways of improving reporting of caesarean section rates according to obstetric and neonatal risk factors, such as use of the Robson classification.

3h. The Commission to refer the Atlas findings to the Community Care and Population Health Principal Committee of the Australian Health Ministers' Advisory Council for consideration in relation to the inclusion of caesarean section <39 weeks (273 days) without obstetric or medical indication as a National Core Maternity Indicator (as described in the AIHW report *National Core Maternity Indicators 2010–2013*, released in 2016).

Third- and fourth-degree perineal tears

3i. Relevant medical and midwifery professional colleges to develop, agree on and disseminate an agreed model of care for the second stage of labour to minimise the risk of severe perineal trauma.

3j. The Commission to work with Women's Healthcare Australasia, and relevant colleges and specialist societies to develop a clinical care standard on perineal care during vaginal birth, to improve national consistency of best practice for the prevention, recognition and management of severe perineal trauma.

4. Surgical interventions

This Atlas examined variation in six surgical interventions by Statistical Area Level 3 (SA3). Lumbar spinal fusion showed the largest variation between areas, with a seven-fold difference between the highest and lowest rates. Rates of spinal decompression showed a five-fold difference. A four-fold difference was found for rates of knee replacement, laparoscopic cholecystectomy, appendicectomy and cataract surgery.

For some of these procedures, 'indication creep' and differing clinician views of the value of the operation in new patient populations are likely to have contributed to the variation. For example, spinal fusion surgery was initially used primarily to treat fractures and deformities of the spine, but its use has now broadened to include treatment of degenerative spine disorders. In the case of cholecystectomy, introduction of the laparoscopic technique was followed by a sharp rise in its use. This may have been partly due to a lowering of the threshold for the procedure.

Wide variation in use of a surgical procedure may reflect a lack of agreement on its indications. For procedures with uncertain benefits outside a small patient population, substantial variation raises the likelihood that rates are too high in some areas. For the interventions in this chapter where the evidence is unclear, determining whether there are subgroups of patients who are more likely to benefit from the procedure should be a priority. Identification of patients who are likely to benefit would be aided by routine collection and analysis of the severity and nature of patients' presenting symptoms, and patient-reported outcomes after surgery. Limiting spinal fusion procedures undertaken because of low back pain has been recommended in the United Kingdom.

Ensuring that patients understand the evidence about the likelihood of risks and benefits is particularly important if the degree of benefit from surgical treatment is not clear. Accessible information, improved health literacy and high-quality tools for shared decision-making would support patients to make better informed choices about care.

The variation in rates of cataract surgery highlights inequity of access. The rate of cataract surgery hospitalisations for Aboriginal and Torres Strait Islander Australians was 80% of the rate for other Australians.

Key findings and recommendations

4. Surgical interventions

Data item	Range across local areas^ per 100,000	Times difference	Times difference excluding top and bottom 10%	Number over one year
4.1 Knee replacement Hospitalisations, people aged 18 years and over	128 to 507	4.0	1.9	52,039
(See table below for 4.2 and 4.3)				
4.4 Laparoscopic cholecystectomy Hospitalisations, all ages	89 to 392	4.4	2.0	49,874
4.5 Appendicectomy Hospitalisations, all ages	103 to 360	3.5	1.7	40,752
4.6 Cataract surgery Hospitalisations, people aged 40 years and over	835 to 3,279	3.9	1.6	245,797

Data item	Range across local areas^ per 100,000	Times difference	Times difference excluding top and bottom 10%	Number over three years
4.2 Lumbar spinal decompression Hospitalisations, people aged 18 years and over	30 to 156	5.2	2.0	44,169
4.3 Lumbar spinal fusion Hospitalisations, people aged 18 years and over	10 to 69	6.9	2.5	14,746

^ Statistical Area 3

Recommendations

Knee replacement

4a. The Medicare Benefits Schedule (MBS) Review Taskforce to ensure that MBS descriptors reflect the care described in the Osteoarthritis of the Knee Clinical Care Standard.

4b. State and territory health departments to use the Osteoarthritis of the Knee Clinical Care Standard to promote appropriate care for the management of people with knee pain, including conservative non-surgical management using a combination of non-pharmacological and pharmacological treatments.

4c. State and territory health departments to promote timely access to joint replacement or joint-conserving surgery when conservative management no longer provides adequate pain relief or maintenance of function.

Lumbar spinal decompression and fusion

4d The Commission to lead work with relevant professional colleges and societies to develop an Australian guideline for management of low back pain and sciatica, to promote appropriate care for people with these conditions.
This should be based on a modification of the 2016 National Institute for Health and Care Excellence guideline *Low Back Pain and Sciatica in Over 16s: Assessment and Management*, and any other relevant high-quality Australian and international evidence.

4e. State and territory health departments, and relevant colleges and specialist societies to implement the Australian guideline on low back pain and sciatica to promote appropriate care for people with low back pain and sciatica.

4f. The Commission to work with relevant specialists and experts to identify the next steps needed to define and deliver appropriate care for low back pain and sciatica.

4g. The Spine Society of Australia to publish the outcome of the pilot trial of the Australian Spine Registry. The Commission to work with the Spine Society of Australia to develop a business case for the development of a clinical quality registry for all patients undergoing spinal fusion and decompression surgery in Australia. All patients who have spinal fusion and decompression operations in Australia would be entered on this registry unless they opt out. The registry is to be established and operated according to the Framework for Australian Clinical Quality Registries.

Laparoscopic cholecystectomy and appendicectomy

4h. State and territory health departments to lead work with relevant professional colleges and societies to develop clinical guidance on timing, imaging and thresholds for surgery for appendicectomy and laparoscopic cholecystectomy.

4i. State and territory health departments, and relevant colleges and specialist societies to promote, disseminate and implement guidance on surgery thresholds for biliary disease and abdominal pain. To maximise implementation, the guidance should be incorporated within care pathways.

4j. The Commission to work with relevant professional colleges and specialist societies and HealthPACT to develop a technology brief to examine the evidence for the use of intraoperative cholangiography to delineate the biliary anatomy and to detect stones in the common bile duct.

Cataract surgery

4k. The Commission to develop a clinical care standard for cataract surgery, and the MBS Review Taskforce to ensure that MBS descriptors reflect the care described in the clinical care standard.

4l. State and territory health departments to work with the Aboriginal Community Controlled Health Service sector to ensure culturally appropriate, ongoing and consistent services for cataract assessment and cataract surgery in areas where these are needed.

Key findings and recommendations

General recommendations

Driving appropriateness of care

5a. The MBS Review Taskforce Committees to identify a range of educational and regulatory mechanisms to improve appropriate test ordering and interpretation. These might include clinical decision support, restrictions on ordering, individualised audit and feedback, and guidance on referrals to secondary care. Funders, test providers and clinicians to ensure these are used in practice and their effectiveness monitored.

5b. The Australian Government and state and territory health departments to promote routine measurement and recording of obesity markers, such as body mass index (BMI) and waist circumference for all adults and children who attend primary care or an outpatient clinic, or who are admitted to a health service, to facilitate strategies to manage obesity being included as options in healthcare decision-making.

5c. The Commission to work with relevant colleges, epidemiological experts and government agencies to develop methods for estimating population needs (expected rates and ranges) of specified interventions based on clinical consensus on best practice and the body of available academic literature.

5d. The Council of Presidents of Medical Colleges to progress its work on obesity by identifying actions that can be taken by professional colleges and societies to improve the prevention and management of obesity.

5e. Professional colleges and societies to work in partnership with relevant organisations within the Aboriginal and Torres Strait Islander health sector to provide cultural safety competency training to their members as part of continuing professional development.

5f. The Commission to publish a set of core common questions for patient reported outcome measures (PROMS) for use in Australia.

5g. The Commission to work with the states and territories, the private healthcare sector and HealthPACT to identify best-practice models for the introduction of new technology in the Australian clinical setting and develop guidance, as required, to support appropriate uptake of new medical technology.

Supporting investigation of variation

5h. The Commission to develop, in collaboration with professional colleges, state and territory health departments and health service representatives (public and private), a guide for clinicians, health service managers and governing bodies of health services to investigate variation in health care and improve appropriateness of care.

5i. The Commission to work with professional colleges and specialist societies to develop resources for clinical leaders, heads of departments and managers on use of data to investigate variation and improve appropriateness of care, consistent with action 1.28 in the National Safety and Quality Health Service Standards (second edition). The resources should be suitable for adoption in training and continuing professional development curriculums for colleges.

5j. Health services to routinely monitor variation in clinical practice and patient outcomes, provide feedback to clinicians on their practice, and take action to improve care, consistent with action 1.28 in the National Safety and Quality Health Service Standards (second edition).

Improving data use

5k. The Commission to hold a roundtable meeting of policymakers, researchers, and clinicians experienced in using routine data sources to investigate variation, to identify ways in which those data sources could be better used for analysing appropriateness of care.

5l. The Australian Institute of Health and Welfare (AIHW) to develop the capacity for national linked data for examining variations in clinical practice, appropriateness of care and patient outcomes.

5m. The Commission to work with the AIHW, state and territory health departments, and researchers to use linked data for examining variations in clinical practice, and to support states and territories to drive appropriateness of care and patient outcomes. Cardiovascular disease to be an initial priority for this work.

5n. The Health Workforce Division of the Australian Government Department of Health to work with the Australian Health Practitioner Regulation Agency (AHPRA) to expand data collection on clinician location of practice so the extent of practice in outer regional and remote areas is quantified. Professional colleges, and states and territories, to use the expanded data on workforce statistics to inform the number and location of training positions.

5o. The Commission to work with the AIHW, state and territory health departments, and researchers to investigate methodologies for monitoring changes in unwarranted variation over time, and the impacts of actions to reduce variation.

About the Atlas

Who has developed the Atlas?

The Commission, in collaboration with the Australian Institute of Health and Welfare (AIHW), has led the development of the 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
- Consumers Health Forum Australia.

An oversight and advisory structure, including a clinical and consumer advisory group (Atlas Advisory Group), and a state and territory advisory group (Jurisdictional Advisory Group), has ensured wide-ranging input into the development of the Atlas. For each chapter, a Topic Expert Group of lead clinicians and academic experts from across Australia was established. The Topic Expert Groups have provided advice at each stage of development, from selection of the clinical items to interpretation of the Atlas findings. The AIHW conducted the data extraction and analysis, produced the maps and graphs and provided expertise in interpreting the data.

How was it developed?

The Atlas examines a selection of clinical items (hospitalisations, procedures or complications) in a range of clinical areas. A large number of clinical items were nominated and considered for inclusion, but many were not suitable, either because of poor data quality or because small numbers limited the capacity to analyse and present the data. The final selection of interventions examined 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.

The clinical items that met these criteria were reviewed by the Atlas Advisory Group, the Jurisdictional Advisory Group and the Commission's executive. Following confirmation of clinical items for analysis, Topic Expert Groups were established around 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 Atlas Advisory Group, the Jurisdictional Advisory Group, the Topic Expert Groups and an epidemiologist reviewed the results.

The advisory and expert groups also provided content for, and reviewed, the clinical commentary. 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 commentary was also reviewed by:

- The expert epidemiologist
- The AIHW
- The National Aboriginal and Torres Strait Islander Health Standing Committee
- Relevant clinical colleges.

More than 150 clinicians, researchers, policy experts and consumer representatives have examined and commented on the data.

What does the Atlas measure?

The data in the Atlas show the rates of hospitalisations for featured conditions and procedures in each geographic area. The number of times the type of hospitalisation occurred in an area is divided by the population of that area. The rate is then age and sex standardised to allow comparisons between populations with different age and sex structures. All rates are based on the patient's place of residence, not the location of the hospital or health service.

Why are the data age standardised and sex standardised?

The data in the Atlas have been age standardised (that is, controlled for age) so fair comparisons can be made between areas that may have different age structures. Without age standardisation, it would be difficult to know whether higher rates of hospitalisation 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 (except for the women's health and maternity items), so that having a larger proportion of males or females in an area does not influence the findings.

Age standardisation involves calculating the rate in each area as if it had a standard proportion of older and younger people. Sex standardisation involves calculating the rate in each area as if it 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/or sex structure of the population have been accounted for.

About the Atlas

What does the magnitude of variation mean?

The magnitude of variation (or ‘fold variation’) shows how large the difference is between the lowest and highest rates of each type of hospitalisation, procedure or complication. For example, if the lowest rate of hospitalisation for a condition was 10 per 100,000 people and the highest rate was 20 per 100,000 people, the rate of hospitalisation shows two-fold variation.

Is the overall Australian rate always the right rate?

No. The overall rate of hospitalisation or use of a procedure is not necessarily the right rate – in some cases, the overall rate of use of a procedure may be too high or too low, and, in many cases, the right rate has not been defined. With a complication that cannot be prevented in all cases, the right rate is also difficult to define.

About the data

The Atlas provides information on 18 clinical items, grouped into four clinical themes, covering hospitalisations for medical care or surgical procedures, and complications from care (one item).

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

The Atlas uses data sourced from two national health datasets:

- National Hospital Morbidity Database (NHMD)
- National Perinatal Data Collection (NPDC).

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

- NHMD items are analysed for the year 2014–15, or the aggregation of three financial years 2012–13 to 2014–15 for clinical items with small numbers.
- NPDC items are analysed by the aggregation of three calendar years 2012, 2013 and 2014, because of small numbers.

For hospitalisations, the rates are determined by the person’s place of residence as recorded at the time of hospitalisations.

The geographic local areas used are Australian Bureau of Statistics (ABS) standard geographical regions known as the Statistical Area Level 3 (SA3). SA3s provide a standardised regional breakdown to assist in analysing data at the regional level. SA3s generally have populations of between 30,000 and 130,000. To enable comparisons, local areas are also grouped by state and territory, and by remoteness and socioeconomic status. The remoteness categories used are from the ABS 2011 Australian Statistical Geography Standard. The socioeconomic quintiles are based on the ABS 2011 Index of Relative Socio-Economic Disadvantage at the SA1 level. The remote and very remote categories were combined into one category to create four remoteness categories.

The Atlas presents age- and sex-standardised rates per 100,000 people for all interventions except the women’s health and maternity interventions. For the women’s health interventions, the data presented are age-standardised rates per 100,000 women. For the maternity items, the data presented are age-standardised rates per 1,000 selected women or vaginal births.

Age- and sex-standardised rates were calculated for all data using the ABS Estimated Resident Population report as at 30 June 2001 (based on the 2001 Census of Population and Housing).

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

Data limitations

The clinical items describe variation in interventions and 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 further analysis and discussion about the reasons for any variation at local, regional, and state and territory levels.

The hospital data from the NHMD exclude episodes of non-admitted care provided in outpatient clinics or emergency departments. Because there is no standardised admissions policy across states and territories, analysis of variation for some procedures should take into account possible differences in admission practices and policies among providers, and states and territories. For example, some same-day procedures such as cervical loop excision and cervical laser ablation can be performed in either non-admitted or admitted care settings.

Some results have been suppressed for two reasons:

- To protect confidentiality if they could potentially identify a patient – for example, when the number of services, or the population used to calculate rates, is very small. A small number of SA3s have a very small or zero population – these are mainly very large national parks close to the outskirts of major cities. The data for these SA3s have been suppressed for the SA3-level analysis. However, the data from suppressed SA3s are included for larger area analysis.
- To account for low numbers of events or very small populations – these rates are more susceptible to random fluctuations.

For further information on the data limitations, refer to the individual clinical items. Detailed information on the methods used to calculate the data is provided in the Technical Supplement.

There may be chance fluctuations in the data from year to year. Three years of data for each indicator is available online, except for the indicators that are based on three years of data. The additional data are available at www.safetyandquality.gov.au/atlas.

Data for Aboriginal and Torres Strait Islander Australians

Analyses in this report have not been adjusted to account for the under-identification of Aboriginal and Torres Strait Islander Australians in any of the datasets used. 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.

About the Atlas

Maps and graphs

Data for the 18 clinical items in the Atlas are displayed as both graphs and maps to show variation in rates by geographic location of patient residence.

On the map for each clinical item, age- and sex-standardised rates in each of the geographic areas are ranked from lowest to highest and then split into deciles. These are displayed with colour gradients, where darker colours represent higher rates and lighter colours represent lower rates. Separate maps show the greater metropolitan areas in more detail.

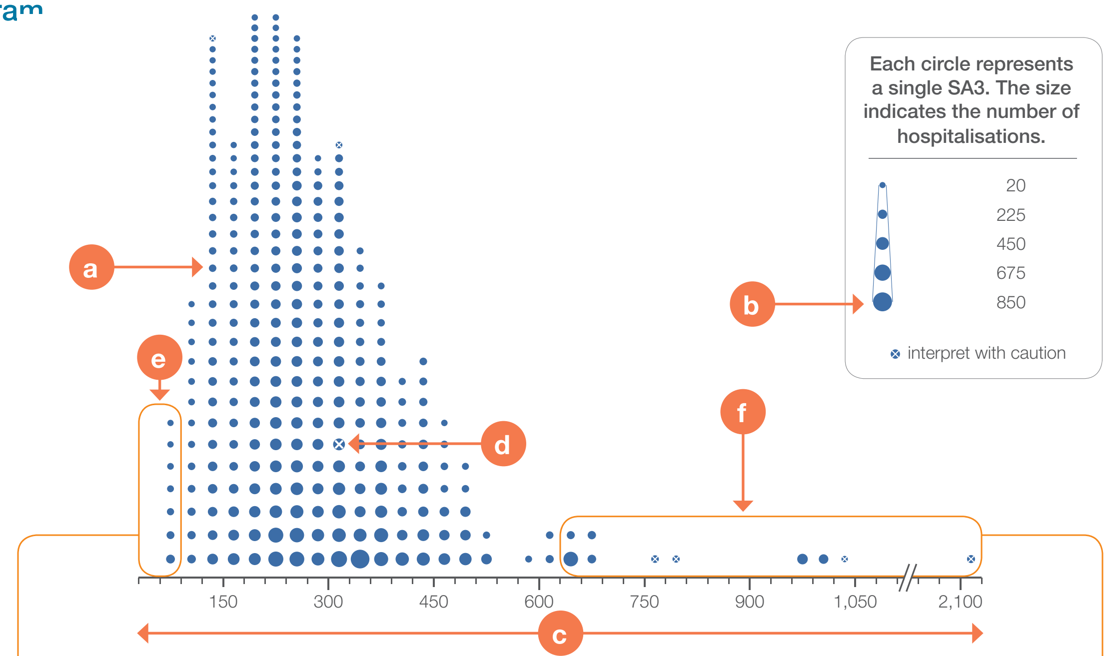
Figures are provided for each item. Each figure presents a different analysis of the data:

- Rate by state and territory and Indigenous status
- Rate by state and territory and patient funding status
- Number and rates by local area, listing the areas with the lowest and highest rates
- Number and rates by state and territory
- Number and rates by remoteness and socioeconomic status.

Further information on interpreting the figures is provided on pages 35–37.

How to interpret our data visualisations

Histogram



Lowest rate areas			
SA3	State	Rate	Hospitalisations
Example 1	State	63	32
Example 2	State	71	71
Example 3	State	72	135

Highest rate areas			
SA3	State	Rate	Hospitalisations
Example 1	State	2,103*	147
Example 2	State	1,043*	42
Example 3	State	990	244

d

a

What does the circle represent

Each circle on the graph represents an SA3. SA3s are geographical areas defined by the Australian Bureau of Statistics that provide a standardised regional breakdown of Australia. SA3s generally have populations between 30,000 and 130,000.

b

Circle size

The size of the circle indicates how many clinical events have been recorded for people living in that SA3. A large circle represents an SA3 with a greater number of clinical events than SA3s with a smaller circle. Each histogram is accompanied by a legend. The numbers represented by each circle size are shown in the legend for that histogram.

c

Horizontal axis

The horizontal axis shows the age- and sex-standardised rates for the clinical item. Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

d

Crosses and asterisks

A circle with a cross or an SA3 rate that has an asterisk indicates a rate that should be interpreted with caution. For more information on rates published with caution, see the suppression protocol in the Technical Supplement.

e

Lowest rates

Circles in the box on the left are SA3s with the lowest rates in Australia. The names, rates and numbers of clinical items recorded for those SA3s are listed in the table below the histogram.

f

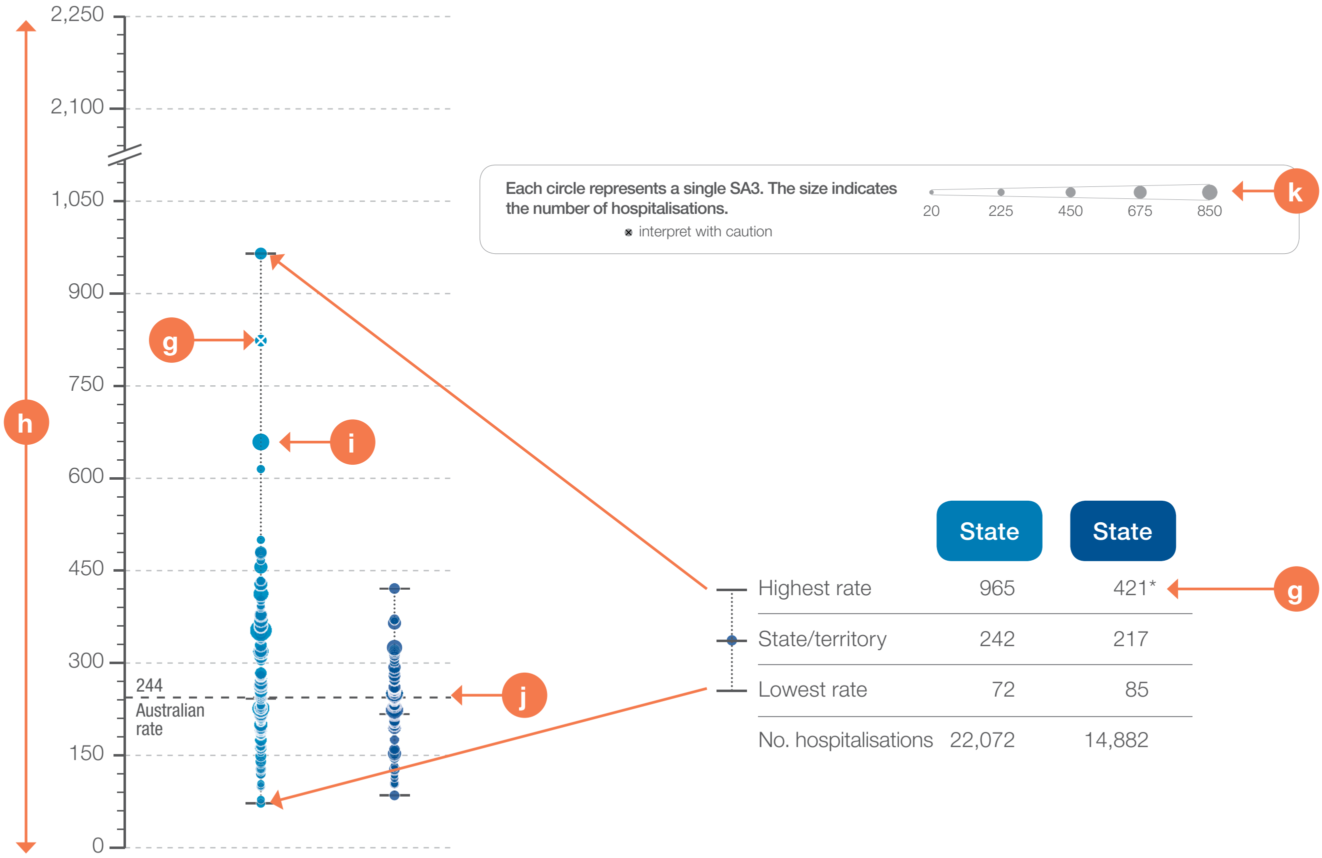
Highest rates

Circles in the box on the right are SA3s with the highest rates in Australia. The names, rates and numbers of clinical items recorded for those SA3s are listed in the table below the histogram.

About the Atlas

How to interpret our data visualisations

State and territory graphic



g **Crosses and asterisks**
A circle with a cross or an SA3 rate that has an asterisk indicates a rate that should be interpreted with caution. For more information on rates published with caution, see the suppression protocol in the Technical Supplement.

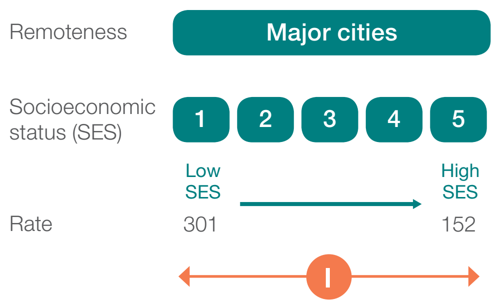
h **Vertical axis**
The vertical axis shows the age- and sex-standardised rate for the clinical item. Rates are age and sex standardised to allow comparisons between populations with different age and sex structures.

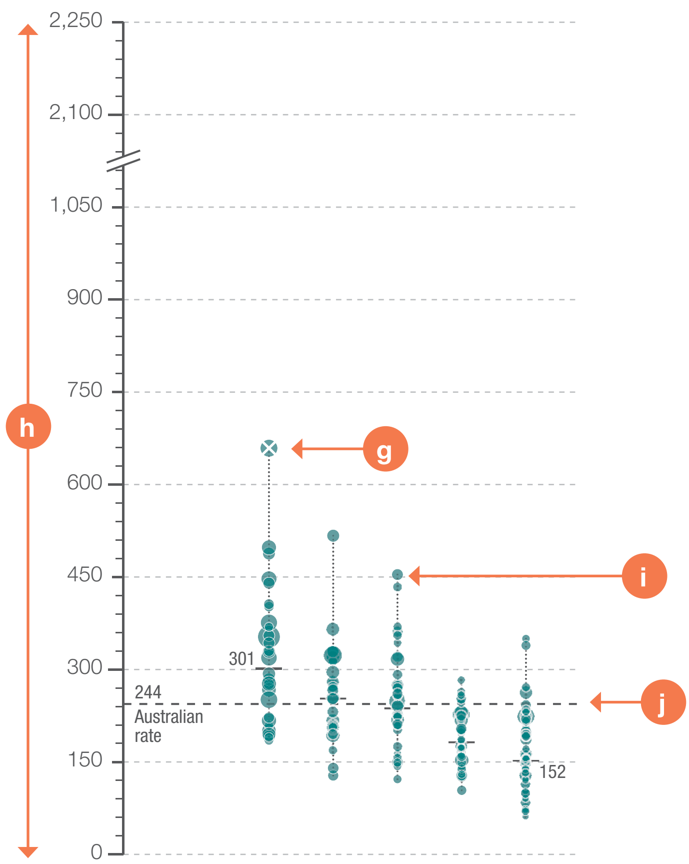
i **What does the circle represent**
Each circle on the graph represents an SA3. SA3s are geographical areas defined by the Australian Bureau of Statistics that provide a standardised regional breakdown of Australia. SA3s generally have populations between 30,000 and 130,000.

j **Australian rate line**
This line indicates the Australian age- and sex-standardised rate for that clinical item in the year(s) analysed.

How to interpret our data visualisations

Remoteness and socioeconomic status graphic





k **Circle size**

The size of the circle indicates how many clinical events have been recorded for people living in that SA3. A large circle represents an SA3 with a greater number of clinical events than SA3s with a smaller circle. Each histogram is accompanied by a legend. The numbers represented by each circle size is shown in the legend for that histogram.

l **Socioeconomic status**

Each SA3 is presented according to its remoteness and socioeconomic status (SES), using standard Australian Bureau of Statistics definitions. Each SA3 is assigned a remoteness category. Within each remoteness category each SA3 is further assigned an SES group. The lowest SES group has the most overall disadvantage and the highest SES group has the least overall disadvantage. Some SES groups are combined in remoteness categories, except in major cities, to allow sufficient number of SA3s for comparison purposes. In the example shown, the rate of hospitalisation is higher in areas with greater socioeconomic disadvantage.

Chapter 1

Chronic disease and infection: potentially preventable hospitalisations

At a glance

Almost half (47%) of the potentially preventable hospitalisations in Australia in 2014–15 were due to the five conditions examined in this chapter: chronic obstructive pulmonary disease (COPD), heart failure, cellulitis, kidney infections and urinary tract infections (UTIs), and diabetes complications.[1] Substantial variation was observed between Statistical Area Level 3 (SA3) areas in the rates of hospitalisation for each condition. Variation was greatest for COPD (16-fold difference), diabetes complications and cellulitis (approximately 12-fold difference for both). Rates of hospitalisation for heart failure and UTIs varied seven-fold and six-fold, respectively.

The high hospitalisation rates and substantial variation reported for the chronic diseases in this chapter show that recommended care is not always provided for people with these conditions. Even with the significant funding provided through Medicare to better coordinate primary care for people with complex chronic disease, fragmented health services contribute to suboptimal management.[2] 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.[3] Ability to access health services is determined not only by clinician supply, but also by costs, transport, cultural factors and sufficient health literacy to know when to consult health providers.[3] For all the conditions examined in this chapter, hospitalisation rates were higher among Aboriginal and Torres Strait Islander Australians, people living in areas of relative socioeconomic disadvantaged, and those living in remote areas.

A fundamental component of system changes to reduce potentially preventable hospitalisations must be a shift to a better integrated primary care system, with a stronger focus on coordinating care.[2] Critically, health systems also need to become better at managing disease where it already exists, to reduce the progression of chronic disease, minimise negative impacts and improve patients' quality of life.

Patients live with their chronic disease all day, every day. They have to be put at the centre of prevention and management, particularly in primary care.[4] The implementation of a Health Care Home model will greatly improve appropriateness and coordination of care for patients with multiple chronic and complex conditions.[2]

Chronic disease and infection

Recommendations

1a. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to follow the following principles in developing chronic disease management programs, as described in the report of the Primary Health Care Advisory Group *Better Outcomes for People with Chronic and Complex Health Conditions* and consistent with the National Strategic Framework for Chronic Conditions:

i. Voluntary patient enrolment with a practice or healthcare provider to provide a clinical 'home base' for coordination of, management of, and ongoing support for, the patient's care

ii. 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

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

iv. Enhanced access by patients to care provided by their Health Care Home; this may include in-hours support by telephone, email or videoconferencing, and effective access to after-hours advice or care

v. Nomination by patients of a preferred clinician, who is aware of their problems, priorities and wishes, and is responsible for their care coordination

vi. 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

vii. 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

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

Many patients will recognise features of the Health Care Home in their existing general practices.

Chronic obstructive pulmonary disease

1b. Local Hospital Networks, Primary Health Networks and the Aboriginal Community Controlled Health Service sector to promote appropriate care for the management of people with chronic obstructive pulmonary disease (COPD) using:

i. *The COPD-X Plan: Australian and New Zealand Guidelines for the Management of Chronic Obstructive Pulmonary Disease 2016* as the routine model of care

ii. Targeted anti-smoking programs in populations with high smoking rates, including areas with a high proportion of the population who are Aboriginal and Torres Strait Islander Australians, rural and remote areas, and areas of socioeconomic disadvantage.

1c. State and territory health departments to develop culturally appropriate pulmonary rehabilitation programs for Aboriginal and Torres Strait Islander Australians with COPD.

Heart failure

1d. 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

1e. 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 using:

   i. The guidelines *General Practice Management of Type 2 Diabetes 2016–18* as the routine model of care

   ii. The *Australian National Diabetes Strategy 2016–2020* to ensure the provision of integrated models of care

   iii. Performance management frameworks to assess compliance of care with relevant diabetes treatment guidelines.

All conditions associated with potentially preventable hospitalisations

1f. The Commission, in collaboration with Aboriginal and Torres Strait Islander Australians and relevant organisations, to produce resources for addressing health literacy.

1g. State and territory health departments, in collaboration with Aboriginal and Torres Strait Islander Australians, and Australian Government health agencies, to continue to invest in whole-of-government approaches for addressing the social determinants of health for Aboriginal and Torres Strait Islander Australians, people in areas of socioeconomic disadvantage, and people living in outer regional and remote areas.

1h. State and territory health departments to investigate funding and pricing strategies within the activity-based funding framework to promote appropriate care for people with conditions associated with potentially preventable hospitalisations, with a particular focus on potentially avoidable hospital readmissions.

1i. Australian, and state and territory health departments to develop appropriate service specifications, evidence-based education and training, and other tools to enable providers, patients, practice managers and the broader healthcare sector to engage with chronic disease management programs, such as Health Care Homes.

1j. Primary Health Networks to use HealthPathways, where practicable, to improve the coordination of care across providers for chronic conditions.

Background

This chapter includes information about potentially preventable hospitalisations for:

- Chronic obstructive pulmonary disease (COPD)
- Heart failure
- Cellulitis
- Kidney and urinary infections (UTIs)
- Diabetes complications.

Timely and adequate health care in the community will prevent some conditions worsening to the point where hospitalisation is necessary, or prevent the condition occurring in the first place. Hospitalisations for such conditions are classified as potentially preventable hospitalisations. Some potentially preventable hospitalisations are due to worsening of chronic conditions. For example, if diabetes is not well managed, patients risk developing diabetic foot disease. In the most severe cases, this can lead to hospitalisation and amputation of the affected toes, foot or lower leg. Other potentially preventable hospitalisations are due to worsening of acute conditions, such as cellulitis, and infections of the kidney and urinary tract. Some potentially preventable hospitalisations could have been prevented by vaccination.

Classifying a hospitalisation as 'potentially preventable' does not mean that the patient did not need to be hospitalised at that time – it means that optimal management at an earlier stage might have prevented the patient's condition worsening to the point where they needed hospitalisation.

Chronic disease and infection

Together, the five conditions examined in this chapter accounted for 47% of the 634,300 hospitalisations in the potentially preventable hospitalisations indicator in Australia in 2014–15.[1] The National Health Performance Authority reported geographic variation in potentially preventable hospitalisations in 2015, and the combined rate of these five conditions was shown to vary nine-fold between SA3 areas.[5] National, and state and territory data on potentially preventable hospitalisations are also reported regularly to promote change towards more appropriate care – for example, by the Australian Institute of Health and Welfare, the Productivity Commission, and state and territory governments. This report builds on the previous analyses by providing further commentary and by examining variation by smaller geographical areas (SA3).

About the potentially preventable hospitalisations indicator

The rate of selected potentially preventable hospitalisations is a health system performance indicator of accessibility and effectiveness in the Australian National Healthcare Agreement, and a measure of the effectiveness, appropriateness and efficiency of the health system in the Aboriginal and Torres Strait Islander Health Performance Framework.[6,7] A potentially preventable hospitalisation is described as 'admission to hospital for a condition where the hospitalisation could have potentially been prevented through the provision of appropriate individualised preventative health interventions and early disease management usually delivered in primary care and community-based care settings (including by general practitioners, medical specialists, dentists, nurses and allied health professionals)'.[8]

The indicator includes 22 conditions, which accounted for 634,300 hospitalisations and 6.2% of all hospital separations in Australia in 2014–15.[1] The conditions are grouped into chronic, acute and vaccine-preventable conditions.

The rate of potentially preventable hospitalisations was first developed as a health system indicator in the United States in the late 1980s; other countries currently using the indicator include New Zealand, Canada and the United Kingdom.[9] Few other indicators examine variation in the performance of health care in the community, and this indicator provides some guidance on which conditions or populations should be prioritised for policy responses. However, the indicator has some limitations:

- Not all hospitalisations included in the indicator could have been prevented. For example, hospitalisations will be appropriate for some chronically ill or elderly patients even with optimal care in the community
- Hospitals, as well as community-based services, influence rates of potentially preventable hospitalisation, because factors such as whether beds are available and how far patients live from hospital affect decisions about whether to admit patients
- Potentially preventable hospitalisations are influenced by factors that are not easily addressed by health policymakers, such as socioeconomic disadvantage[10]
- Emergency department presentations and outpatient services are not included
- Variation in admission practices and policies may lead to variation among providers in the number of hospitalisations for conditions.

These factors should be taken into account when interpreting and responding to variation in potentially preventable hospitalisations.

For more information, see the *Guide to Potentially Preventable Hospitalisations*, available at www.safetyandquality.gov.au from mid-2017.[9]

Influences on potentially preventable hospitalisation rates

Rates of potentially preventable hospitalisations reflect a range of health system and population characteristics. These influences can result in variation in the rate of these hospitalisations, as well as patients' length of stay and readmission rates.

Effective management of chronic conditions requires multidisciplinary, coordinated care.[4] The team of clinicians providing care may include general practitioners, medical specialists, dentists, nurses and allied health professionals. Although some patients are fortunate enough to receive this type of care, the current Australian health system does not provide the ideal supports for integrated team care.[2] Health services are often fragmented, with poor communication between providers, and between community and hospital services.[4] Many other health systems around the world also face the challenge of reorienting their services to cope with the rise of chronic diseases, and the direction of health policy internationally is to increase coordination and integration of health services.[4]

Half of the Australian population has at least one chronic disease, and 29% of people aged 65 years and over have three or more chronic diseases.[11] Chronic diseases are not evenly distributed; the prevalence is higher among certain groups, including Aboriginal and Torres Strait Islander Australians, people who live in socioeconomically disadvantaged areas, and people who live outside major cities.[11] The severity and complexity of chronic disease vary, as does the intensity of care patients require.

Approximately 1% of the population have highly complex health needs arising from multiple chronic diseases, and many in this group will need frequent care in an acute setting or home-based palliative care.[2] In Australia in 2012–13, people who saw a general practitioner 12 times or more accounted for almost 60% of people admitted to hospital four or more times that year, according to survey responses.[12] Approximately 85% of these patients had chronic disease, and many are likely to be in this first tier of patients with the highest needs.[12]

A second tier of patients with multiple chronic diseases have more moderate health service needs, and account for approximately 9% of the population. This group can be managed effectively in the community with increased access to primary and specialist care, and appropriate support, or in aged care homes.[2]

A third tier of patients with multiple chronic diseases are largely self-managing, and account for approximately 10% of the population.[2] This group could still gain significant benefits from structured support.[2] Targeting the intensity of health services for people with multiple chronic diseases according to these levels of need has the potential to improve patient outcomes and the efficiency of the health system.[2]

Many studies have found that higher rates of potentially preventable hospitalisations correlate with a lack of access to primary care. Access to high-quality health care in the community is not only related to supply of clinicians.[3] Time and financial costs, language and cultural aspects, and the quality of clinician–patient interactions contribute to the accessibility of care.[13] Recent Australian research, using person-level data from a large New South Wales cohort, found that the supply of general practitioners alone explained only a small proportion of geographic variation in potentially preventable hospitalisations (except for conditions in the vaccine-preventable category), and that socioeconomic and demographic factors had a much greater influence.[10] Risk factors for potentially preventable hospitalisations included older age; being an Aboriginal or Torres Strait Islander Australian; and having male gender, more comorbidities, socioeconomic disadvantage and fewer positive health behaviours.[10] This highlights the complex means by which potentially preventable hospitalisations may reflect 'access to care'.[9]

Chronic disease and infection

In some circumstances, better access to primary care increases hospitalisations. For example, increased access to primary care among a group of patients with chronic diseases and complex health needs increased their rate of hospitalisations in a study in the United States.[14] This may have been due to better recognition of health problems and consequent treatment, because the participants' satisfaction with their care also increased.[14]

Aboriginal and Torres Strait Islander Australians have higher rates of potentially preventable hospitalisations than non-Indigenous Australians.[15] The reasons are complex, but socioeconomic disadvantage, high prevalence of risk factors for chronic disease such as smoking and obesity, and a lack of health services that provide culturally appropriate care play a part.[16,17] Higher rates of potentially preventable hospitalisations among Aboriginal and Torres Strait Islander Australians may also reflect gaps in the provision of population health interventions, and the need to strengthen services to detect and treat disease early, and improve chronic disease management.[18]

Many of the maps in this chapter show particularly high levels of potentially preventable hospitalisations in remote areas with a high proportion of Aboriginal and Torres Strait Islander residents. Remoteness and socioeconomic disadvantage disproportionately affect Aboriginal and Torres Strait Islander Australians. The contribution of each of these factors has not been separated in this analysis, but will be explored in the future to gain further insights. Some states and territories contain a substantially higher proportion of remote areas than others, and the associated challenges in providing health care in this context should be considered when interpreting the variation in rates of potentially preventable hospitalisations between states and territories.

A lack of community-based health services and long distances to travel contribute to the high admission 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 need to 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 in a range of ways, such as greater disease severity, multiple comorbidities and poor health literacy.[19] Individual health literacy is about a person's skills and abilities, and how these are applied to health and health care.[20] It covers a range of skills, behaviours and activities, such as reading about what foods are required for healthy eating, the motivation to participate in a cardiac rehabilitation support group, and the capacity to make an appointment to see a clinician.[21] Low individual health literacy is associated with increased rates of hospitalisation, poorer ability to demonstrate taking medications properly and poorer ability to interpret health messages.[21] The health literacy environment includes the infrastructure, policies, processes, materials, cultural and linguistic competence, people and relationships of the health system.[21,22]

Increasing patients' health literacy and ability to self-manage is a vital component of any strategy to reduce potentially preventable hospitalisations due to chronic diseases. Changing the healthcare system to enable people with low health literacy to use it more effectively also has great potential for reducing hospitalisations – for example, by making the system easier to navigate and health information easier to understand.[21]

Rates of potentially preventable hospitalisations may also be influenced by readmissions to hospital. Any readmissions that meet the criteria for the relevant potentially preventable hospitalisation are included in the data here; they could not be counted separately without data linkage. High rates of readmissions can be due to suboptimal inpatient care, but may also reflect inevitable deterioration of chronic conditions.[3] Premature discharge and inadequate information to allow patients to self-manage after discharge also contribute to preventable readmissions.[3]

Length of stay for potentially preventable hospitalisations varies widely across Australia. For example, the percentage of potentially preventable hospitalisations that were same-day varied from 23% to 41% between Australian Primary Health Networks in 2013–14.[5] Length of stay can reflect the severity of the patient's illness, as well as the quality and efficiency of their hospital care. Shorter length of stay is often considered more efficient, but stays that are too short may result in poorer outcomes and increased risk of readmission.[23-25]

Long-term interventions may be able to address the social determinants of health. In the short term, better care in the community is needed to reduce potentially preventable hospitalisations – particularly among Aboriginal and Torres Strait Islander Australians, people living in rural and remote areas, and people with socioeconomic disadvantage.

Health Care Homes

The high rates of hospitalisation and very high rates of variation for the potentially preventable hospitalisations reported in this chapter demonstrate that recommended care is not always provided to people with complex chronic disease. Improvements in the design of delivery systems, team-based care and consumer self-management could increase the success of chronic disease management.[4]

Medicare provides significant funding to encourage better practice in the care of people with complex chronic disease. Funding is provided for the assessment, planning, coordination and review of services for chronic disease in acute care services and general practice. The Medicare Benefits Schedule includes a set of items for planning and coordinating health care for patients with chronic disease. The Australian Government has a number of grants and programs related to chronic disease, such as the Chronic Disease Prevention and Service Improvement Flexible Fund. Even with this significant funding to better coordinate primary care–based chronic disease management, treatment services remain fragmented. This contributes to inadequate management of patients with chronic and complex conditions.[2]

Health policies aimed at improving management of patients with multiple chronic diseases include better coordination and integration of care, reducing the progression of chronic disease and reforming payment models.[26] The recent implementation in Australia of Health Care Homes for people with chronic diseases encompasses these principles and addresses many of the contributors to potentially preventable hospitalisations.

The Health Care Home model supports integrated and coordinated team care, and targets the most intensive health services to those with the greatest needs.[27] The model allows better sharing of information between patients and members of the health team using My Health Record. Evidence-based planning tools created for Health Care Homes, and bundled payments rather than fee-for-service, further support high-quality care. Trials of similar models in the United States have shown reductions in hospitalisations and reduced costs.[28] Potentially preventable hospitalisations are costly for the Australian health system; the estimated savings from reducing these hospitalisations from high to average rates in priority areas are $10–15 million per year for Victoria and Queensland alone.[29]

Other models of care to reduce potentially preventable hospitalisations

Increasing the availability of alternatives to hospital care, particularly in regional and remote areas, could reduce potentially preventable hospitalisations. A number of other innovative models of care in the community have shown reductions in potentially preventable hospitalisations, or improvements in the chronic conditions that contribute to them.[16,30] Many of these share common elements of outreach care and nurse-led coordination of care in the community. These models include[16,30]:

- Increased use of community nursing and hospital-in-the-home (HITH) services
- Multidisciplinary clinics for management of chronic disease
- Aged care emergency services led by nursing staff.

Chronic disease and infection

HITH supplies hospital-level care at home as a substitute for care in hospital. HITH care is administered by multidisciplinary teams who visit patients at least daily and deliver full care at home. A 2012 meta-analysis found that HITH treatment reduced mortality by 19% and readmissions by 2% compared with in-hospital treatment.[31] The improvements in outcomes may be due in part to a reduction in hospital-related adverse events.[32] Patient satisfaction with HITH is also high.[31,33]

A model of in-reach community nursing has also been trialled successfully in Australia. An in-reach nurse identifies hospital patients in the emergency department and acute wards who could be cared for in their home or a community clinic, and facilitates handover and future care coordination.[34]

Rapid-access clinics based in hospitals may be a useful option for patients who are deteriorating and cannot wait for a long time for specialist review but do not require emergency department care. Success of any novel health pathways depends on clear communication to general practitioners about how to access them and the eligibility criteria.

Telehealth is being used effectively in some parts of Australia.[16] However, this technology 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.

Readmissions account for a substantial proportion of some potentially preventable hospitalisations. For example, 26% of COPD hospitalisations and 19% of diabetes hospitalisations in Queensland in 2012–13 were readmissions.[29] Strategies for reducing readmissions include case management by a specialist nurse.[35] Meta-analysis of this model showed that readmissions for heart failure at 12 months were almost halved compared with usual care (odds ratio, 0.55).[35] Other successful strategies to reduce readmission rates have included financial penalties for United States hospitals with high readmission rates.[36]

Tailoring these models of care and other interventions for patients with the most complex needs – who are also often the costliest for the health system – is likely to produce the greatest reductions in potentially preventable hospitalisations.[16] Several of the conditions contributing to potentially preventable hospitalisations often exist as comorbidities – for example, COPD and heart failure.[37] Addressing common clusters of comorbidity in local areas within coordinated services will improve management for patients with complex needs. Restructuring Medicare item numbers and hospital services around common comorbidities could also better support patients with chronic diseases.[37]

Reducing potentially preventable hospitalisation rates among Aboriginal and Torres Strait Islander Australians

For Aboriginal and Torres Strait Islander Australians, availability of health services in urban and regional centres does not necessarily equate to accessibility.[38] Services need to be not only affordable and physically accessible but also culturally safe. Aboriginal and Torres Strait Islander staff are key to engaging with Aboriginal and Torres Strait Islander patients, and a sufficient number of Aboriginal and Torres Strait Islander health workers is essential for service success. For Aboriginal and Torres Strait Islander Australians living in remote areas, physical distances compound the challenges in accessing health care. Remoteness also tends to reduce employment options, thereby contributing to socioeconomic disadvantage and poorer health outcomes.[17] Differences in rates of potentially preventable hospitalisations between Aboriginal and Torres Strait Islander and non-Indigenous Australians are highest in remote areas (a seven-fold difference).[18]

The Aboriginal and Torres Strait Islander Health Performance Framework reports include rates of potentially preventable hospitalisations. From July 2011 to June 2013, rates of potentially preventable hospitalisations were three times as high among Aboriginal and Torres Strait Islander Australians as among non-Indigenous Australians.[18]

For several of the types of potentially preventable hospitalisations explored in this chapter, higher rates of the condition among Aboriginal and Torres Strait Islander Australians can be partly attributed to higher rates of smoking, poor diet and obesity.[39] Community-initiated programs can improve diet and increase physical activity, but the socioeconomic disadvantage in Aboriginal and Torres Strait Islander communities has been a barrier to sustaining these programs.[40] For example, food insecurity is associated with obesity, a major risk factor for type 2 diabetes.[41,42] A recent Victorian study found that the rate of food insecurity was 20% among Aboriginal and Torres Strait Islander Australians compared with 5% among other Australians.[41] Food insecurity was defined in the study as having run out of food and not being able to afford to buy more during the previous year.[41]

Public health approaches focusing on lifestyle risk factors at the expense of the social determinants of health can over-inflate the contribution that lifestyle risk factors make to poor health, and assume that the proximal factors in the causal chain are more amenable to change than they are.[43] Moreover, members of the Aboriginal and Torres Strait Islander community have expressed the view that traditional health promotion in the form of health education is disempowering and stigmatising because it conflates Aboriginal and Torres Strait Islander status with unhealthy behaviours, thus reinforcing racism, which creates and compounds health inequality.[44] This cycle needs to be acknowledged.

Lessons can be learnt from the implementation of a number of recent programs. Models of care are more likely to meet the needs of Aboriginal and Torres Strait Islander Australians if they are built on cultural safety, and designed in partnership with Aboriginal and Torres Strait Islander Australians. For example, one urban-based model of home-based case management by nurses for Aboriginal and Torres Strait Islander Australians with multiple chronic diseases uses a holistic view of health, addressing psychosocial factors as well as physical health. The model is designed to resonate with the Aboriginal and Torres Strait Islander perspective of interconnectedness of health with other aspects of wellbeing. It has been met with high levels of satisfaction from staff and patients, as well as significant improvements in blood pressure, glycated haemoglobin (HbA1c) levels and rates of depression.[45] However, no significant improvement was seen in hospitalisations in this exploratory study, possibly because of the short follow-up period.

Another model of out-of-hospital health care has produced encouraging reductions in hospitalisations among Aboriginal and Torres Strait Islander children in both urban and remote areas in Western Australia. The program, which was based on nurse-led coordination of care, created partnerships with Aboriginal Controlled Health Services, general practitioners, allied health professionals, specialist doctors and other community health workers. Care coordination included organising outreach care closer to home, travel, social support, telehealth services and combining appointments to minimise disruption.[46]

The role of the Aboriginal Health Liaison Officer has the potential to improve the cultural security of hospitals, and may also result in better discharge planning and liaison with care in the community.[47] The National Safety and Quality Health Services Standards (second edition) includes a number of actions that focus specifically on providing care for Aboriginal and Torres Strait Islander Australians. These include strategies to improve the cultural competency and cultural awareness of the health workforce to meet the needs of Aboriginal and Torres Strait Islander patients, and health services working in partnership with Aboriginal and Torres Strait Islander Australians from local communities to meet their healthcare needs. Discharge against medical advice is a contributor to readmissions, and is significantly more common among Aboriginal and Torres Strait Islander patients, particularly in rural and remote areas.[48] Several strategies have been suggested for reducing discharge against medical advice in Aboriginal and Torres Strait Islander patients, including more flexible community-care models to provide culturally appropriate care.[49]

Chronic disease and infection

The national Indigenous Chronic Disease Package improved access to chronic illness prevention and management for Aboriginal and Torres Strait Islander Australians through a range of strategies. The most successful of these were removing cost barriers to medicines, providing transport to appointments and improving cultural safety in general practices. However, the ability to perceive the need for health care and to seek it were identified as major barriers to accessing the program.[50] Improvements in these behaviours will partly rely on addressing social determinants of health among Aboriginal and Torres Strait Islander Australians – for example, through the Closing the Gap initiatives.[39,50]

Long-term investment and actions on many levels are needed to achieve lasting improvements in rates of potentially preventable hospitalisations among Aboriginal and Torres Strait Islander Australians. For example, continuous efforts and long-term investments are needed to reduce the high smoking rate among Aboriginal and Torres Strait Islander Australians.

Smoking rates mirror the pattern of potentially preventable hospitalisations

Smoking is a contributor to most of the conditions analysed in this chapter.[13,51] Reducing smoking rates could substantially decrease the number of potentially preventable hospitalisations. Addressing the higher rates of smoking among Aboriginal and Torres Strait Islander Australians, people at socioeconomic disadvantage and people living in remote areas could help reduce the disparity in potentially preventable hospitalisations seen in these groups.[52]

Attention should also be paid to the underlying determinants of smoking. For example, psychological distress is a known determinant of smoking, and Aboriginal and Torres Strait Islander Australians have a significantly higher prevalence of psychological distress than other Australians.[53,54] Moreover, psychological distress has been shown to precede the onset of smoking and is associated with less success in quitting smoking.[53,55] Addressing the high levels of psychological distress among Aboriginal and Torres Strait Islander Australians is likely to simultaneously address the high prevalence of smoking and enable those who already smoke to quit.

Condition-specific interventions are also required to reduce potentially preventable hospitalisations; these are discussed later in the chapter.

About the data

Hospital admission data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations per 100,000 people. Because a record is included for each hospitalisation, 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 residential address of the patient and not the location of the hospital. Rates are age and sex standardised to allow comparison between populations with different age and sex structures.

Factors influencing population-based hospitalisation rates include incidence and prevalence of risk factors and disease, hospital admission practices, bed availability, and patient social factors such as the availability of carers, the availability of other treatment options, treatment compliance and travel distance. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

Most states and territories in Australia have HITH programs, and hospitalisations involving HITH care are recorded in national hospital data. Because patients receiving HITH are, in principle, required to meet the same criteria as a patient admitted for in-hospital care, variation in admission practices could lead to variation in the number of hospitalisations involving HITH care.

Australian initiatives

The information in this chapter will complement work already under way to address the rate of potentially preventable hospitalisations in Australia. This work includes strategies to prevent the development of conditions such as diabetes and COPD, and to optimise care in the community. At a national level, the work includes:

- Introduction of the Health Care Home model, in which eligible patients can enrol with a participating medical practice known as their Health Care Home, which will provide ongoing coordination, management and support
- The Indigenous Australians' Health Programme, which aims to provide Aboriginal and Torres Strait Islander Australians with access to effective, high-quality healthcare services through both Aboriginal Community Controlled Health Services, wherever possible and appropriate, and mainstream services delivering comprehensive, culturally safe primary health care
- The Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013–2023, which outlines strategies and actions to be taken to improve health outcomes for Aboriginal and Torres Strait Islander Australians; it will soon be updated to address social and cultural determinants of health
- The Cultural Respect Framework for Aboriginal and Torres Strait Islander Health 2016–2026 (Australian Health Ministers' Advisory Council)
- The National Strategic Framework for Chronic Conditions, which moves away from a disease-specific approach and provides high-level guidance to enable all levels of government and health professionals to develop future policy, strategies, actions and services to work towards delivery of a more effective and coordinated national response to chronic conditions and their risk factors. The framework addresses primary, secondary and tertiary prevention of chronic conditions, recognising that the prevention and management of many chronic conditions often have similar underlying principles. It better caters for shared health determinants, risk factors and multiple morbidities across a broad range of chronic conditions. The framework is expected to be publicly available in 2017
- The National Tobacco Strategy 2012–2018, a framework to reduce tobacco-related harm in Australia
- The Australian Chronic Disease Prevention Alliance – an alliance of five non-government health organisations working together on the primary prevention of chronic disease, with particular emphasis on the shared risk factors of poor nutrition, physical inactivity and obesity

Chronic disease and infection

- Medicare Benefits Schedule (MBS) items relating to chronic disease management – an Australian Government initiative that helps general practitioners to manage the health care of people with chronic conditions. It makes MBS rebates available for those requiring multidisciplinary, team-based care from a general practitioner and at least two other healthcare providers
- The National Aboriginal and Torres Strait Islander Flexible Aged Care Program, which provides culturally appropriate aged care and respite services to support people with complex care needs
- The Commonwealth Home Support Programme, which is the entry level to aged care, and delivers small amounts of care and services to older people in their homes.

Many state and territory initiatives are also in place to reduce potentially preventable hospitalisations, including:

- Coordination of care programs for patients at risk of further hospitalisation – for example, the Complex Needs Coordination Team, Perth; the Hospital Admission Risk Program, Victoria; the Chronic Disease Management Program – Connecting Care in the Community, NSW Health; the Home and Community Care Program, a jointly funded initiative of the Australian and Western Australian governments; and HITH and Silver Chain in-home health and care services in several states
- Policies to optimise care in the community, such as Framework for Action on Diabetes and Diabetes Service Standards, Western Australia
- Health system reform that focuses on integrated service delivery, such as the Western Australian Health Reform Program and the Victorian Integrated Chronic Disease Management model
- Reporting of potentially preventable hospitalisation rates – for example, the NSW Clinical Excellence Commission reports rates by Local Health District
- Programs to improve chronic disease management for Aboriginal and Torres Strait Islander Australians, such as the New South Wales Walgan Tilly clinical services redesign program, and the Western Australian Aboriginal Health and Wellbeing Framework 2015–2030 (which also addresses prevention of chronic diseases)
- Healthy skin programs – reducing skin infections reduces the risk of cellulitis
- Improvements in health-related housing condition – for example, Housing for Health, New South Wales
- Multidisciplinary diabetes clinics – for example, Inala Chronic Disease Management Service, Queensland, and Perth tertiary hospitals
- Projects to reduce readmissions, such as Reducing Heart Failure Readmissions, funded by the Victorian Government and led by the Heart Foundation
- Chronic disease self-management programs – for example, Black Swan Health, and 360 Health and Community, Western Australia
- Programs to support a healthy lifestyle, such as Active Measures through Arche Health, Western Australia, and Get Healthy, NSW Health.

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1.1 Chronic obstructive pulmonary disease

Context

This data item examines hospitalisations for chronic obstructive pulmonary disease (COPD) in people of all ages based on their place of residence. COPD is a serious chronic lung disease that often impairs quality of life and sometimes causes premature death.[1] The term COPD encompasses chronic bronchitis and emphysema. COPD accounted for 355,328 hospital bed days, and 15% of all potentially preventable hospitalisations, in Australia in 2013–14.[2]

Australia, along with Ireland, New Zealand and Austria, has high hospitalisation rates for COPD compared with other countries in the Organisation for Economic Co-operation and Development (OECD).[3] Although Australia's smoking rate was below the OECD average in 2013 (13% and 20%, respectively, for daily smoking in people over 15 years of age), it was close to the OECD average in 2000 (25% and 26%, respectively).[3]

Smoking is the most common cause of COPD. There is typically a lag of decades between starting regular smoking and the appearance of symptoms. Genetic factors, chronic asthma, pulmonary tuberculosis and environmental exposures (for example, to fumes and dust) are also associated with an increased risk of COPD.[1] Approximately 30–40% of people with COPD continue to smoke, and people with COPD often find it more difficult to quit than other smokers.[4]

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 and cultural factors.[5] Many of these factors originate in childhood and accumulate through an individual's lifetime.[5]

Poor health literacy is associated with worse outcomes in COPD, independently of socioeconomic disadvantage.[6] As a result of poor health literacy, many people with COPD are not able to understand written information or complex verbal information well enough to make appropriate health decisions.[7] This can reduce their ability to take medicines correctly, maintain good healthcare habits and respond to acute exacerbations of COPD promptly.[7]

Chronic obstructive pulmonary disease

The rate of smoking among Aboriginal and Torres Strait Islander Australians is 41%, which is more than double the rate for the Australian population as a whole.[8] Aboriginal and Torres Strait Islander Australians have approximately 2.5 times the rate of COPD as other Australians.[9,10]

Approximately 5% of Australians aged 55 years and over have COPD, rising to 9% of those aged 85 years and over.[1] COPD was the fourth leading cause of burden of disease in 2011.[11]

Symptoms of COPD include shortness of breath with little or no exertion, coughing, phlegm production and wheezing. Patients with COPD may require hospitalisation for severe exacerbations, which are often caused by infections of the respiratory tract or the tracheobronchial tree. Interventions to reduce exacerbations and hospitalisations in COPD include use of long-acting muscarinic antagonist (LAMA) and long-acting beta$_2$ agonist (LABA) medicines.[12,13] Vaccination against influenza reduces by approximately 50% the risk of exacerbations, hospitalisations and death in people with COPD.[13,14] Pulmonary rehabilitation is recommended to improve exercise capacity and quality of life, and reduce hospitalisations and length of stay for COPD.[15–19] Further details of recommended management are in the COPD-X guidelines.[14]

Low health literacy and a lack of culturally safe services for Aboriginal and Torres Strait Islander Australians, and people from other culturally and linguistically diverse backgrounds may be a barrier to accessing health care effectively.[20] This may contribute to poorer medication management and lower influenza vaccination rates, with resulting higher hospitalisation rates. No national data are available on the individual health literacy of Aboriginal and Torres Strait Islander Australians. However, education attainment, and school-based literacy and numeracy scores for Aboriginal and Torres Strait Islander Australians are significantly lower than for the general population.[8,21] In addition, compared with other Australians, Aboriginal and Torres Strait Islander Australians experience disadvantage across a range of socioeconomic indicators, including education, employment and income.[22] It is therefore highly likely that Aboriginal and Torres Strait Islander Australians may be at risk of lower individual health literacy.[20]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for COPD (based on the potentially preventable hospitalisation specification) per 100,000 people in 2014–15. Because a record is included for each hospitalisation, rather than for each patient, patients hospitalised more than once in the financial year will be counted more than once. The full data specification is available from the Australian Institute of Health and Welfare.[23]

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 66,250 hospitalisations for COPD, representing 244 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for COPD across 324† local areas (Statistical Area Level 3 – SA3) ranged from 63 to 990 per 100,000 people. The rate was **15.7 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 193 per 100,000 people in the Australian Capital Territory to 619 in the Northern Territory (Figures 1.2–1.5).

After the highest and lowest 10% of results were excluded and 259 SA3s remained, the number of hospitalisations per 100,000 people was 3.3 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

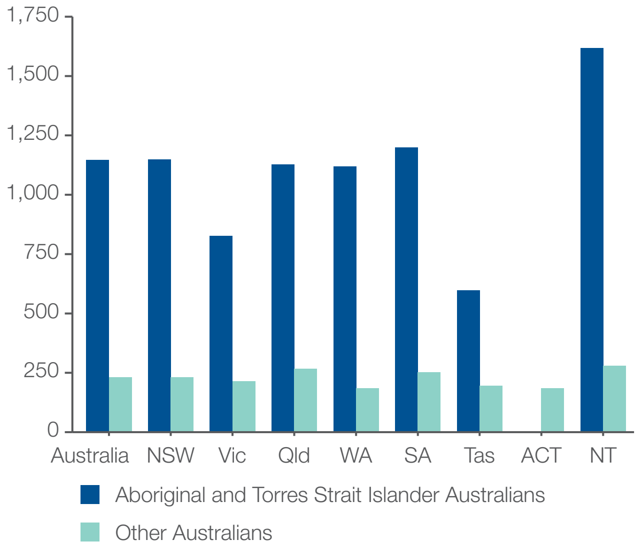
Analysis by remoteness and socioeconomic status

Two SA3s in remote parts of Australia (Bourke – Cobar – Coonamble and Alice Springs) had hospitalisation rates that were more than three times the national rate. Seven further SA3s in outer regional and remote areas (Palmerston, Port Douglas – Daintree, Lower Murray, Outback – North and East, Outback – South, Far North, and Kimberley) had rates that were more than double the national rate. Rates of hospitalisation for COPD were substantially higher in remote areas than in other areas. Hospital admission rates increased with socioeconomic disadvantage, regardless of remoteness category (Figure 1.6).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (1,146 per 100,000 people) was 5 times as high as the rate for other Australians (230 per 100,000 people). Rates were higher among Aboriginal and Torres Strait Islander Australians than other Australians in all states and territories (Figure 1.1).

Figure 1.1: Number of potentially preventable hospitalisations – COPD per 100,000 people, age and sex standardised, by state and territory and Indigenous status, 2014–15



The data for Figure 1.1 are available at www.safetyandquality.gov.au/atlas.

† There are 333 SA3s. For this item, data were suppressed for nine SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

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

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.

Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.

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

Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Chronic obstructive pulmonary disease

Interpretation

Potential reasons for the variation include differences in:

- The prevalence of COPD and comorbidities
- Adherence to evidence-based guidelines by clinicians and service providers[24]
- Access to community pulmonary rehabilitation or physiotherapy services and multidisciplinary care
- Access to secondary prevention programs, such as support for regular physical activity and a healthy diet, which decrease the rate of hospitalisation for COPD[25]
- Inability to always afford medications and supplemental oxygen when needed
- Patients' health literacy and ability to self-manage exacerbations
- Rates of influenza and pneumococcal vaccination
- Air quality and occupational exposures
- Rates of smoking, which are influenced by socioeconomic disadvantage, psychological distress, Aboriginal and Torres Strait Islander status, and remoteness
- Clinicians' focus on smoking cessation
- Rates of respiratory infections, which are related to socioeconomic disadvantage; people living in overcrowded conditions are more likely to come into contact with others who have influenza, which can cause an exacerbation of COPD
- Primary care services that are affordable, culturally appropriate and easily accessible
- The quality, efficiency and effectiveness of primary health care received by Aboriginal and Torres Strait Islander Australians
- The proportion of people from non-English-speaking backgrounds; the risk of hospitalisations for COPD is higher in these groups[1]
- Diagnostic error.

Pulmonary rehabilitation is a program of exercises and education strategies delivered by health professionals to improve breathing and function. Estimates of the use of pulmonary rehabilitation by people with COPD in Australia have ranged from less than 5% to 10%.[26] Uptake of pulmonary rehabilitation is lower for Aboriginal and Torres Strait Islander Australians with COPD than for other Australians.[27] One reason for this low uptake is difficulty in accessing services.[17,18,28] 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.[29,30] Depression and a lack of perceived benefit also prevent some people with COPD from attending pulmonary rehabilitation.[30]

System factors likely to influence hospitalisation rates for COPD include access to multidisciplinary respiratory specialty care (particularly 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.

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.

Case study: Pulmonary rehabilitation

Aboriginal and Torres Strait Islander Australians with COPD have lower rates of participation in pulmonary rehabilitation than the general Australian population, but a culturally appropriate program has succeeded in engaging patients and improving outcomes. The program combined cardiac and pulmonary rehabilitation and prevention, and was open to Aboriginal and Torres Strait Islander Australians with COPD, heart failure, ischaemic heart disease or at least two cardiovascular risk factors (for example, smoking, obesity, hypertension).[27]

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.[27] The program encouraged participation by providing a variety of exercise types and transport, if required; 79% of the 92 participants attended at least half 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 use of Aboriginal health workers were thought to be key factors in the program's success.[27]

Addressing variation

Reducing smoking rates is key for reducing hospitalisations for COPD, particularly among Aboriginal and Torres Strait Islander Australians, people at socioeconomic disadvantage, people living in regional or remote areas, and people who already have COPD. Rates of smoking are higher among people living in outer remote and remote areas of Australia (21%) than in those living in inner regional areas (17%) or major cities (13%).[31]

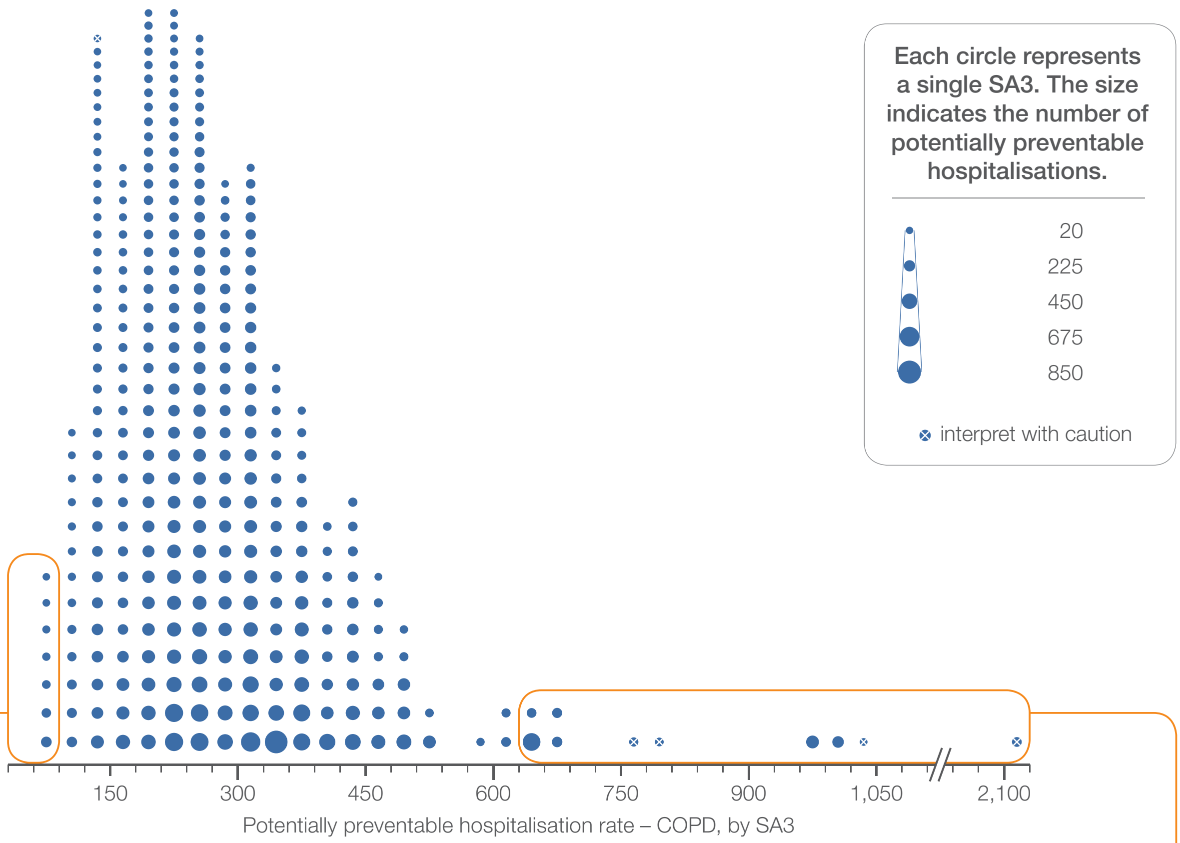
A potential lack of adherence to best practice in primary care contributes to variation in hospitalisation, by leading to differences in education about inhaler technique, differences in rates of influenza and pneumonia vaccination, differences in smoking cessation practices, and late diagnosis. Earlier diagnosis through greater use of spirometry in primary care, strong care coordination and improved access to pulmonary rehabilitation could substantially improve outcomes for people with COPD in Australia.[32]

Providing pulmonary rehabilitation in community settings with easy access to transport has shown positive results in improving attendance and reducing hospitalisations.[17,18] Access to pulmonary rehabilitation in rural and remote areas is particularly challenging. A training program for health professionals in rural and remote areas in providing pulmonary rehabilitation has been trialled successfully and has 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 Australians with COPD. Improving health literacy and self-management is particularly important for people with COPD who do not have access to pulmonary rehabilitation.

Chronic obstructive pulmonary disease

Improving individual and environmental health literacy requires a coordinated and collaborative approach. Strategies are needed to build the capacity of people to understand the choices they have, and make decisions about their health and health care. As well, the capacity of the health system to support, encourage and allow this to occur needs to increase.[33] A number of strategies are recommended for improving communication about COPD at the clinician level – for example, using simple language, telephone follow-up and case management; using simple action plans with pictograms rather than words; and providing written material in the patient's preferred language.[7]

Figure 1.2: Number of potentially preventable hospitalisations – COPD per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Sherwood - Indooroopilly	Qld	**63**	32
Cottesloe - Claremont	WA	**71**	71
Ku-ring-gai	NSW	**72**	135
Burnside	SA	**74**	59
North Sydney - Mosman	NSW	**78**	92
Boroondara	Vic	**85**	197
Hobart - South and West	Tas	**89**	38

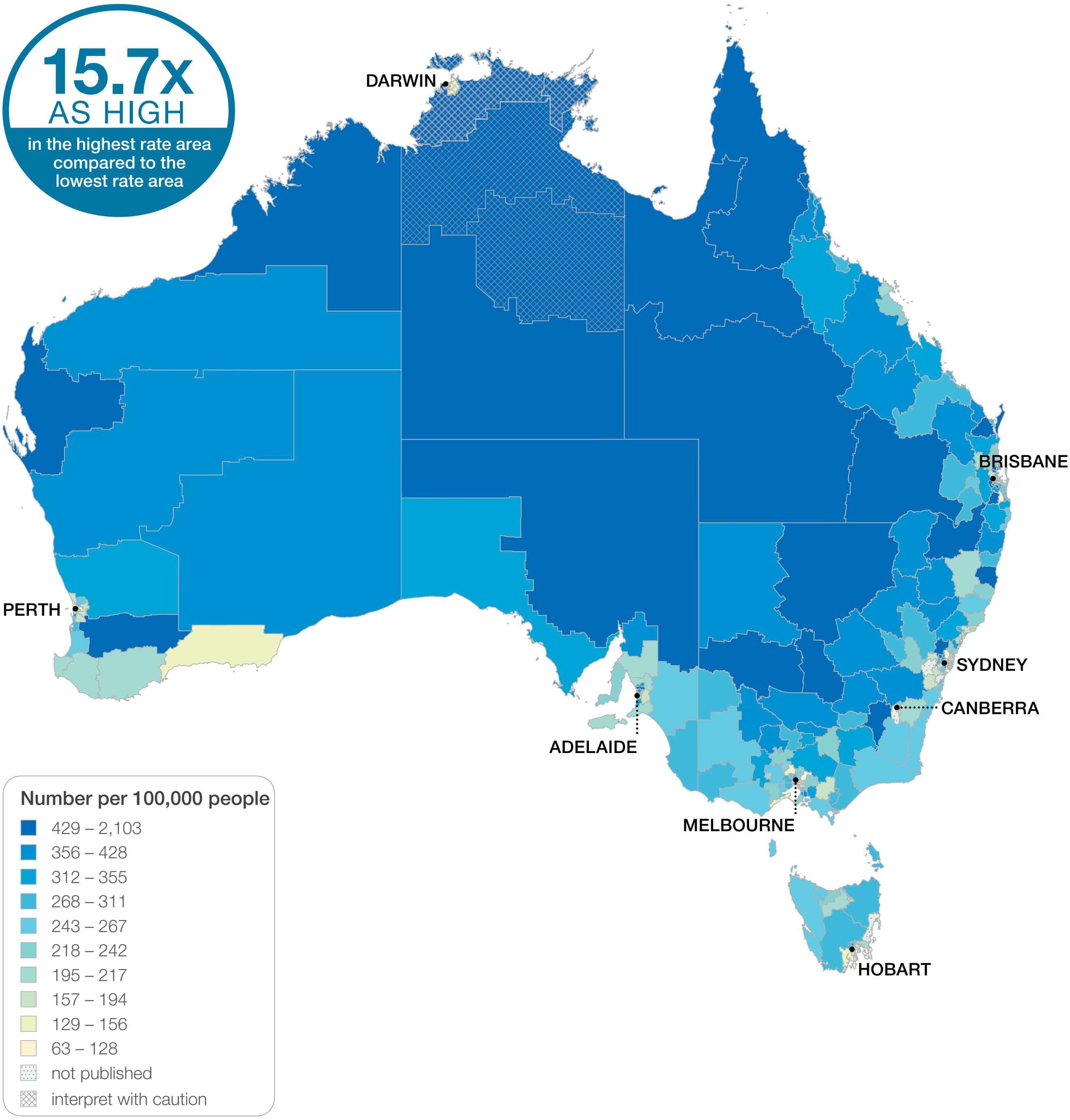
Highest rate areas

SA3	State	Rate	Hospitalisations
East Arnhem	NT	**2,103***	147
Barkly	NT	**1,043***	42
Alice Springs	NT	**990**	244
Bourke - Cobar - Coonamble	NSW	**965**	311
Katherine	NT	**789***	95
Daly - Tiwi - West Arnhem	NT	**761***	122
Kimberley	WA	**679**	165
Outback - North and East	SA	**663**	186
Mount Druitt	NSW	**659**	570
Far North	Qld	**631**	146

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

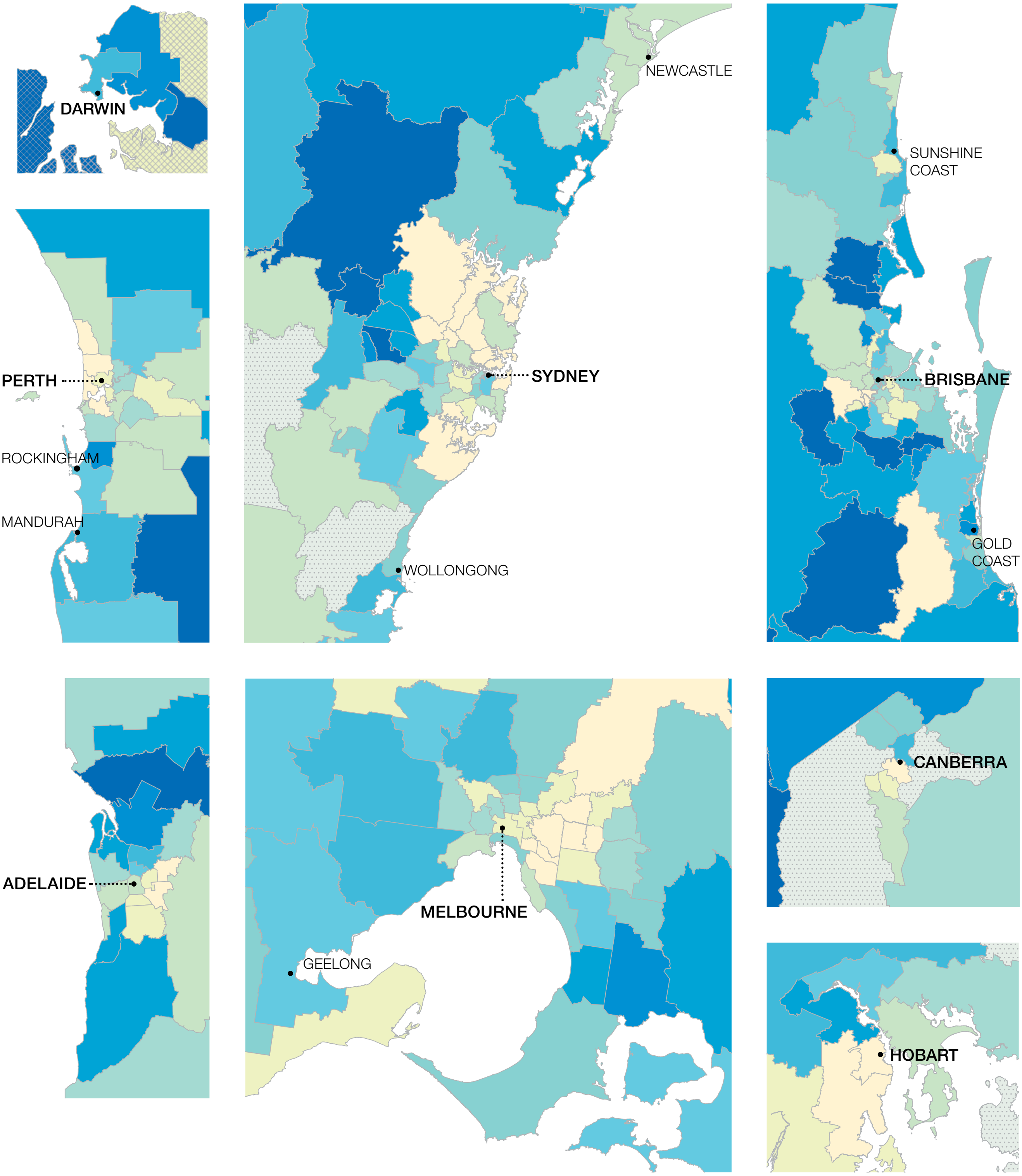
Chronic obstructive pulmonary disease

Figure 1.3: Number of potentially preventable hospitalisations – COPD per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.4: Number of potentially preventable hospitalisations – COPD per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps

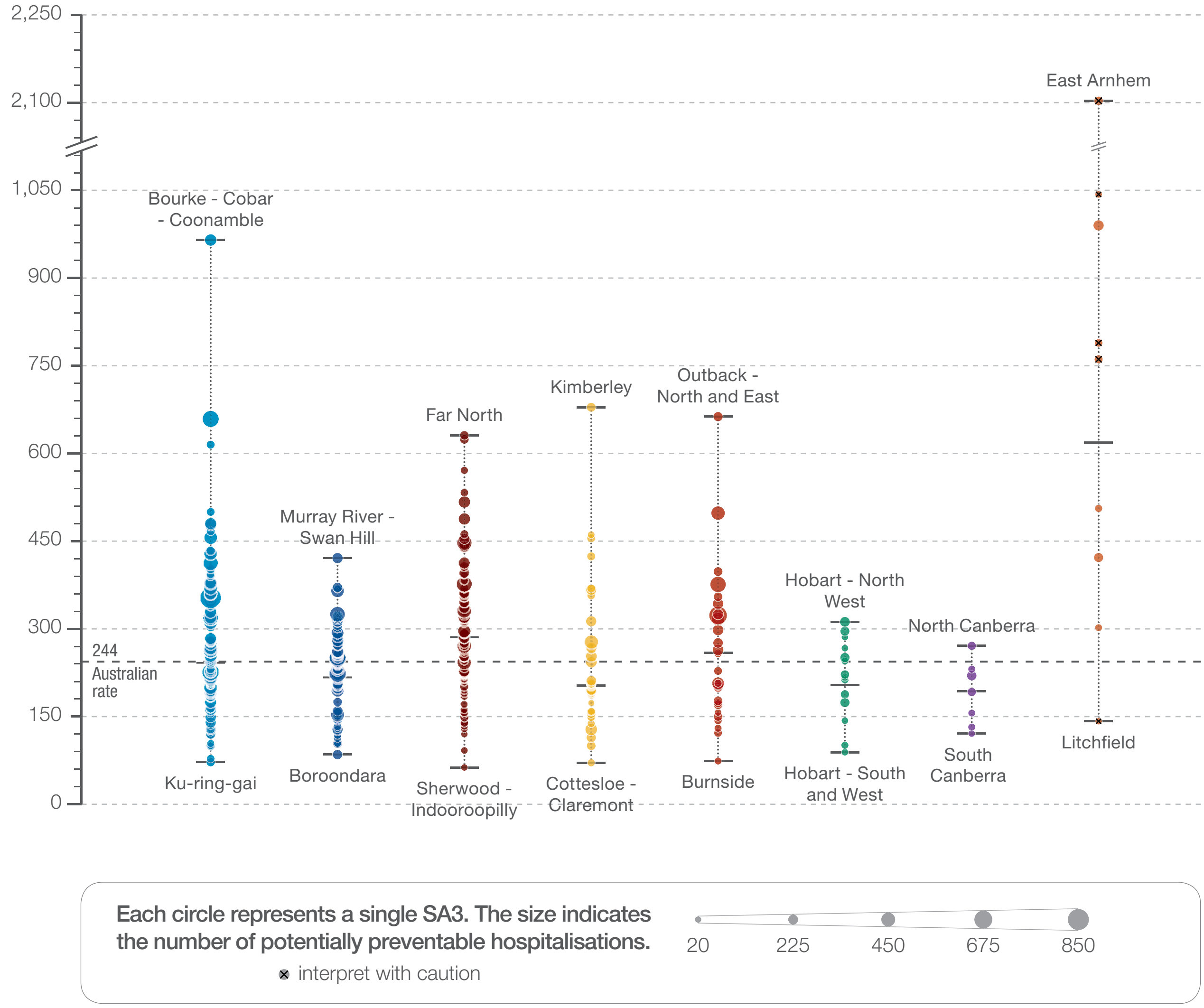


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Chronic obstructive pulmonary disease

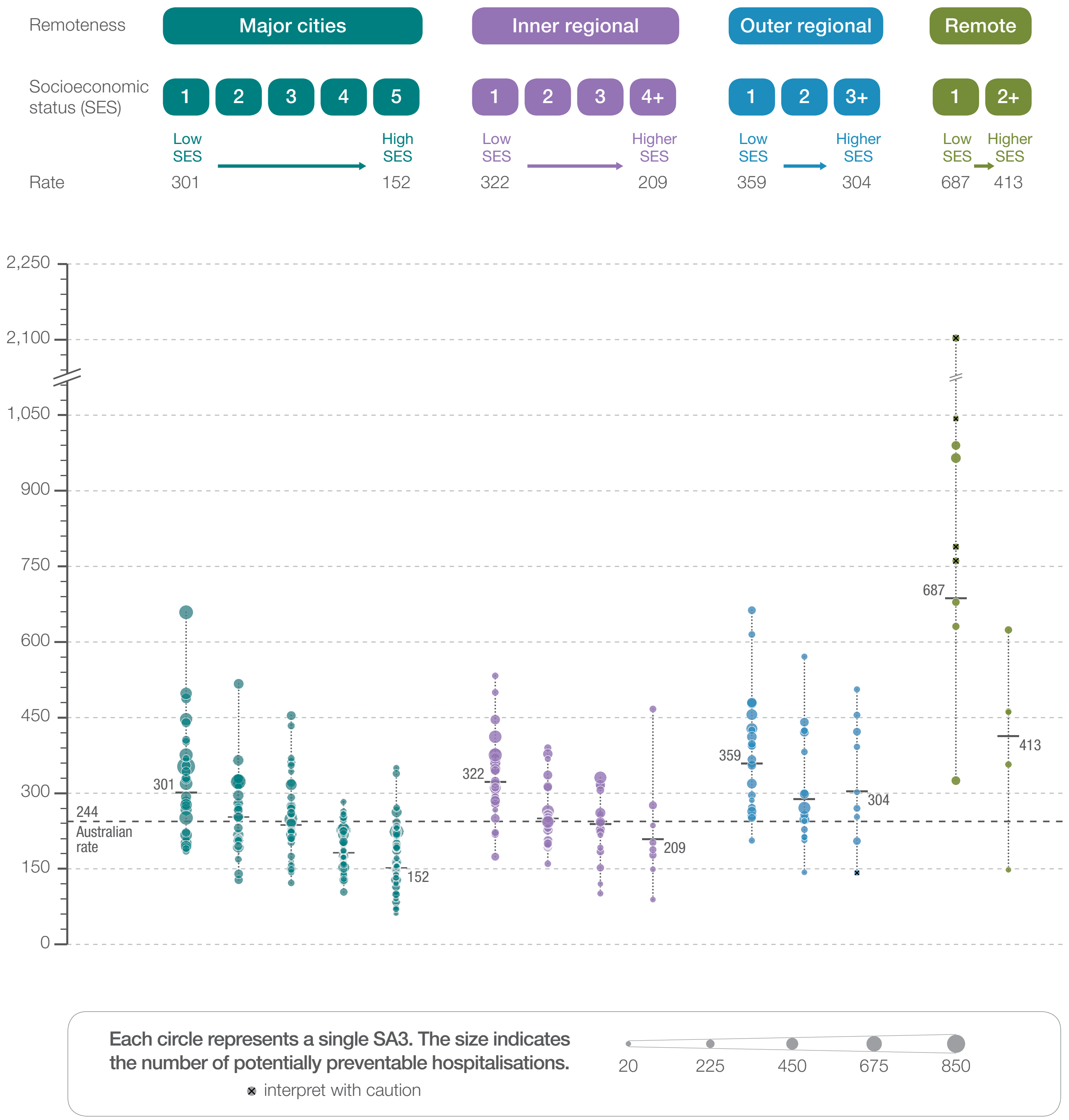
Figure 1.5: Number of potentially preventable hospitalisations – COPD per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	965	421	631	679	663	312	271	2,103*
State/territory	242	217	286	203	259	204	193	619
Lowest rate	72	85	63	71	74	89	121	142*
No. hospitalisations	22,072	14,882	14,846	5,352	5,799	1,438	700	1,001



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.6: Number of potentially preventable hospitalisations – COPD per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Chronic obstructive pulmonary disease

Resources

- Abramson M, Crockett AJ, Dabscheck E, Frith PA, Johnson G, Glasgow N, et al. The COPD-X Plan: Australian and New Zealand guidelines for the management of chronic obstructive pulmonary disease. Lung Foundation Australia, and Thoracic Society of Australia and New Zealand; 2016. Available from: www.copdx.org.au
- Lung Foundation Australia, Australian Physiotherapy Association. Pulmonary rehabilitation toolkit. Brisbane: Lung Foundation Australia; 2016. Available from: www.pulmonaryrehab.com.au
- NPS MedicineWise. Pharmacological therapies for chronic obstructive pulmonary disease in Australia. Sydney: NPS MedicineWise; 2014. Available from www.nps.org.au
- Information and assistance for smokers to quit is available at www.quitnow.gov.au.

Australian initiatives

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

- National Tobacco Strategy 2012–2018, a framework to reduce tobacco-related harm in Australia
- Tackling Indigenous Smoking program
- Breathe Easy, Walk Easy training program for rural and remote healthcare providers, Lung Foundation Australia.

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

- State- and territory-based tobacco control strategies
- Aboriginal Tobacco Control Project, Western Australia
- *The ATRAC Framework: A Strategic Framework for Aboriginal Tobacco Resistance and Control in NSW*, NSW Ministry of Health, and Aboriginal Health and Medical Research Council
- Reports on hospital readmission rates for COPD, NSW Bureau of Health Information.

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1.2 Heart failure

Context

This data item examines hospitalisations for heart failure in people of all ages based on their place of residence. Heart failure is a chronic condition that occurs when the heart becomes weaker and less effective at pumping blood around the body. Symptoms of chronic heart failure include fluid accumulation in the body and breathlessness.

The most common cause of heart failure is underlying coronary heart disease, usually accompanied by a history of myocardial infarction (heart attack). Other causes include hypertension, idiopathic cardiomyopathy and valvular heart disease. Risk factors for these conditions and heart failure include age, family history, smoking, poor diet, obesity, diabetes, high cholesterol, excessive alcohol consumption and inadequate physical activity.[1] People admitted to hospital with acute heart failure often have comorbidities with shared risk factors, such as renal disease, diabetes and pulmonary disease.[2]

The prevalence of heart failure in Australia is estimated at 1–2%.[3] The rates are higher among Aboriginal and Torres Strait Islander Australians, women, and people living in rural and remote areas.[3] The prevalence of heart failure rises steeply with age, and is rare in people younger than 50 years.[4] Two-thirds of Australian adults with heart failure are aged 65 years or over.[5]

The age-standardised prevalence of diagnosed heart failure for Aboriginal and Torres Strait Islander Australians is 1.7 times the prevalence for other Australians.[6] Central Australian Aboriginal and Torres Strait Islander communities have extremely high rates of heart failure: a prevalence of 5% was found in a recent study, and 65% of these cases were previously undiagnosed.[7] This suggests a large unidentified burden of heart failure among Aboriginal and Torres Strait Islander Australians.[7]

Heart failure

Aboriginal and Torres Strait Islander Australians have higher rates than other Australians of risk factors for heart failure, including hypertension, coronary heart disease, chronic kidney disease, rheumatic heart disease, metabolic syndrome, diabetes and obesity.[6] Psychological distress is also more common among Aboriginal and Torres Strait Islander Australians; this increases the risk of coronary heart disease independently of health behaviours.[8,9] Aboriginal and Torres Strait Islander Australians with heart failure also have worse disease severity and increased mortality at younger ages than other Australians with heart failure.[6]

The rate of hospitalisations for heart failure in Australia is close to the average for countries in the Organisation for Economic Co-operation and Development (240 and 244 per 100,000 people, respectively, in 2015).[10]

Effective management of heart failure involves multidisciplinary care across the acute and primary care sectors, and a combination of strategies, including[11]:

- Non-pharmacological approaches, such as physical activity programs, and fluid or dietary management
- Pharmacotherapy, including diuretics, angiotensin-converting enzyme inhibitors and beta-blockers
- Surgical procedures and supportive devices – for example, coronary artery bypass graft surgery, or cardiac resynchronisation therapy with or without insertion of an implantable cardiac defibrillator.

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for heart failure (based on the potentially preventable hospitalisation specification) per 100,000 people in 2014–15. Because a record is included for each hospitalisation, rather than for each patient, patients hospitalised more than once in the financial year will be counted more than once. The full data specification is available from the Australian Institute of Health and Welfare.[12]

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 55,511 hospitalisations for heart failure, representing 196 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for heart failure across 324† local areas (Statistical Area Level 3 – SA3) ranged from 90 to 632 per 100,000 people. The rate was **7.0 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 169 per 100,000 people in the Australian Capital Territory to 344 in the Northern Territory (Figures 1.8–1.11).

After the highest and lowest 10% of results were excluded and 260 SA3s remained, the number of hospitalisations per 100,000 people was 2.1 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

Analysis by remoteness and socioeconomic status

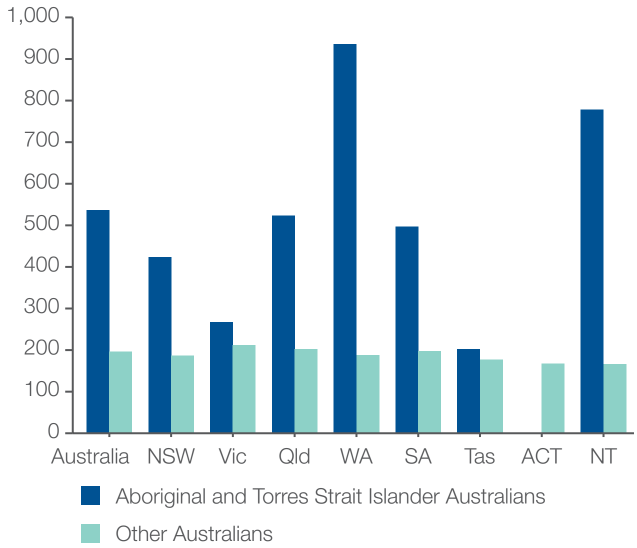
Three SA3s in remote parts of Australia (Bourke – Cobar – Coonamble, Alice Springs, and Kimberley) had hospitalisation rates that were more than double the national rate.

Rates of hospitalisation for heart failure were markedly higher in remote areas than in other areas. Rates increased with socioeconomic disadvantage, particularly in major cities (Figure 1.12).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (537 per 100,000) was 2.7 times as high as the rate for other Australians (197 per 100,000 people). Rates were higher among Aboriginal and Torres Strait Islander Australians than other Australians in all states and territories (Figure 1.7).

Figure 1.7: Number of potentially preventable hospitalisations – heart failure per 100,000 people, age and sex standardised, by state and territory and Indigenous status, 2014–15



The data for Figure 1.7 are available at www.safetyandquality.gov.au/atlas.

† There are 333 SA3s. For this item, data were suppressed for nine SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

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

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.

Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.

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

Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Heart failure

Interpretation

Potential reasons for the variation include differences in:

- The prevalence of risk factors for heart failure, such as coronary heart disease, rheumatic fever and rheumatic heart disease, diabetes, hypertension, smoking, obesity, kidney disease and psychological distress
- Implementation of cardiac rehabilitation programs that include education, psychosocial support, exercise training and optimal pharmacotherapy[13]
- Access to evidence-based multidisciplinary heart failure services in the community
- Socioeconomic disadvantage; heart failure appears to be more prevalent among people living in lower socioeconomic areas, and in rural and remote areas[2]
- Health literacy about medications, adherence to medications and ability to afford medications
- The quality of both hospital and community care, which can be affected by suboptimal communication between clinicians
- The quality, efficiency and effectiveness of primary health care; these may be lower for Aboriginal and Torres Strait Islander Australians
- Access to dialysis; 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[14]
- Diagnostic error.

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.

Expansion of the Northern Territory Integrated Cardiac Network Service in 2013–14 may have reduced hospitalisations for heart failure in 2014–15. The Victorian policy Heart Health: Improved Services and Better Outcomes for Victorians, which was released in 2014–15, may also have reduced hospitalisations for heart failure in 2014–15.

Common reasons for hospitalisation with acute heart failure are infection, non-adherence to medication, and non-adherence to dietary and fluid restrictions, each of which accounted for about one-fifth of hospitalisations in a recent study in New South Wales and the Australian Capital Territory.[2] The high rates of non-adherence emphasise the need for management interventions.[2] Rates of prescription for ACE inhibitors and beta-blockers among patients admitted to hospital for heart failure are also lower than recommended, suggesting that uptake of evidence-based guidelines could be improved.[2]

Readmissions make a substantial contribution to hospitalisations for people with heart failure. Rates of readmission within 30 days, for any cause, among people with heart failure ranged from 13% to 30% in a recent Victorian study.[15] Factors that increase the risk of readmission for heart failure include male gender, socioeconomic disadvantage and being admitted from an aged care setting.[16] A recent study of hospitalisations with acute heart failure in New South Wales and the Australian Capital Territory found that 11% of patients were residents of aged care homes.[2]

Case study: Telephone support for heart failure patients

In Australia, heart failure is more common in rural and remote areas than in cities, but access to multidisciplinary and community-based care and its benefits is limited in rural and remote areas.[17] A randomised trial of usual care compared with usual care plus telephone support was conducted with 405 patients with heart failure. Approximately half the practices involved in the trial were in rural or remote locations, and the remainder were in outer metropolitan areas without access to multidisciplinary heart failure care.

The intervention included an automated telemedicine system that asked patients questions about their clinical status, medical management and social issues. Patients dialled into this system at least once a month, and a heart failure specialist nurse was alerted of signs or symptoms that warranted intervention. Patients were able to contact the telemedicine system or nurse for advice at any time. Patients and clinicians were also given resources to support heart failure management. The nurse could implement a diuretic algorithm if the patient was not able to access their general practitioner.

Patients in the intervention group had a 30% lower rate of death or hospitalisation than the usual care group over the one-year trial ($P = 0.01$), and saw their general practitioner half as often as those in the usual care group. The increased access to a heart failure nurse by telephone may also reduce anxiety and improve the quality of life of patients.[17] Telephone support may be an effective way to improve outcomes in rural and remote patients, particularly those with heart failure.[17]

Addressing variation

Reducing the rate of risk factors for heart failure, such as hypertension, coronary heart disease, rheumatic fever and rheumatic heart disease, diabetes, smoking and obesity, is vital for reducing hospitalisations for heart failure.[18]

Best-practice management of people with chronic heart failure involves evidence-based, multidisciplinary care. This can be delivered in a range of settings, including in the patient's home and via telemedicine.[18]

Educating patients about self-management may reduce the risk of heart failure complications – for example, managing fluid intake, increasing physical activity levels, reducing salt intake and managing weight.[18] Addressing psychosocial factors is an important aspect of supporting patients to make these changes.[18]

Strategies to reduce the readmission rate include offering a heart failure service within hospitals to provide specialist input within 24–48 hours of hospitalisation; providing clear information to patients and carers about self-management, and ensuring that they understand it; and ensuring effective transition to community care.[19]

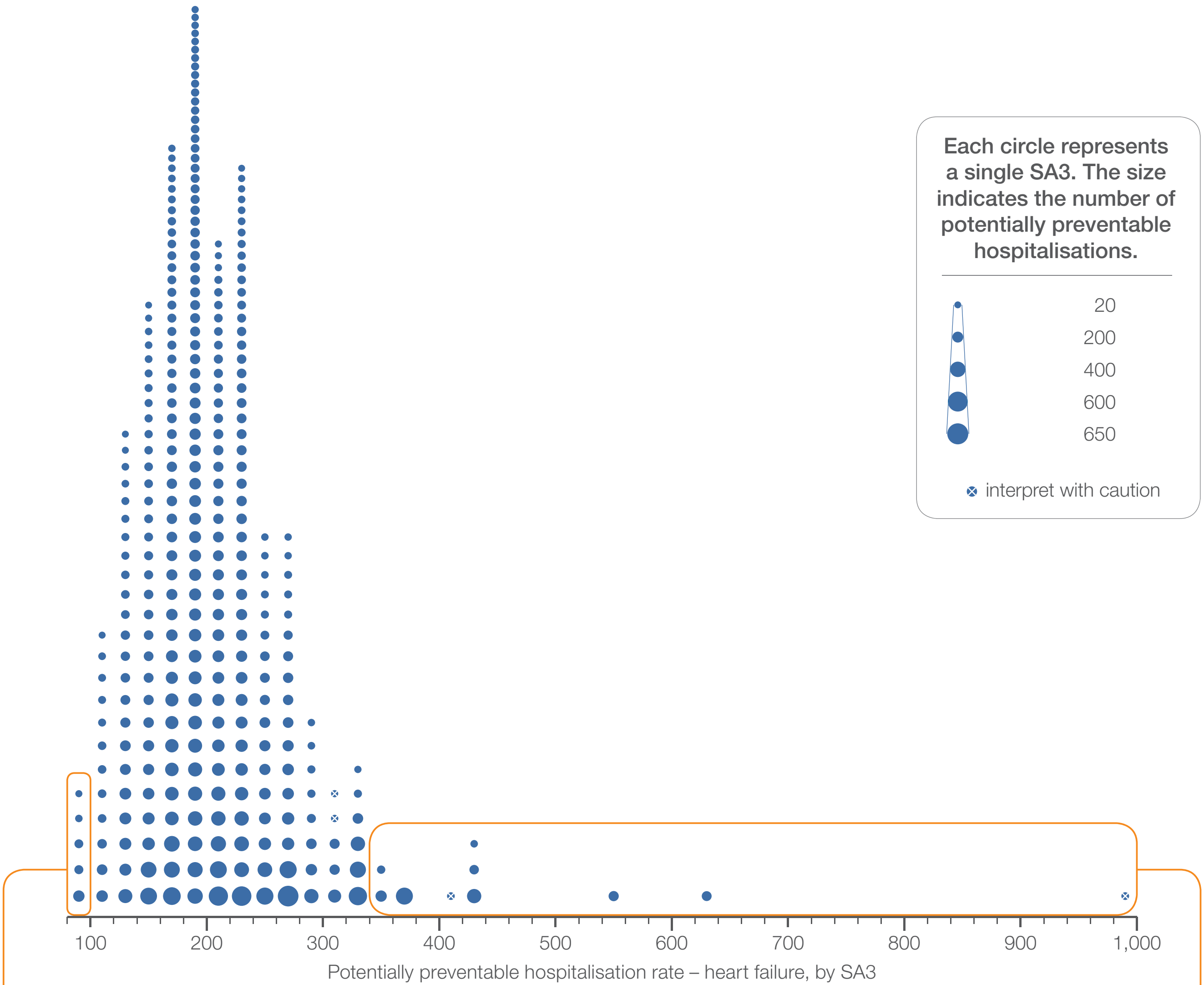
Promising models of care to reduce readmissions for heart failure include case management and multidisciplinary interventions. Case management by nurse specialists reduced readmissions for heart failure and death from any cause over a one-year period.[20] A multidisciplinary model of care for people with heart failure significantly reduces readmissions and death from any cause, and improves patients' quality of life.[21]

Heart failure

Suggested strategies to improve heart failure management among Aboriginal and Torres Strait Islander Australians include:

- Increasing access to cardiac rehabilitation programs that include education, psychosocial support, exercise training and optimal pharmacotherapy[13]
- Using telemedicine and remote monitoring to improve access for Aboriginal and Torres Strait Islander Australians living in rural and remote locations[13]
- Ensuring follow-up of patients after discharge
- Incorporating family-based and outreach programs into models of care[13]
- Improving prevention, early diagnosis and treatment of rheumatic fever[22]
- Preventing progression of kidney disease
- Improving access to dialysis for Aboriginal and Torres Strait Islander communities.

Figure 1.8: Number of potentially preventable hospitalisations – heart failure per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Dural - Wisemans Ferry	NSW	**90**	29
Sherwood - Indooroopilly	Qld	**94**	48
Warringah	NSW	**95**	220
Launceston	Tas	**96**	115
Surf Coast - Bellarine Peninsula	Vic	**98**	109

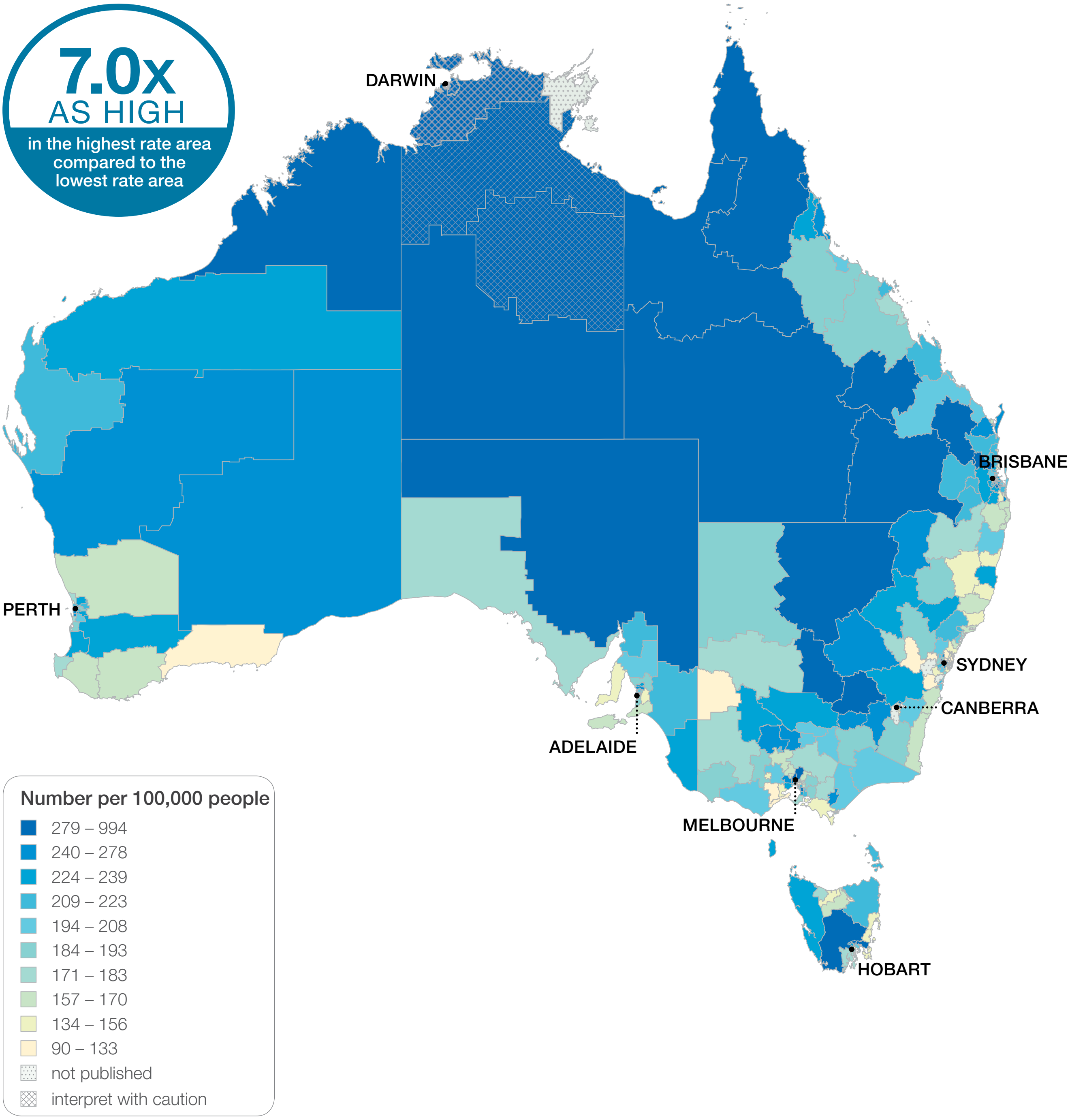
Highest rate areas

SA3	State	Rate	Hospitalisations
Barkly	NT	**994***	61
Kimberley	WA	**632**	154
Alice Springs	NT	**554**	167
Mount Druitt	NSW	**437**	350
Bourke - Cobar - Coonamble	NSW	**429**	137
Port Douglas - Daintree	Qld	**424**	50
Katherine	NT	**400***	58
Wagga Wagga	NSW	**363**	471
Outback - South	Qld	**358**	86
Griffith - Murrumbidgee (West)	NSW	**340**	216

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

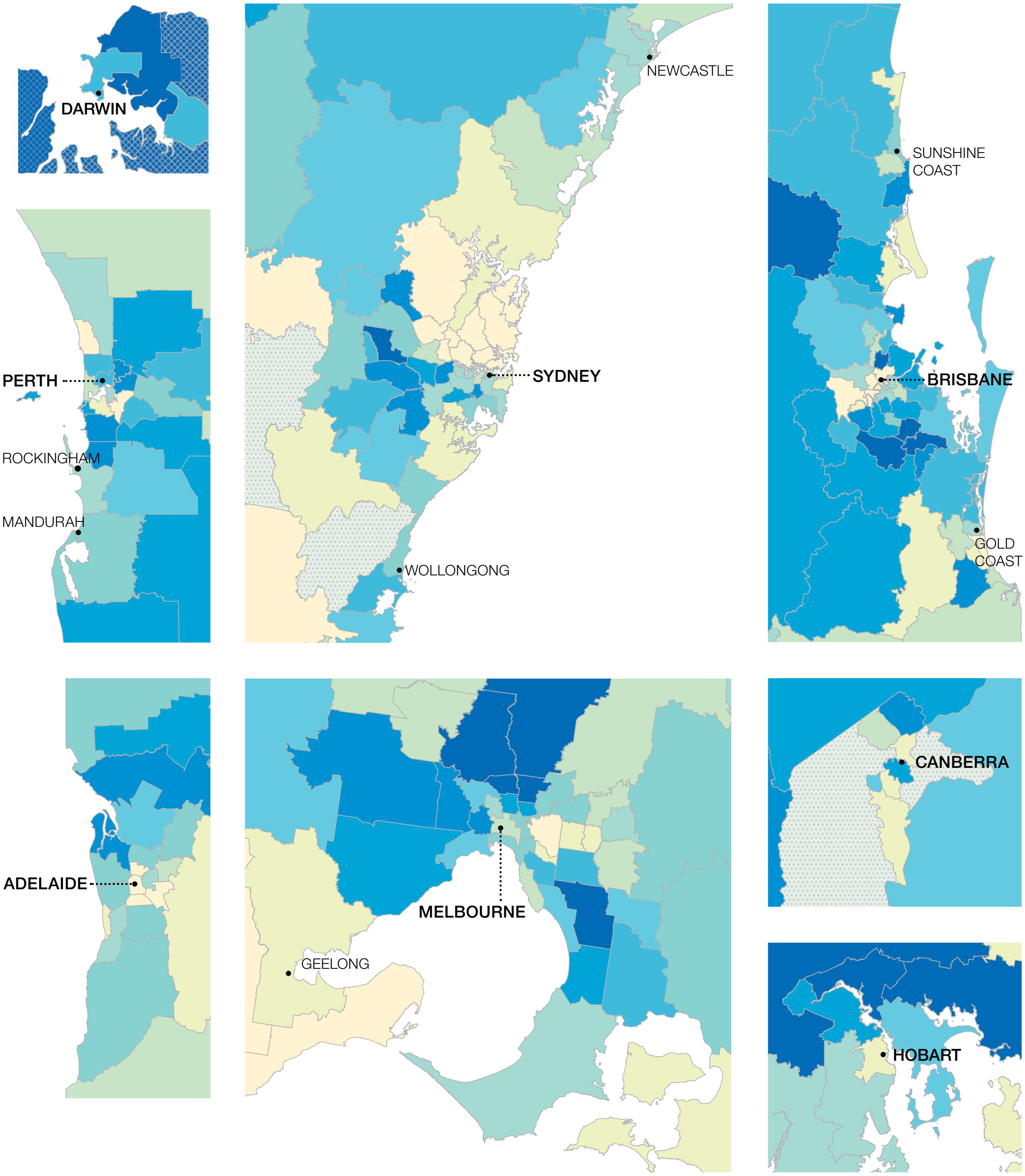
Heart failure

Figure 1.9: Number of potentially preventable hospitalisations – heart failure per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.10: Number of potentially preventable hospitalisations – heart failure per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps

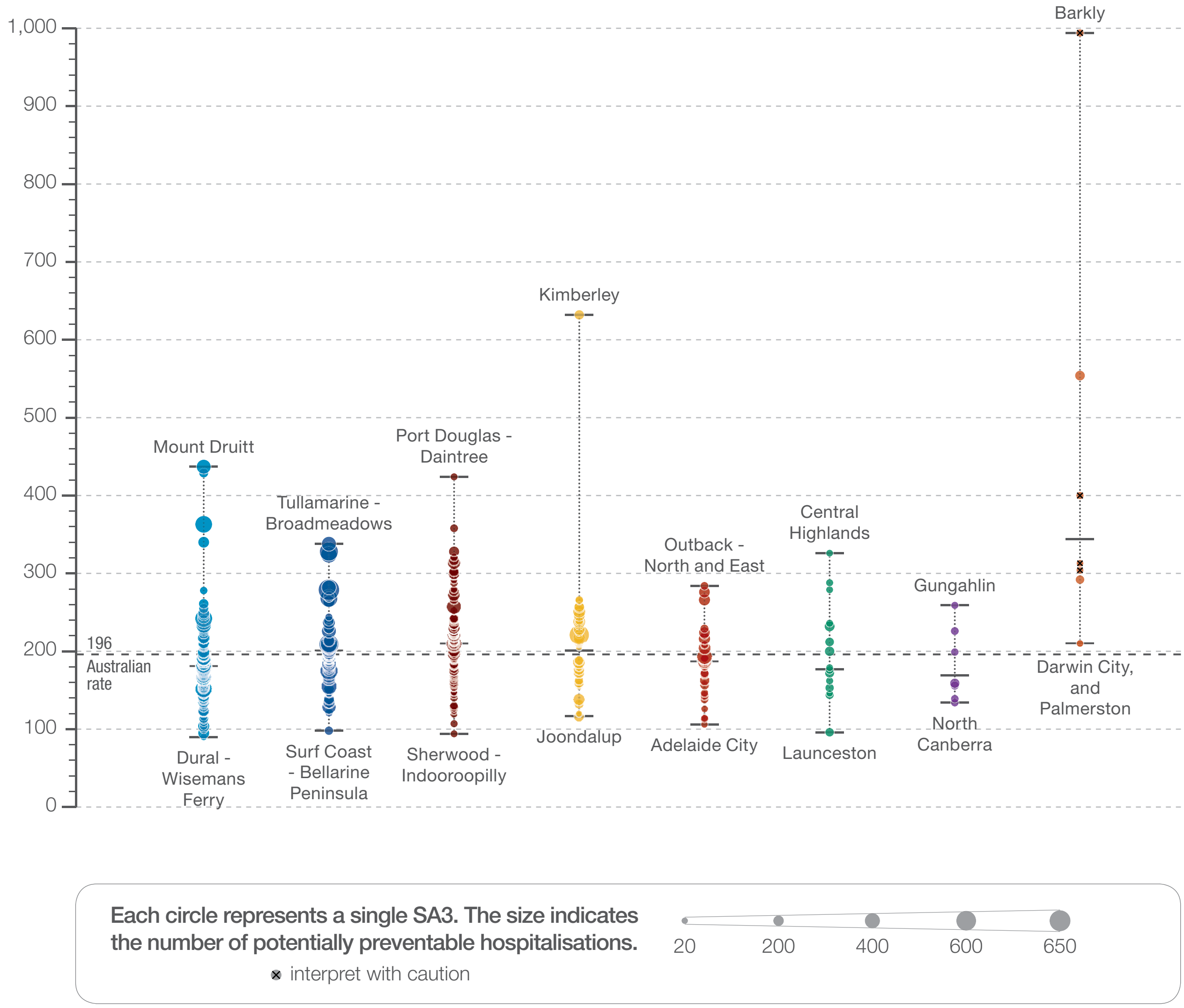


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Heart failure

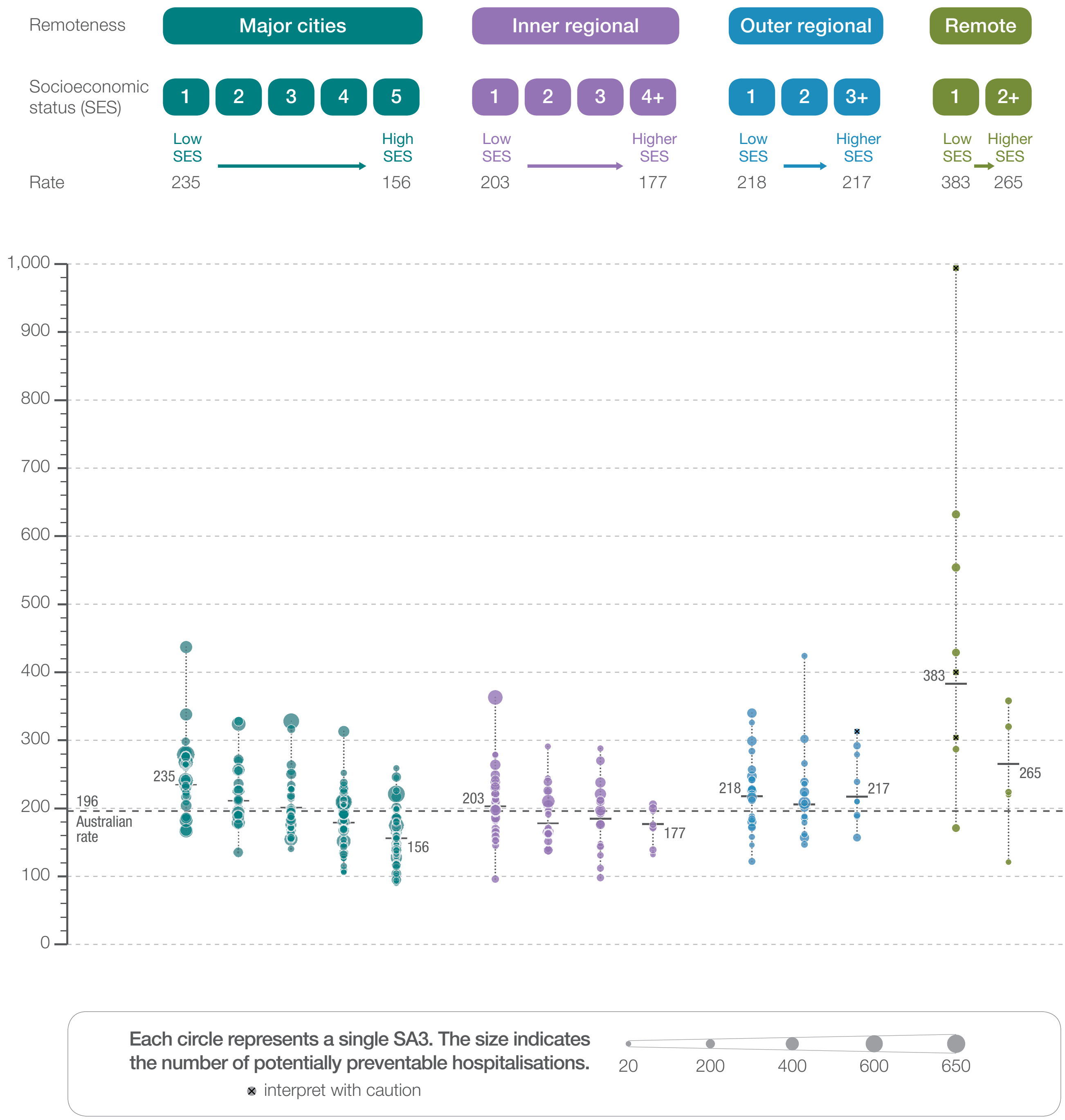
Figure 1.11: Number of potentially preventable hospitalisations – heart failure per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	437	338	424	632	284	326	259	994*
State/territory	181	201	210	201	187	177	169	344
Lowest rate	90	98	94	117	106	96	134	210
No. hospitalisations	17,394	14,580	10,997	5,355	4,536	1,295	614	572



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.12: Number of potentially preventable hospitalisations – heart failure per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Heart failure

Resources

- NSW Agency for Clinical Innovation. Clinical services framework for chronic heart failure. Sydney: NACI; 2016.
- Consumer resources for people with heart failure, including specific resources for Aboriginal and Torres Strait Islander Australians.
- National Heart Foundation of Australia, Cardiac Society of Australia and New Zealand (Chronic Heart Failure Guidelines Expert Writing Panel). Guidelines for the prevention, detection and management of chronic heart failure in Australia. Heart Foundation; 2011.
- National Heart Foundation of Australia. Multidisciplinary care for people with chronic heart failure: principles and recommendations for best practice. Heart Foundation; 2010.
- National Heart Foundation of Australia. A systematic approach to chronic heart failure care: a consensus statement. Heart Foundation; 2013.
- National Heart Foundation of Australia. Toolkit for health professionals: improving cardiac rehabilitation and heart failure services. Heart Foundation.
- Recommendations from the Cardiac Society of Australia and New Zealand (CSANZ) arising from the inaugural CSANZ Conference on Indigenous Cardiovascular Health.[22]

Australian initiatives

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

- Heart Failure Toolkit – a targeted approach to reducing heart failure readmissions, Heart Foundation[19]
- Essential Service Standards for Equitable National Cardiovascular Care (ESSENCE) for Aboriginal and Torres Strait Islander Australians.

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

- Northern Territory Heart Failure Initiative – Clinical Audit
- Northern Territory Integrated Cardiac Network Service www.healthinfonet.ecu.edu.au/key-resources/programs-projects?pid=2812
- Queensland Heart Failure Services, Queensland Government
- Victorian Heart Health: Improved Services and Better Outcomes for Victorians policy
- Reducing heart failure admissions, Heart Foundation Victoria and Victorian Government
- 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
- State and territory cardiac networks.

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1.3 Cellulitis

Context

This data item examines hospitalisations for cellulitis in people of all ages based on their place of residence. Cellulitis is an infection of the subcutaneous tissues. Cellulitis accounted for 250,554 hospital bed days, and 11% of all potentially preventable hospitalisations, in Australia in 2013–14.[1] International rates for comparison are not readily available.

Cellulitis occurs in a range of different conditions and circumstances, with different causes and management – for example, penetrating injuries, insect bites, scabies, furunculosis and wounds.[2,3] Risk factors for cellulitis include diabetes, lymphoedema, poor blood flow, immunosuppression and obesity.[2] Distinguishing cellulitis from other conditions can be challenging; for example, chronic venous insufficiency and erythema around venous ulcers are commonly misdiagnosed as cellulitis.

Cellulitis is caused by a variety of pathogens. Spontaneous, rapidly spreading cellulitis is most commonly caused by *Streptococcus pyogenes* or other streptococci; cellulitis caused by *Staphylococcus aureus* is less common, and is often associated with ulceration or penetrating injury.[3] Some community-acquired *S. aureus* infections in Australia are now due to methicillin-resistant *S. aureus* (MRSA).[4]

Recommended initial treatment for cellulitis is with oral antibiotics. In severe cases or if oral antibiotics are not available, intravenous antibiotics are recommended.[3] Risk factors for complications of cellulitis include type 2 diabetes and delayed initiation of treatment.[5,6]

Recent national data on the prevalence of cellulitis in the Australian community are not available.

Cellulitis

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for cellulitis (based on the potentially preventable hospitalisation specification) per 100,000 people in 2014–15. Because a record is included for each hospitalisation, rather than for each patient, patients hospitalised more than once in the financial year will be counted more than once. The full data specification is available from the Australian Institute of Health and Welfare.[7]

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 59,466 hospitalisations for cellulitis, representing 237 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for cellulitis across 324† local areas (Statistical Area 3 – SA3) ranged from 102 to 1,262 per 100,000 people. The rate was **12.4 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 177 per 100,000 people in the Australian Capital Territory to 540 in the Northern Territory (Figures 1.14–1.17).

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 to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

Analysis by remoteness and socioeconomic status

Two SA3s in remote areas of Australia (Far North and Kimberley) had markedly higher hospitalisation rates than other SA3s, at 4.8 and 5.3 times the national rate, respectively. Four further SA3s in outer regional and remote areas (Tablelands [East] – Kuranda, Innisfail – Cassowary Coast, Outback – South, and Alice Springs) had hospitalisation rates that were at least 3 times the national rate.

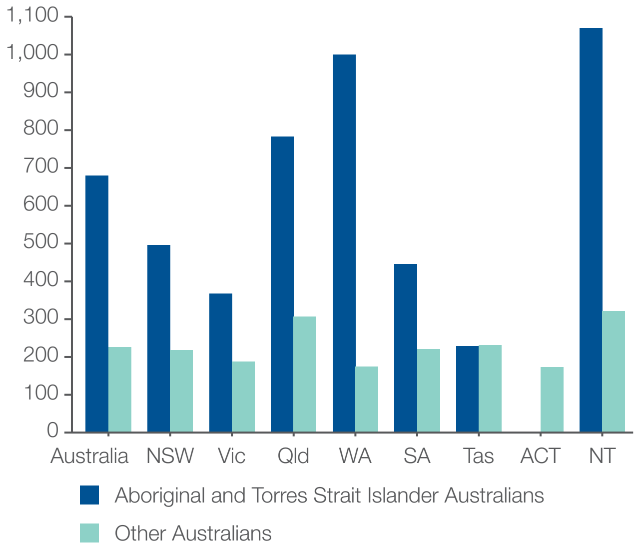
† There are 333 SA3s. For this item, data were suppressed for nine SA3s due to a small number of hospitalisations and/or population in an area.
Some of the published SA3 rates were considered more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.

Rates of hospitalisations for cellulitis were markedly higher in outer regional and remote areas than in other areas. Rates increased with socioeconomic disadvantage regardless of remoteness category, except in major cities (Figure 1.18).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (679 per 100,000 people) was 3 times as high as the rate for other Australians (226 per 100,00 people). Rates were higher among Aboriginal and Torres Strait Islander Australians than other Australians in all states and territories, except in Tasmania (Figure 1.13).

Figure 1.13: Number of potentially preventable hospitalisations – cellulitis per 100,000 people, age and sex standardised, by state and territory and Indigenous status, 2014–15



The data for Figure 1.13 are available at www.safetyandquality.gov.au/atlas.

Interpretation

Potential reasons for the variation include differences in:

- The prevalence of diabetes, which increases the risk of skin disease; diabetes is more prevalent among Aboriginal and Torres Strait Islander Australians
- The prevalence of streptococcal infections, which is higher in some Aboriginal and Torres Strait Islander communities than in the general population
- The prevalence of community-acquired MRSA, which is higher in local areas with a high proportion of Aboriginal and Torres Strait Islander Australians
- The prevalence of overcrowded housing
- Occupational risk factors for skin injury, which may be higher among socioeconomically disadvantaged people
- Delayed or inadequate access to health care; poor health literacy may contribute to delays in seeking health care, resulting in increased need for hospitalisation
- The quality, efficiency and effectiveness of primary health care – these may be lower for Aboriginal and Torres Strait Islander Australians
- Clustering of populations with a high risk of cellulitis, such as residents of nursing homes[8]
- Prevalence of other risk factors for cellulitis, such as lymphoedema and obesity
- Temperature and humidity, and associated effects (for example, open footwear, tinea, insect bites)
- Diagnostic error.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Cellulitis

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.

Recent research in Aboriginal and Torres Strait Islander communities in north Queensland has shown that an extremely high background rate of community-acquired infection, plus high prevalence of type 2 diabetes, leads to high rates of hospitalisation for infections, including cellulitis.[9] The risk of skin infections is increased by poor housing conditions, including overcrowding.[10] Aboriginal and Torres Strait Islander households are three times as likely to be overcrowded as other Australian households, and remote Aboriginal and Torres Strait Islander communities have higher rates of inadequate facilities to support healthy living practices, such as washing.[11]

Addressing variation

Suitable strategies to reduce potentially preventable hospitalisations for cellulitis will depend on the specific underlying causes in local areas and their accurate diagnosis. More effective prevention and management of type 2 diabetes may reduce this important risk factor for cellulitis. Increased 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 the availability of lymphoedema services and specific compression stockings may reduce rates of cellulitis in patients with chronic oedema.

Using better-tolerated treatments for impetigo in primary care may encourage people to present earlier for treatment. Delays in presentation due to the pain of treatment with bicillin injection, or experience of previous ineffective treatment for MRSA infections – for example, with flucloxacillin or other ß-lactam antibiotics – may be a reason for treatment failure in the primary healthcare setting.[13]

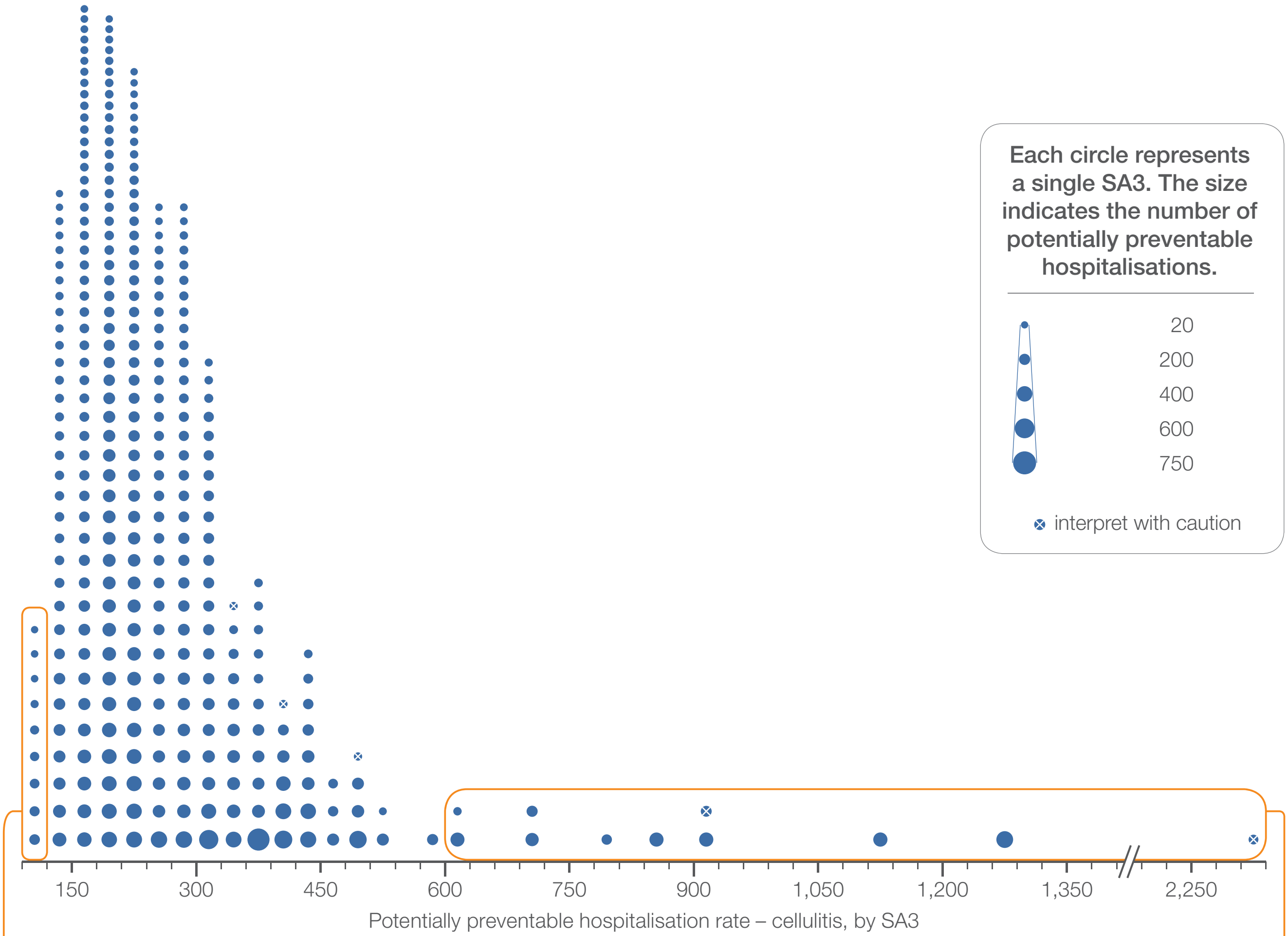
Children in remote Aboriginal and Torres Strait Islander communities in northern Australia have the highest rates of impetigo in the world, as well as high rates of scabies and tinea.[14,15] Prevention programs for skin infections can reduce predisposing factors for cellulitis in these settings.[15,16] 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, particularly staphylococcal diseases.[17,18]

Case study: Housing improvements to reduce skin infections in Aboriginal and Torres Strait Islander Australians

The risk of skin infections is increased by poor housing conditions, including inadequate facilities for healthy living practices.[10] A program that repairs and maintains housing items required for healthy living practices has shown a significant reduction in the rate of hospitalisation for skin infections, and other benefits for people living in Aboriginal community housing.[12]

Over the 10-year evaluation period, repairs were made to 2,230 houses; these included fixing hot water systems, showers, washing machines, toilets and insect screens. Repairs were also made to improve safety, temperature control, and the ability to store and prepare food. 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 as, or the day after, houses were surveyed), and through employing local Aboriginal and Torres Strait Islander tradespeople to carry out the repairs, where possible.[12]

Figure 1.14: Number of potentially preventable hospitalisations – cellulitis per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Nillumbik - Kinglake	Vic	**102**	62
Meander Valley - West Tamar	Tas	**102**	24
Canning	WA	**104**	115
South Canberra	ACT	**111**	32
Sutherland - Menai - Heathcote	NSW	**112**	134
Launceston	Tas	**112**	106
Macedon Ranges	Vic	**113**	33
Cronulla - Miranda - Caringbah	NSW	**117**	175
Melville	WA	**119**	151

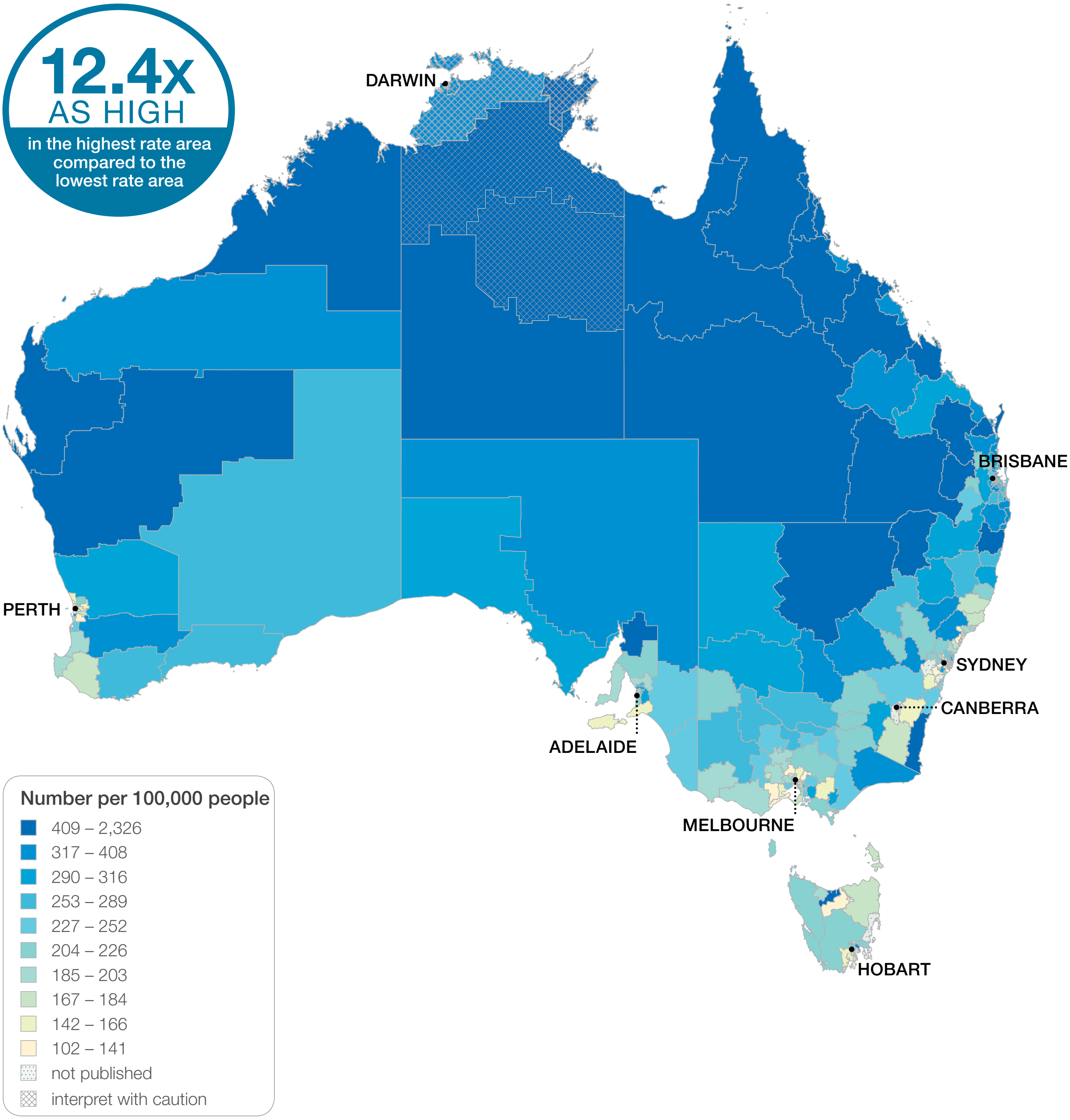
Highest rate areas

SA3	State	Rate	Hospitalisations
Barkly	NT	**2,326***	138
Kimberley	WA	**1,262**	461
Far North	Qld	**1,131**	341
Innisfail - Cassowary Coast	Qld	**922**	341
Katherine	NT	**910***	188
Alice Springs	NT	**856**	338
Outback - South	Qld	**802**	165
Tablelands (East) - Kuranda	Qld	**717**	297
Bourke - Cobar - Coonamble	NSW	**693**	198
Devonport	Tas	**628**	333
Port Douglas - Daintree	Qld	**619**	73

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

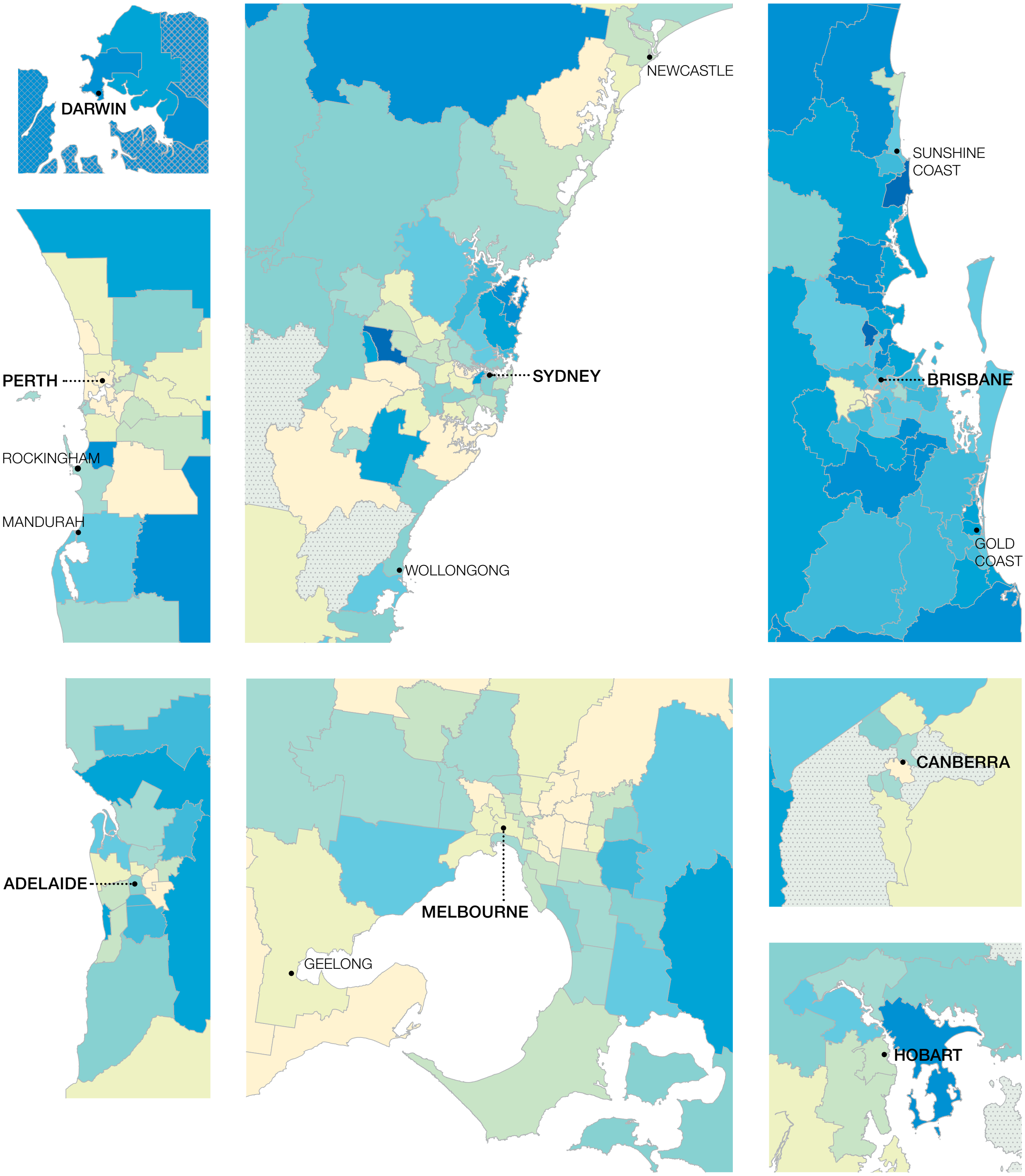
Cellulitis

Figure 1.15: Number of potentially preventable hospitalisations – cellulitis per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.16: Number of potentially preventable hospitalisations – cellulitis per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps

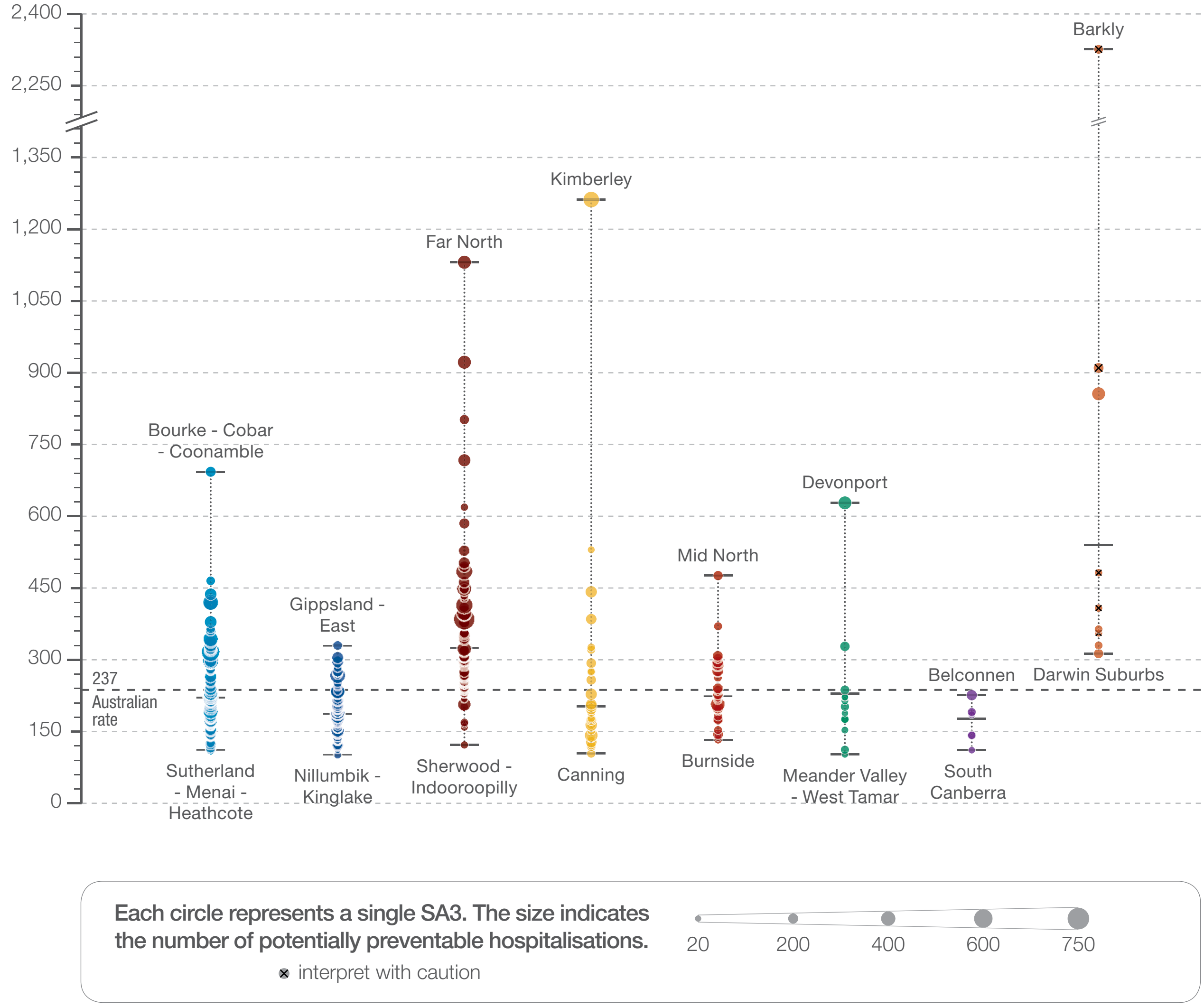


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Cellulitis

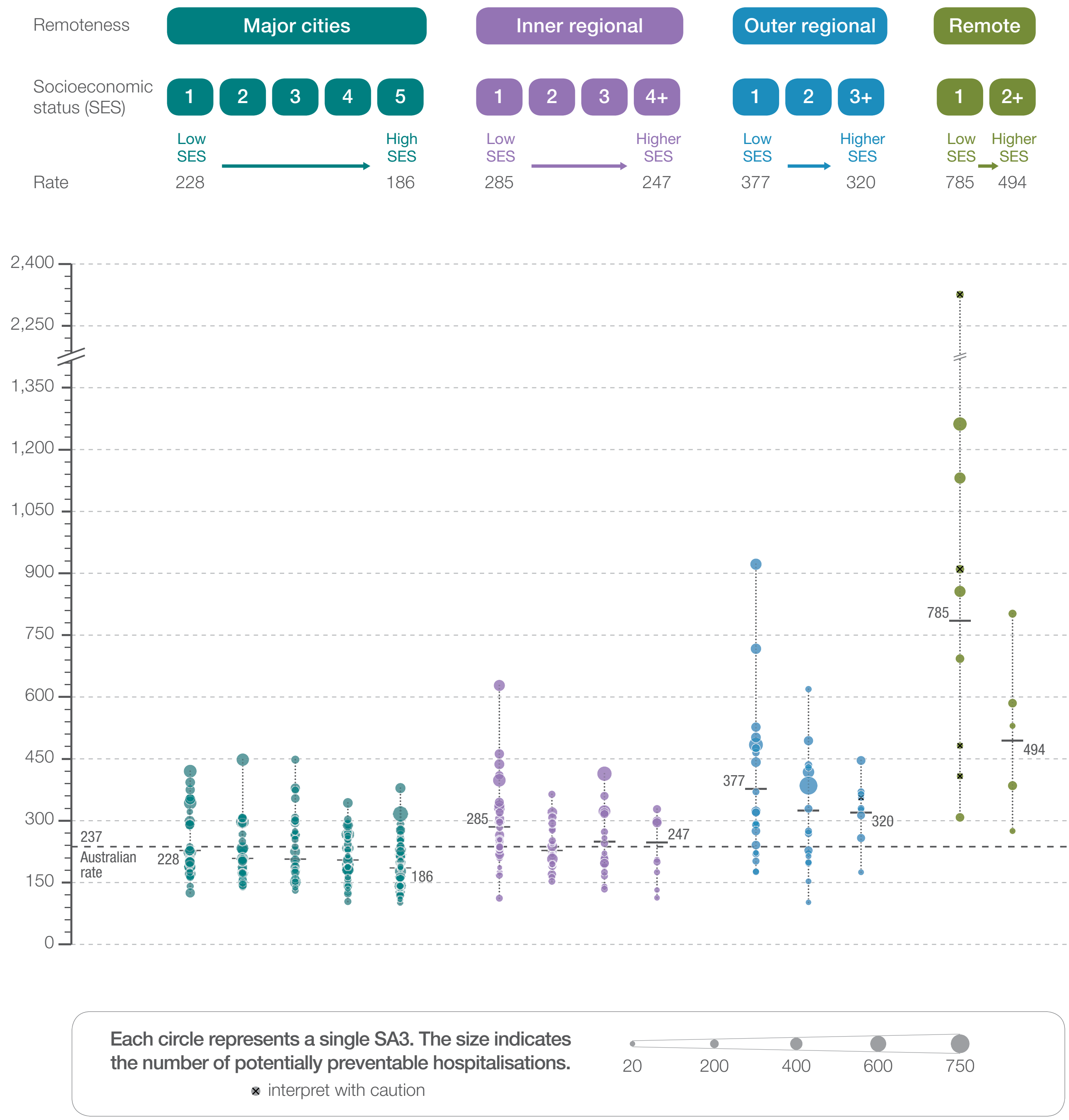
Figure 1.17: Number of potentially preventable hospitalisations – cellulitis per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	693	329	1,131	1,262	476	628	226	2,326*
State/territory	221	187	325	203	224	229	177	540
Lowest rate	112	102	122	104	133	102	111	313
No. hospitalisations	18,340	11,787	15,871	5,274	4,433	1,314	670	1,210



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.18: Number of potentially preventable hospitalisations – cellulitis per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Cellulitis

Resources

- Therapeutic Guidelines Limited. Skin and soft tissue infections: bacterial (revised November 2014). In: eTG complete. Melbourne: TGL; 2015.
- Royal Children's Hospital Melbourne. Clinical practice guidelines: cellulitis and skin infections. Melbourne: RCH. Available from: www.rch.org.au/clinicalguide/guideline_index/cellulitis_and_skin_infections
- Northern Territory Department of Health. 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.
- Central Australian Rural Practitioners Association (CARPA). Standard treatment manual, 6th ed. Alice Springs: Remote Primary Health Care Manuals; 2014.

Australian initiatives

The information in this chapter will complement work already under way 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.

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

- Housing for Health in Aboriginal communities of New South Wales.

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1.4 Kidney and urinary tract infections

Context

This data item examines hospitalisations for kidney and urinary tract infections (UTIs) in people of all ages based on patient place of residence. Kidney infections and UTIs accounted for 12% of potentially preventable hospitalisations in 2013–14.[1]

Risk factors for kidney infections and UTIs include female gender, diabetes, advanced age pregnancy and urinary catheters.[2] People with diabetes are more likely than the general population to develop serious complications, such as kidney infection, and have longer hospitalisations and increased mortality.[3]

UTIs are common in the community, accounting for 1.2% of all problems managed in Australian general practice consultations.[4] Despite the high prevalence of hospitalisations for kidney infections and UTIs, published evidence on international rates and interventions for these conditions is lacking.

Kidney and urinary tract infections

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for kidney infections and UTIs per 100,000 people in 2014–15. Because a record is included for each hospitalisation, rather than for each patient, patients hospitalised more than once in the financial year will be counted more than once. The full data specification is available from the Australian Institute of Health and Welfare.[5]

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 73,277 hospitalisations for kidney and urinary tract infections, representing 286 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for kidney and urinary tract infections across 323† local areas (Statistical Area 3 – SA3) ranged from 140 to 899 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 hospitalisations varied across states and territories, from 214 per 100,000 people in Tasmania to 411 in the Northern Territory (Figures 1.20–1.23).

After the highest and lowest 10% of results were excluded and 260 SA3s remained, the number of hospitalisations per 100,000 people was 2.2 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

Analysis by remoteness and socioeconomic status

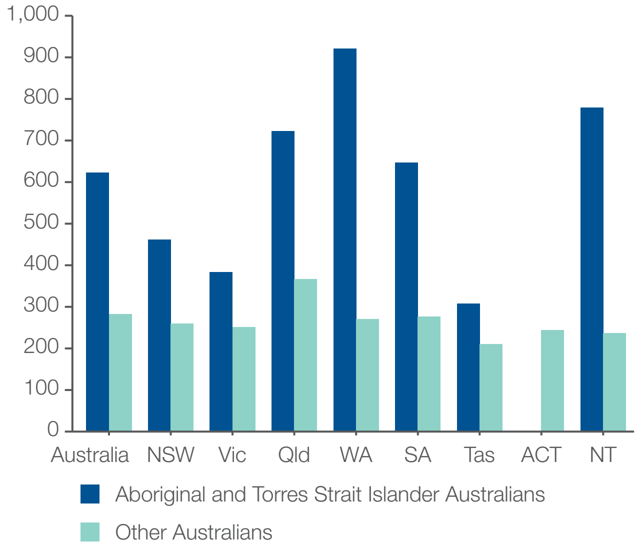
Rates of hospitalisation for kidney infections and UTIs were markedly higher in remote areas than in other areas. Two remote SA3s (Kimberley and Alice Springs) had hospitalisation rates that were more than double the national rate. A further three SA3s in outer regional and remote areas (Outback – North, Innisfail – Cassowary Coast and Tablelands [East] – Kuranda) had rates that were almost double the national rate. Rates of kidney infections and UTIs also increased with socioeconomic disadvantage in all areas, regardless of remoteness category (Figure 1.24).

† There are 333 SA3s. For this item, data were suppressed for 10 SA3s due to a small number of hospitalisations and/or population in an area.
Some of the published SA3 rates were considered 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 Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (623 per 100,000 people) was 2.2 times as high as the rate for other Australians (282 per 100,000 people). Rates were higher among Aboriginal and Torres Strait Islander Australians than other Australians in all states and territories (Figure 1.19).

Figure 1.19: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people, age and sex standardised, by state and territory and Indigenous status, 2014–15



The data for Figure 1.19 are available at www.safetyandquality.gov.au/atlas.

Interpretation

Potential reasons for the variation include differences in:

- Adherence to evidence-based guidelines, including choice and length of antimicrobial treatment
- Access to primary care, including its availability, acceptability and affordability
- Access to hospital in the home and other community services
- Clustering of populations with a high risk of urinary tract infections, such as residents of aged care homes, people with type 2 diabetes, and Aboriginal and Torres Strait Islander Australians[6]
- The quality, efficiency and effectiveness of primary health care; these may be lower for Aboriginal and Torres Strait Islander Australians
- The incidence of infection with multidrug-resistant, extended-spectrum ß-lactamase-producing bacteria
- Weather; hot conditions can increase the risk of dehydration and UTI[7]
- Diagnostic error.

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.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Kidney and urinary tract infections

Access to primary care is likely to affect hospitalisation rates for kidney infections and UTIs. Barriers to access include distance, cost, and a lack of health services that provide culturally appropriate care for Aboriginal and Torres Strait Islander Australians, 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.

Severe UTIs are highly prevalent among Aboriginal and Torres Strait Islander Australians living in remote communities.[8] Aboriginal and Torres Strait Islander Australians, particularly women, have much higher rates of kidney infections and UTIs than other Australians, and screening, treatment and follow-up of these infections among Aboriginal and Torres Strait Islander Australians is often inadequate.[9]

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, leads to excess hospitalisation for these infections.[8] UTI is the second most common cause of hospitalisation for infection, and cellulitis is the most common cause, in this population.[8]

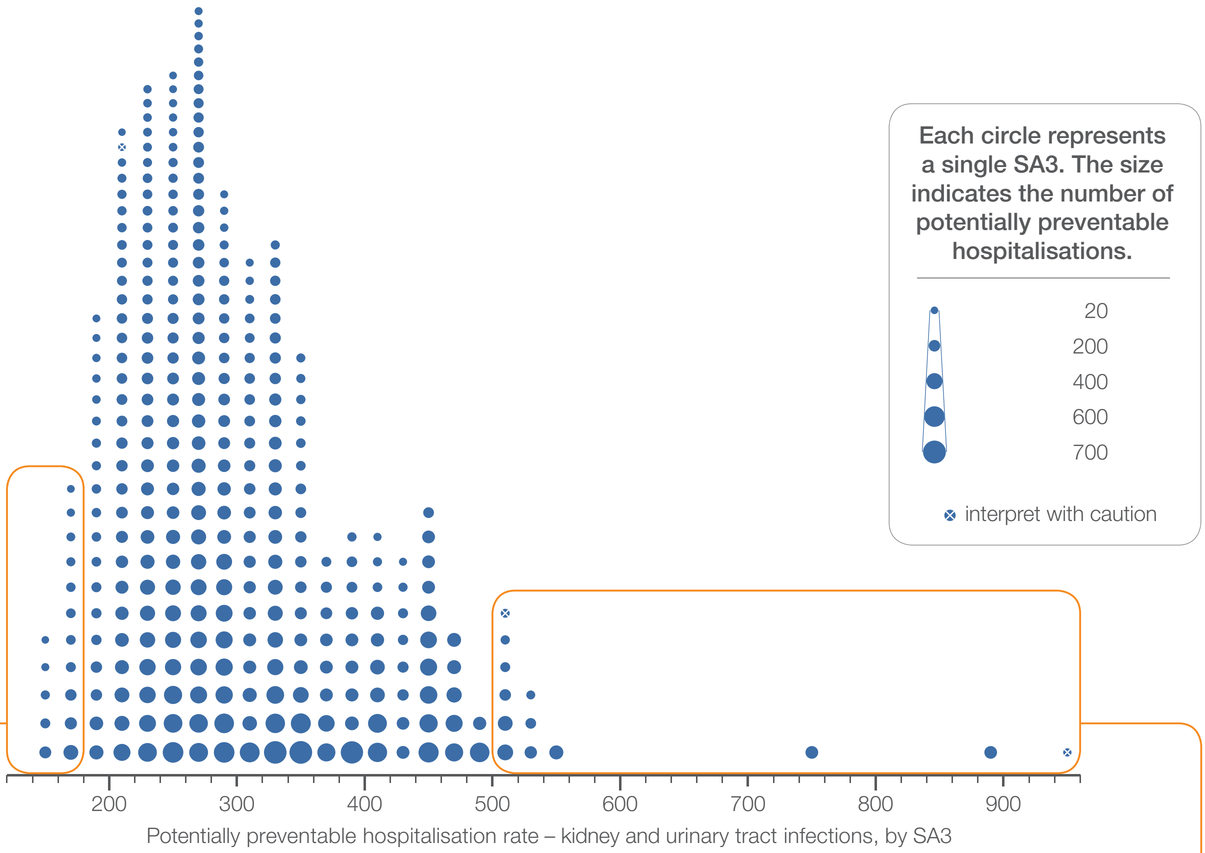
Addressing variation

Increasing incidence of multidrug-resistant, extended-spectrum ß-lactamase-producing bacteria in Australia will contribute to increasing rates of hospitalisation for UTI, and longer hospital stay as a result of more complex treatment. Risk factors for UTI with multidrug-resistant bacteria include recent overseas travel, previous exposure to antibiotics and living in an aged care home.[10] Urine culture before starting treatment is advisable for patients with any of these risk factors to guide antibiotic choice.[10]

Recurrent UTIs account for a substantial number of infections, and prophylaxis may be appropriate for some women with frequent recurrences.[11] Vaginal oestrogen has also been shown to reduce recurrences of UTI in postmenopausal women.[12]

UTIs are a common healthcare-associated infection, and many are associated with indwelling urinary catheters. To reduce the risk of UTI, indwelling urinary catheters are not recommended for managing urinary incontinence except to prevent skin breakdown or wound infection, or as a last resort.[13]

Figure 1.20: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Barwon - West	Vic	**140**	23
Burnie - Ulverstone	Tas	**144**	92
Shoalhaven	NSW	**157**	214
Surf Coast - Bellarine Peninsula	Vic	**158**	127
Manjimup	WA	**158**	43
Adelaide Hills	SA	**161**	117
Burnside	SA	**162**	104
Baw Baw	Vic	**166**	88
Sutherland - Menai - Heathcote	NSW	**167**	192
Macedon Ranges	Vic	**167**	50
Boroondara	Vic	**171**	343
North East	Tas	**171**	77
Southern Highlands	NSW	**176**	115
Manningham - West	Vic	**177**	225
Sorell - Dodges Ferry	Tas	**178**	30
Carlingford	NSW	**179**	130

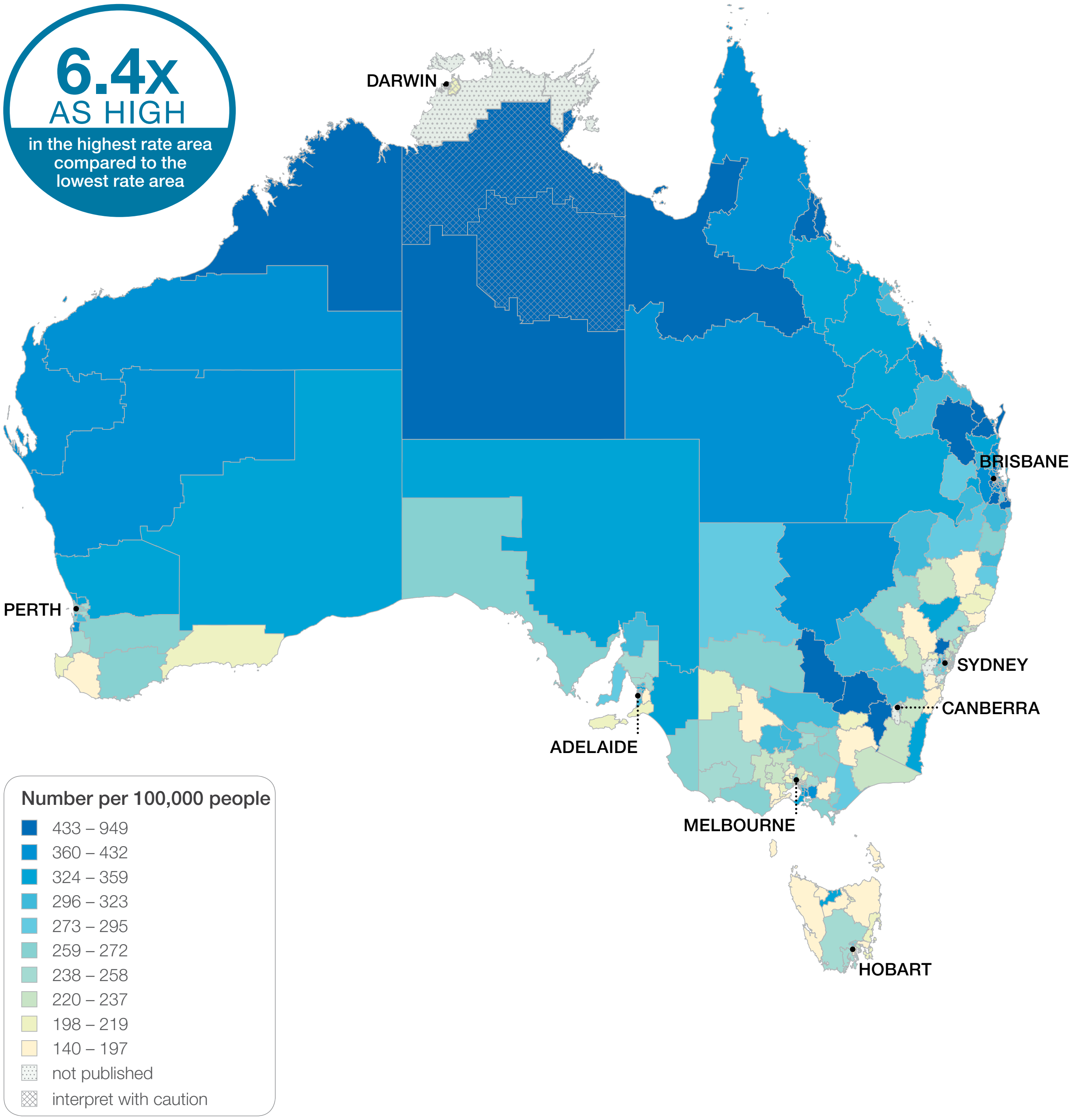
Highest rate areas

SA3	State	Rate	Hospitalisations
Barkly	NT	**949***	54
Kimberley	WA	**899**	248
Alice Springs	NT	**750**	249
Loganlea - Carbrook	Qld	**543**	308
Beaudesert	Qld	**533**	82
Mudgeeraba - Tallebudgera	Qld	**530**	159
Tablelands (East) - Kuranda	Qld	**523**	234
Outback - North	Qld	**517**	125
Springwood - Kingston	Qld	**516**	388
Tumut - Tumbarumba	NSW	**514**	97
Katherine	NT	**511***	83
Innisfail - Cassowary Coast	Qld	**508**	197
Southport	Qld	**503**	343

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

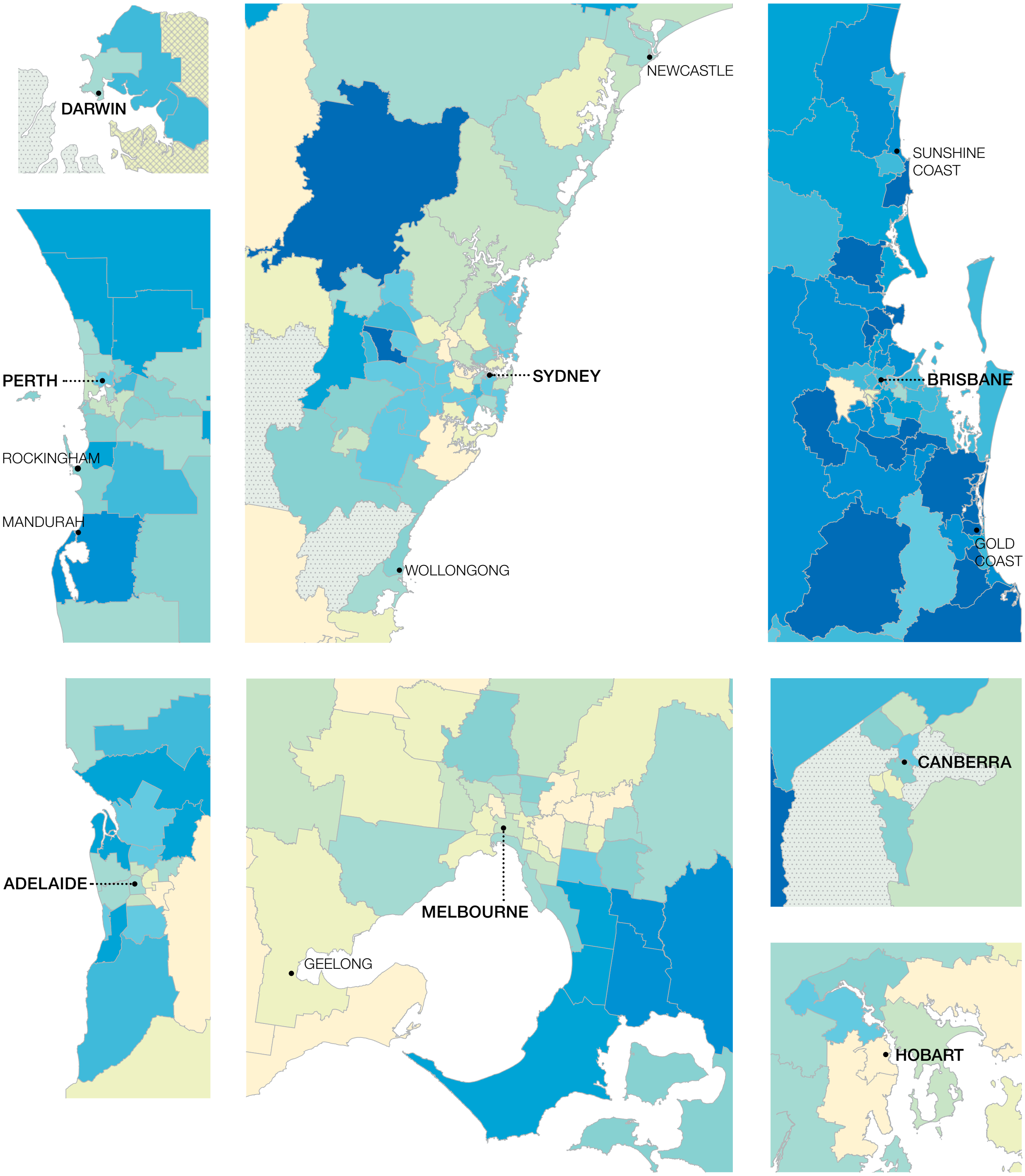
Kidney and urinary tract infections

Figure 1.21: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.22: **Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps**

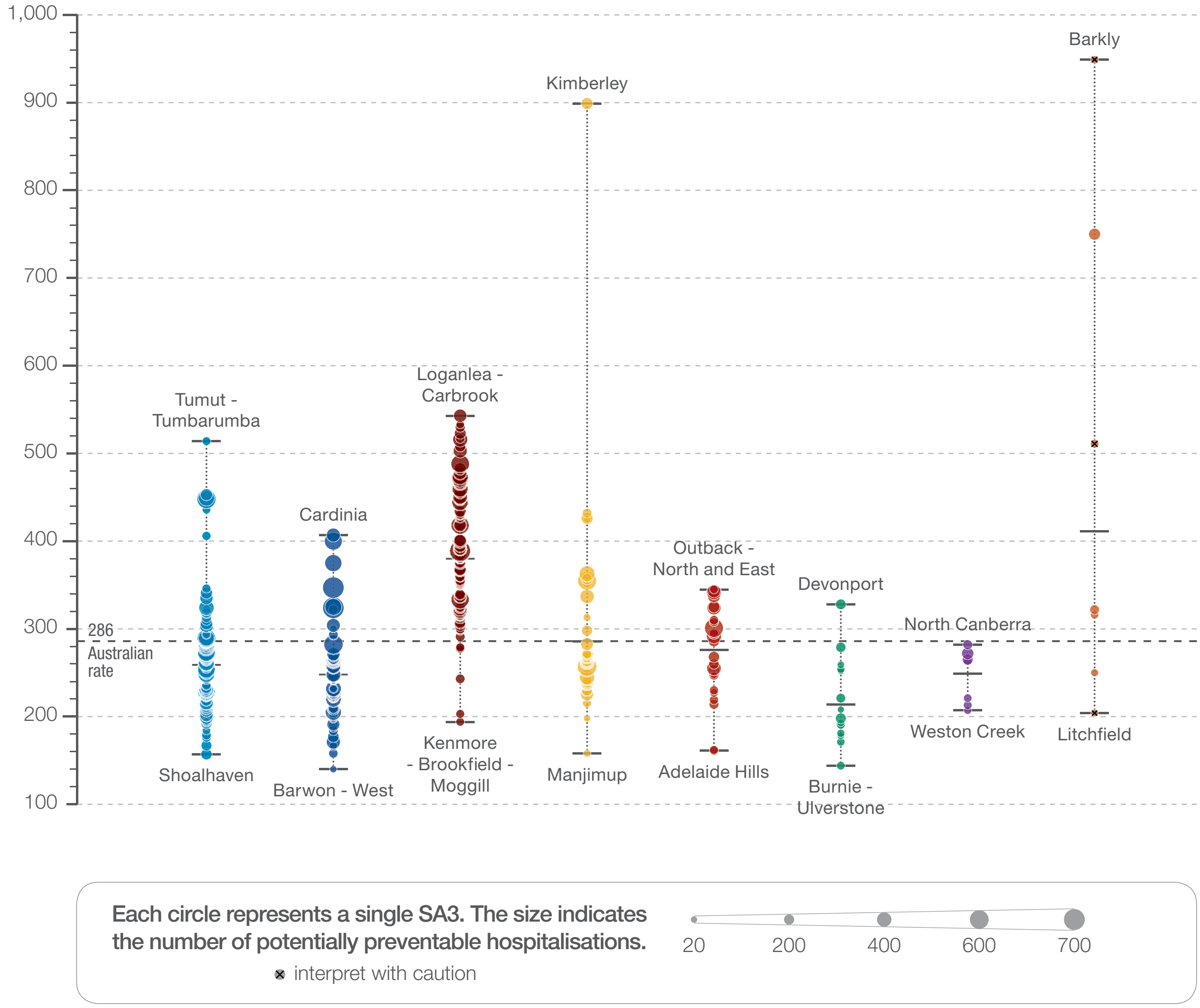


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Kidney and urinary tract infections

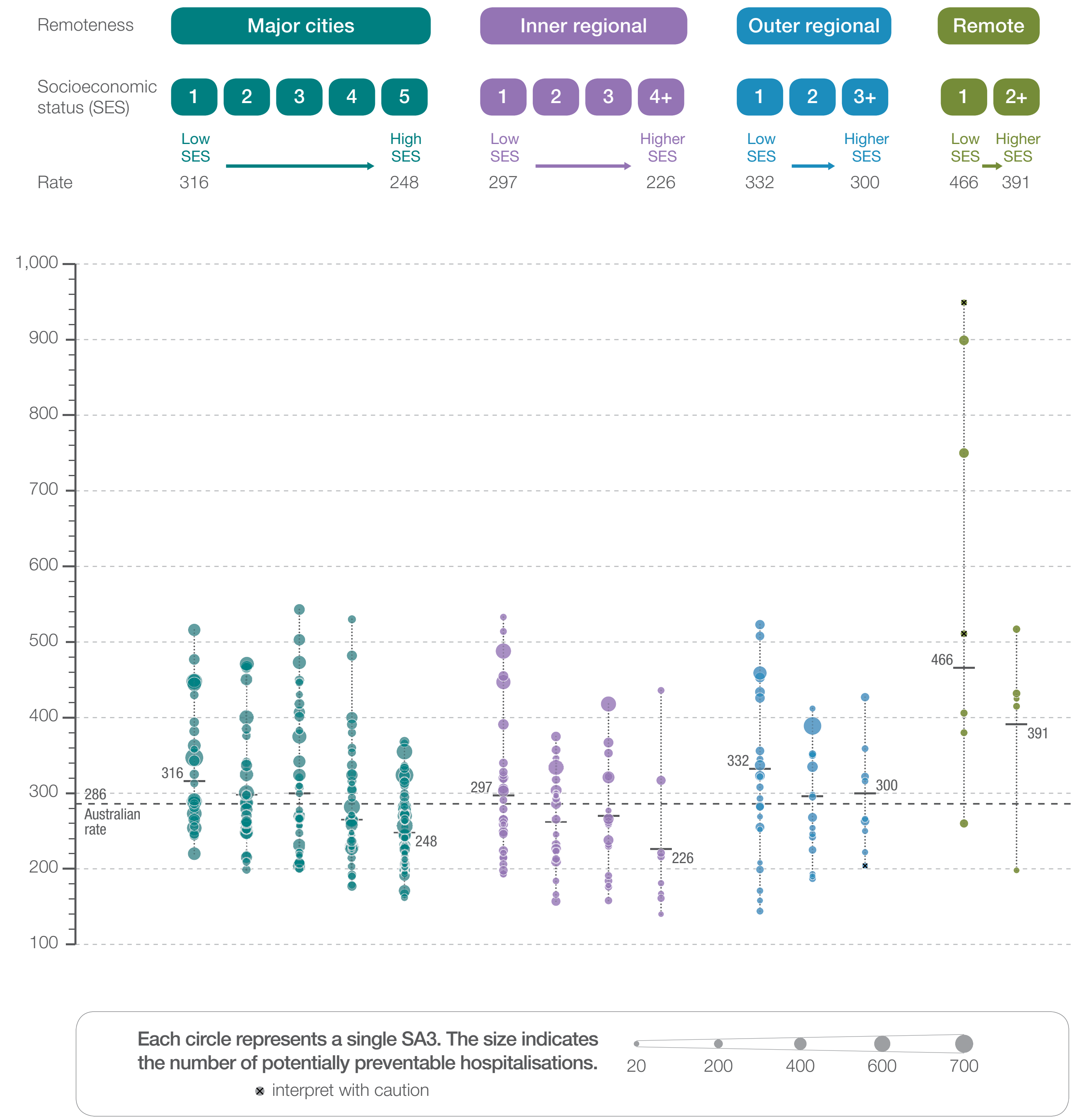
Figure 1.23: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	514	407	543	899	345	328	282	949*
State/territory	259	248	380	286	276	214	249	411
Lowest rate	157	140	194	158	161	144	207	204*
No. hospitalisations	22,088	16,002	18,720	7,365	5,602	1,301	930	766



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.24: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Kidney and urinary tract infections

Resources

- Therapeutic Guidelines Limited. Antibiotic guidelines: urinary tract infections (revised October 2015). In: eTG complete. Melbourne: TGL; 2016.
- Royal Australian College of General Practitioners. Medical care of older persons in residential aged care facilities (silver book). Melbourne: RACGP; 2006.

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1.5 Diabetes complications

Context

This data item examines hospitalisations for diabetes complications in people of all ages based on patient place of residence. Long-term complications of diabetes include stroke, heart disease, kidney disease, eye disease, nerve problems and foot ulcers.[1] Short-term complications include diabetic ketoacidosis.

Of hospitalisations with a principal diagnosis of diabetes, type 2 diabetes accounts for most (69%), type 1 diabetes accounts for 22%, and gestational diabetes and 'unspecified' diabetes account for the remainder.[1] Diabetes complications accounted for 222,429 hospital bed days, and 9% of all potentially preventable hospitalisations, in Australia in 2013–14.[2]

Approximately 5% of Australian adults have diabetes, and the prevalence has more than doubled since 1990.[3] Risk factors for developing type 2 diabetes include physical inactivity, obesity, poor diet and a genetic predisposition.[3] Aboriginal and Torres Strait Islander Australians are more than three times as likely to have diabetes as are other Australians, as a result of higher rates of risk factors for type 2 diabetes, including excess weight, poor nutrition and gestational diabetes.[4] Food insecurity (limited or uncertain availability of nutritionally adequate and safe foods) is strongly associated with obesity, and Aboriginal and Torres Strait Islander Australians experience food insecurity at a higher rate than other Australians.[5,6] Socioeconomic disadvantage also strongly increases the risk: adults at greatest socioeconomic disadvantage have three times the rate of diabetes as those with the least socioeconomic disadvantage (9% and 3%, respectively).[3]

Poor management increases the risk of diabetes complications. Access to comprehensive, systematic care and follow-up reduces complications and preventable hospitalisations among people with diabetes.[7] For example, hospitalisation and lower-extremity amputation may be avoided if a patient with diabetic foot complications is seen as soon as possible in a high-risk foot clinic that includes vascular, orthopaedic, endocrine and podiatry services.[8] Aboriginal and Torres Strait Islander Australians were five times as likely as other Australians to be hospitalised for diabetic foot infections, and had poorer diabetes control, in a study from the Northern Territory.[9]

Diabetes complications

The prevalence of diabetes in people aged 20–79 years in Australia is close to the average for countries in the Organisation for Economic Co-operation and Development (OECD) (6.8% and 6.9%, respectively, in 2011).[10] The rate of diabetes hospitalisations in Australia is also close to the OECD average (141 and 150 per 100,000, respectively, in 2013).[11]

The Australian National Diabetes Strategy 2016–2020 includes the goals of reducing the occurrence of diabetes-related complications, improving the quality of life of people with diabetes, and reducing the impact of diabetes among Aboriginal and Torres Strait Islander Australians. Potential areas for action include[12]:

- Culturally relevant awareness programs about diabetes and its complications
- Detecting gestational and previously undiagnosed diabetes, and managing it through pregnancy
- Reducing the use of alcohol and tobacco before conception
- Increasing the availability and affordability of fresh foods.

Strategies relating to people living in rural and remote areas include encouraging use of My Health Record; coordinating regional services across primary, secondary and tertiary care; and developing links between local clinicians and major diabetes centres.[12]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for diabetes complications (based on the potentially preventable hospitalisation specification) per 100,000 people in 2014–15. Data include hospitalisations for type 1 diabetes, type 2 diabetes, and other or unspecified diabetes. Hospitalisations with diabetes complications as the primary diagnosis and dialysis as an additional diagnosis are included. Because a record is included for each hospitalisation, rather than for each patient, patients hospitalised more than once in the financial year will be counted more than once. The full data specification is available from the Australian Institute of Health and Welfare.[13]

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 43,737 hospitalisations for diabetes complications, representing 173 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for diabetes complications across 319† local areas (Statistical Area 3 – SA3) ranged from 52 to 601 per 100,000 people. The rate was **11.6 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 118 per 100,000 people in the Australian Capital Territory to 307 in the Northern Territory (Figures 1.26–1.29).

After the highest and lowest 10% of results were excluded and 256 SA3s remained, the number of hospitalisations per 100,000 people was 2.8 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

Analysis by remoteness and socioeconomic status

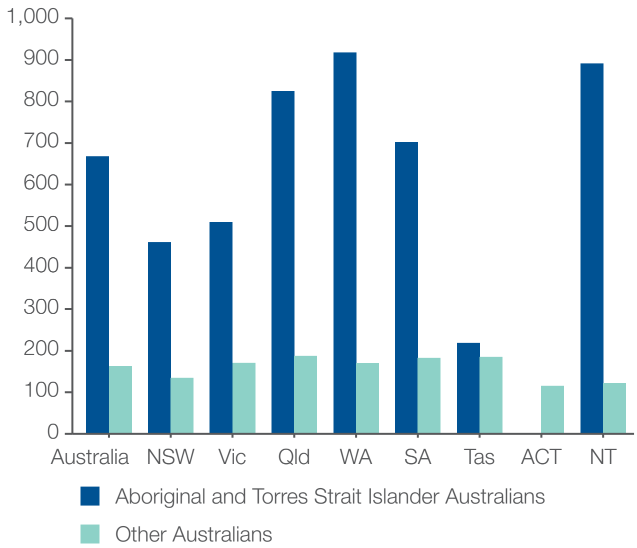
Five SA3s in remote parts of Australia (Kimberley, Alice Springs, Outback – South, Far North, and Outback – North) had hospitalisation rates that were more than double the national rate.

Rates of hospitalisations for diabetes complications were markedly higher in remote and outer regional areas than in other areas. Rates increased with socioeconomic disadvantage, regardless of remoteness category (Figure 1.30).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (668 per 100,000 people) was 4.1 times as high as the rate for other Australians (163 per 100,000 people). Rates were higher among Aboriginal and Torres Strait Islander Australians than other Australians in all states and territories (Figure 1.25).

Figure 1.25: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by state and territory and Indigenous status, 2014–15



The data for Figure 1.25 are available at www.safetyandquality.gov.au/atlas.

† There are 333 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 of the published SA3 rates were considered more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.

Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.

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

Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Diabetes complications

Interpretation

Potential reasons for the variation include differences in:

- The prevalence of diabetes and risk factors for type 2 diabetes
- Adherence to evidence-based guidelines by clinicians
- Access to integrated hospital and primary care
- The availability of high-risk foot clinics and eye clinics
- The availability of diabetes educators
- 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, poor glycaemic control and dialysis (which can contribute to poor glycaemic control)[14]
- Clustering of ethnic groups with higher prevalence of type 2 diabetes, such as Aboriginal and Torres Strait Islander Australians, people born in the Pacific islands, and people born in southern and central Asia[1,15]
- Access to healthcare services that provide culturally appropriate care
- The quality, efficiency and effectiveness of primary health care received by Aboriginal and Torres Strait Islander Australians
- Diagnostic error.

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.

People with diabetes in Australia receive care that corresponds to best-practice guidelines in approximately 63% of encounters with healthcare providers.[16] Only 56% of adults with diabetes in Australia have achieved the target HbA1c (glycated haemoglobin) level of 7.0% or less, and only one-third meet targets for cholesterol or blood pressure levels.[17]

Case study: Integrated primary and secondary care clinic for diabetes

An Australian multidisciplinary, integrated primary and secondary care diabetes service has approximately halved the rate of hospitalisations due to diabetes complications.[18] The success of this model is particularly encouraging, given that the patients had complex type 2 diabetes and were from socioeconomically disadvantaged areas.

The clinical team was made up of an endocrinologist, two or three general practitioners 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 patients who lived in the service catchment area and 145 patients who received usual care at a hospital outpatient clinic. Patients 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 significantly 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. Patients treated in the integrated care model also showed greater improvements in HbA1c level, total cholesterol and blood pressure, and valued the supportive interpersonal care provided and the accessibility of the clinicians in the team.[19]

Integrating primary and secondary care to develop the skills of the primary care team during patient management is also being done in other ways – for example, through case conferences conducted by a specialist and involving the patient, general practitioner and practice nurse. A recent Australian initiative based on this model has shown significant improvements in glycaemic control and blood pressure.[20]

Addressing variation

Preventing type 2 diabetes is key to reducing hospitalisations for diabetes complications – for example, through population health programs to reduce lifestyle-related risk factors. For people with established diabetes, models of integrated primary and secondary care have been successful in reducing diabetes complications (see the case study on this page).

In addition to new models of care, a number of specific interventions show promise for reducing complications 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 patients.[21]

Women who have had gestational diabetes are seven times as likely to develop type 2 diabetes, and follow-up of these women is often poor.[22] Among Australian women with gestational diabetes, Aboriginal and Torres Strait Islander women are four times as likely as other women to develop type 2 diabetes.[23] Improving detection and follow-up of diabetes in pregnancy could reduce complications in both the mother and the child.

Diabetic retinopathy is a leading cause of blindness in Australians aged 20–74 years. Early detection and treatment can prevent severe vision loss and blindness in almost all cases.[1] 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.[24] Rural and remote populations have successfully been screened via telemedicine.[24] 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.[24]

Diabetes complications

Diabetes requires intensive self-management to prevent complications.[25] Structured education for people with type 2 diabetes reduces a range of risk factors for complications, such as dietary habits, foot care and smoking.[25] Structured education for people with type 1 diabetes also reduces severe hypoglycaemic events.[26] Structured diabetes education has significant potential to improve outcomes among people with diabetes.[12,27]

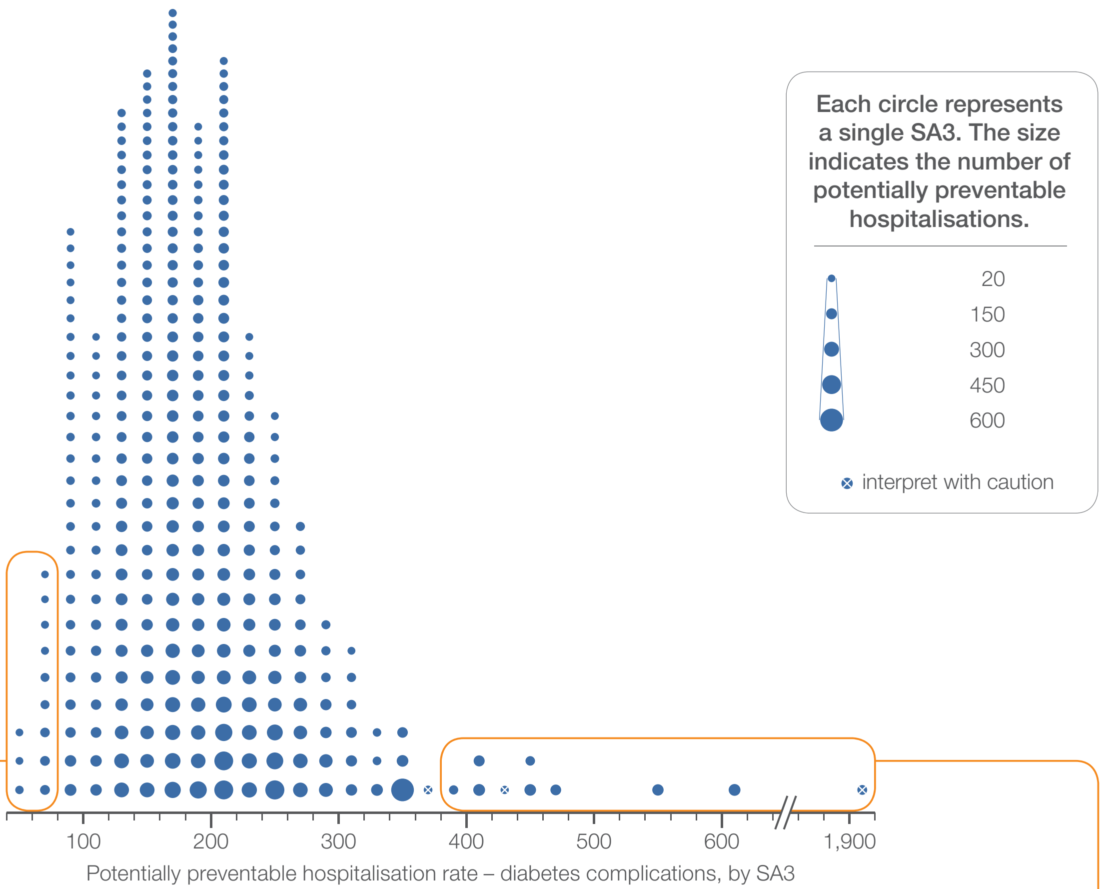
Aboriginal and Torres Strait Islander Australians with diabetes are at greater risk of vision impairment from diabetic eye disease, but are less likely to have eye checks in the recommended time frame than are other Australians with diabetes.[28–30] Annual eye screening, clearly defined pathways of care and timely treatment are key to improving eye health in Aboriginal and Torres Strait Islander Australians with diabetes.[28] The Roadmap to Close the Gap for Vision includes a range of strategies aimed at increasing the accessibility and uptake of eye care services by Aboriginal and Torres Strait Islander Australians, some of which have been implemented.[31]

Models of care showing early success for Aboriginal and Torres Strait Islander Australians with diabetes include home-based outreach case management that provides holistic, multidisciplinary care. A program based on this model has been highly rated by patients and staff, and achieved significant improvements in blood pressure and diabetes control.[32] A mobile outreach service that provides foot care and diabetes education in a metropolitan area has been similarly well received by the Aboriginal and Torres Strait Islander community. The service addresses social issues as well as clinical care, and patients are managed in partnership with their general practitioners. This model has achieved high attendance levels. Its outcomes are currently being evaluated.[33]

In the remote setting, preventive management of diabetes in Aboriginal and Torres Strait Islander Australians has been improved through partnerships between the local hospital, population health unit and 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 included health promotion days for screening and education, and team outreach clinics for developing self-management plans with patients. An almost 10-fold increase in the proportion of eligible patients having a diabetes annual cycle of care was seen after the integrated model of care was introduced.[34]

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 Australians with diabetes in remote areas could prevent a substantial number of foot complications.[35]

Figure 1.26: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Brisbane Inner - West	Qld	52	28
Manly	NSW	52	26
Blue Mountains	NSW	58	53
Baulkham Hills	NSW	65	97
Eastern Suburbs - North	NSW	66	107
North Sydney - Mosman	NSW	69	72
Dural - Wisemans Ferry	NSW	69	22
Pennant Hills - Epping	NSW	72	38
Macedon Ranges	Vic	72	23
Ku-ring-gai	NSW	73	105
Stonnington - East	Vic	74	36
Mitcham	SA	78	75

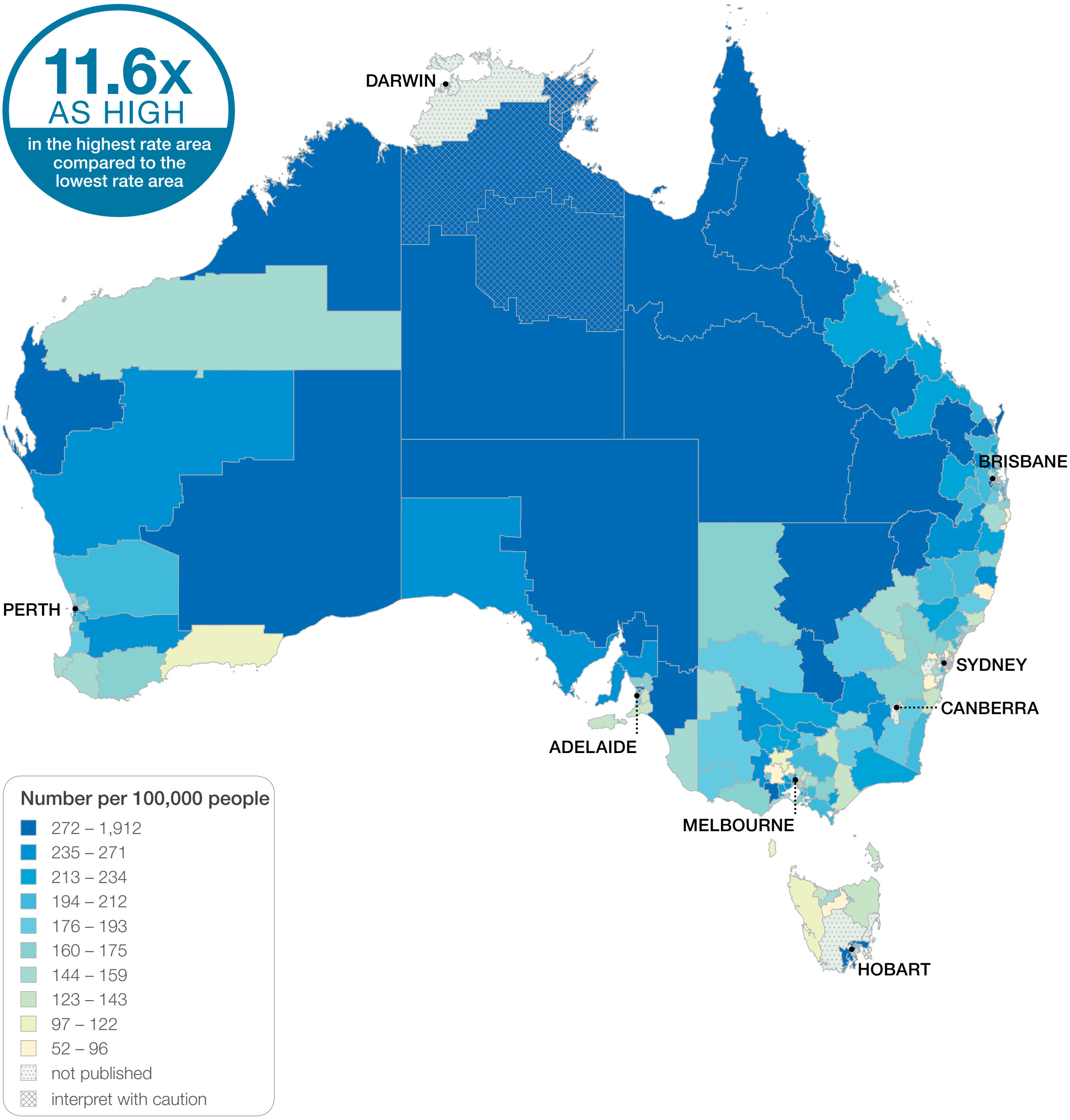
Highest rate areas

SA3	State	Rate	Hospitalisations
Barkly	NT	1,912*	107
Outback - North	Qld	601	181
Far North	Qld	542	164
Outback - North and East	SA	473	141
Outback - South	Qld	453	95
Alice Springs	NT	452	173
East Arnhem	NT	421*	50
Kimberley	WA	408	152
Tablelands (East) - Kuranda	Qld	407	181
Barwon - West	Vic	395	84

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

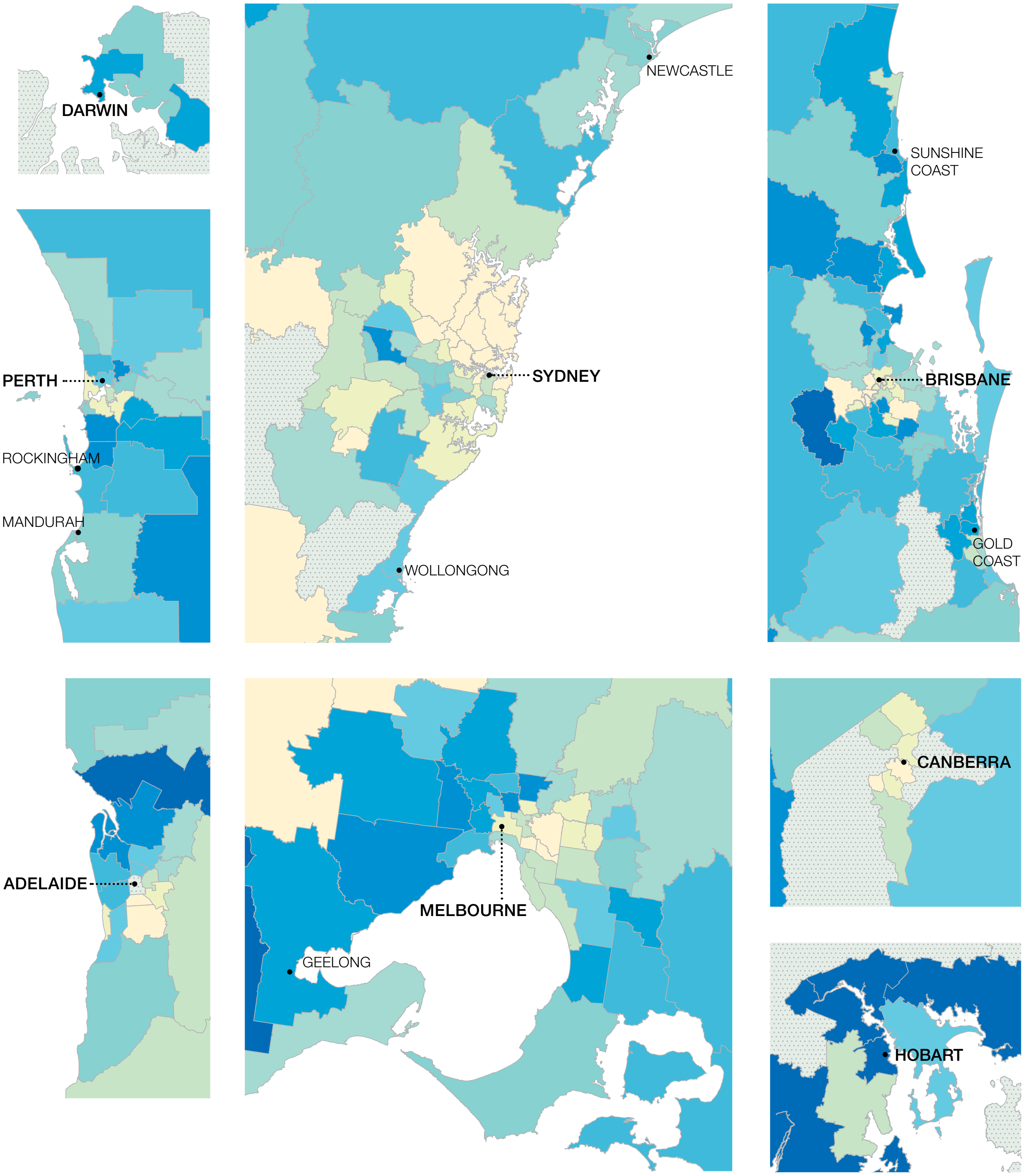
Diabetes complications

Figure 1.27: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.28: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps

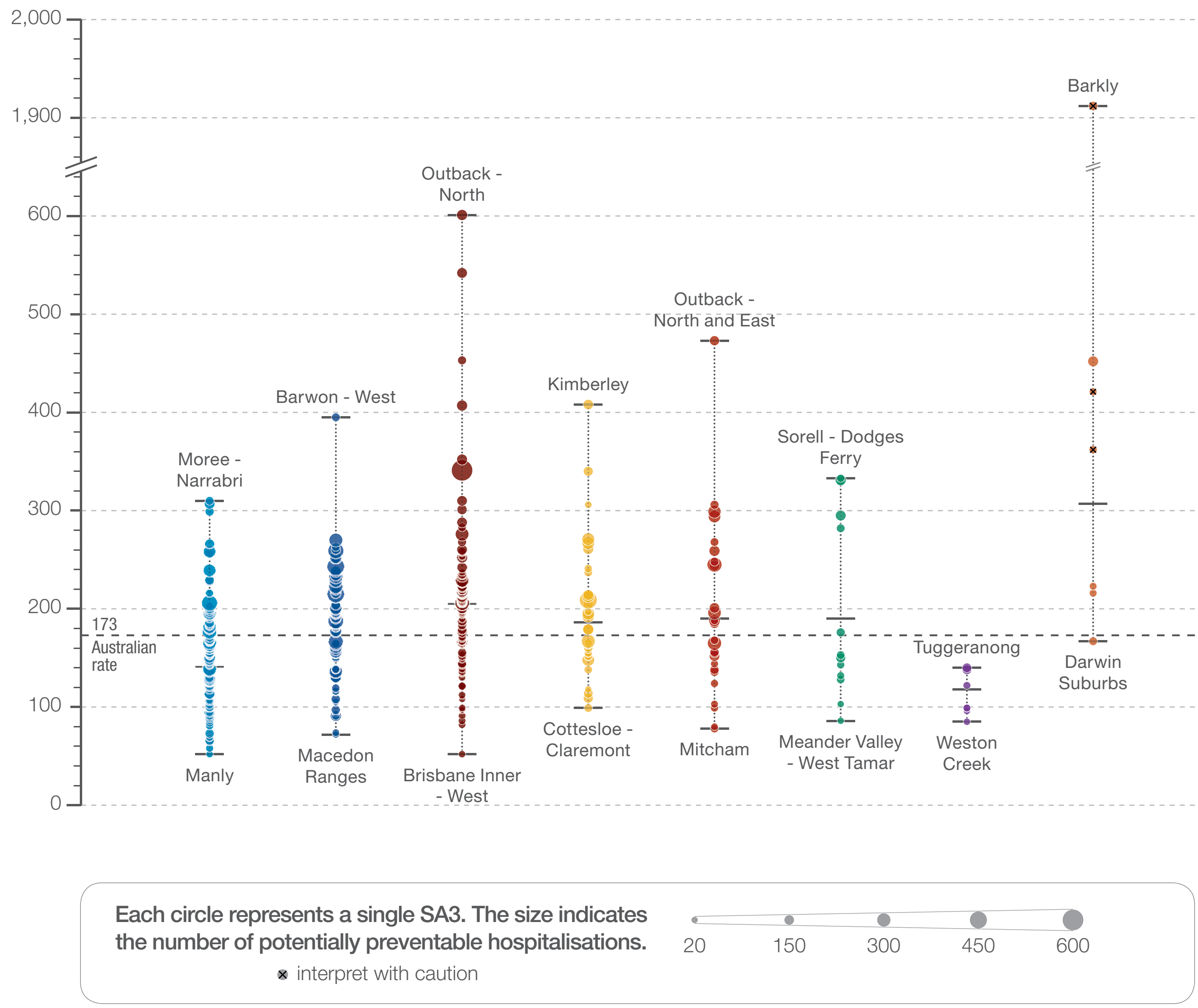


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Diabetes complications

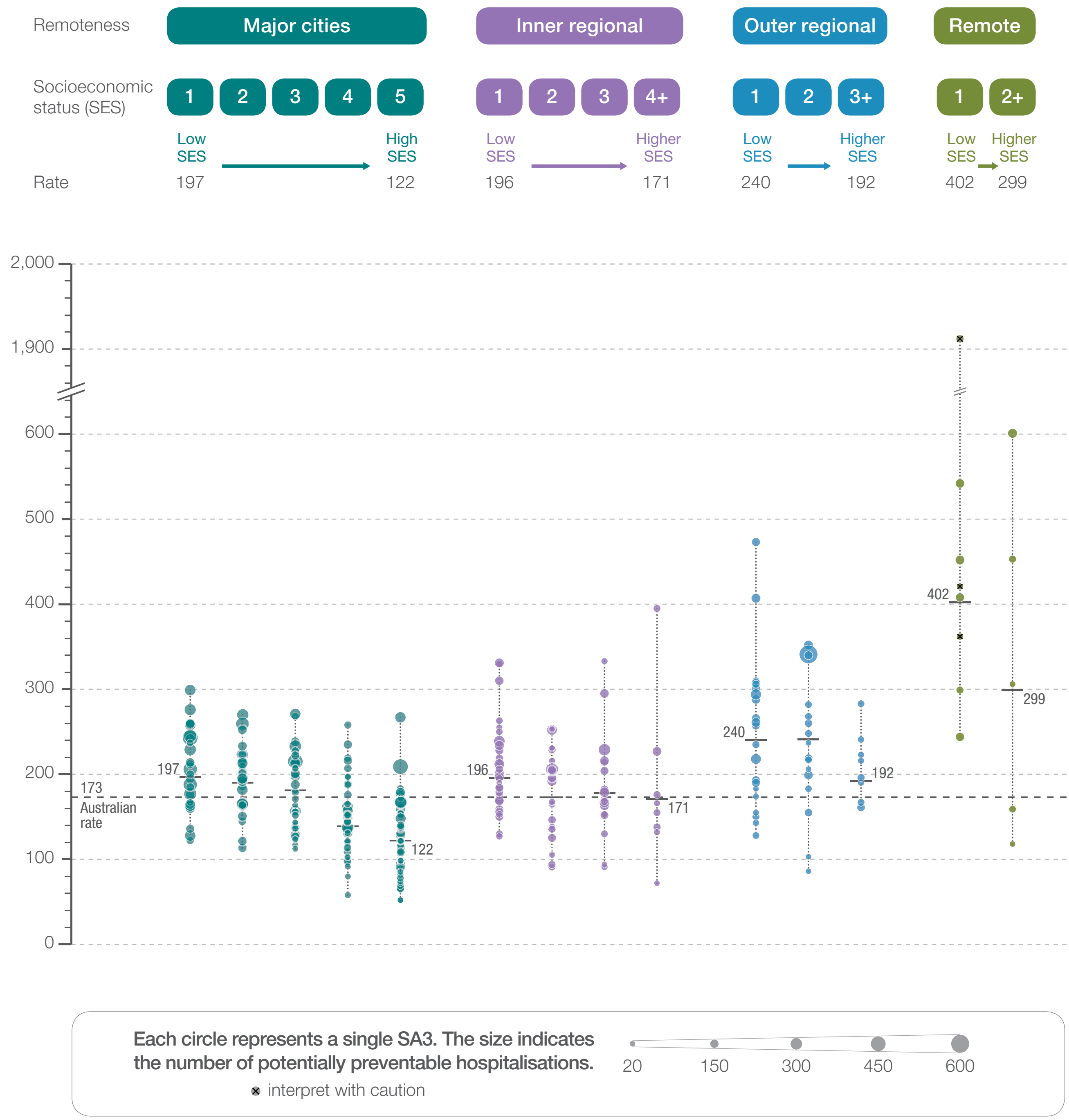
Figure 1.29: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	310	395	601	408	473	333	140	1,912*
State/territory	141	173	205	186	190	190	118	307
Lowest rate	52	72	52	99	78	86	85	167
No. hospitalisations	11,660	10,968	10,120	4,892	3,714	1,119	443	643



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 1.30: Number of potentially preventable hospitalisations – diabetes complications per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Diabetes complications

Resources

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- International Society for Pediatric and Adolescent Diabetes. Clinical practice consensus guidelines 2014. Berlin: ISPAD; 2014.
- 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 under way to prevent diabetes and improve its management in Australia. At a national level, this work includes:

- Australian National Diabetes Strategy 2016–2020
- A Wellbeing Framework for Aboriginal and Torres Strait Islander Peoples Living with Chronic Disease.

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

- Diabetes Taskforce, NSW Agency for Clinical Innovation
- Get Healthy Information and Coaching Service, New South Wales
- Aunty Jean's Good Health Team Program, New South Wales
- Framework for Action on Diabetes and Diabetes Service Standards, Western Australia
- My Healthy Balance, Western Australia
- Moorditj Djena – Strong Feet, Western Australia
- Education Services for Heart Disease and Diabetes, Northern Territory
- Improving Health Outcomes in the Tropical North: A Multidisciplinary Collaboration (Hot North); Northern Territory, Queensland and Western Australia
- Structured systems approach to improving health promotion practice for chronic disease prevention in Indigenous communities, Northern Territory
- HealthLAB Project, Northern Territory
- Diabetes in Pregnancy Partnership, Northern Territory
- LIFE! program, Victoria
- Aboriginal Health Promotion and Chronic Care Partnership Initiative, Victoria
- COACH program, Tasmania
- Move for Diabetes, Australian Capital Territory and New South Wales
- 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 Health Care Settings, Queensland
- Diabetes Service, Country Health SA, South Australia.

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Chapter 2
Cardiovascular conditions

At a glance

Analysis of Statistical Area Level 3 (SA3) rates shows a nine-fold variation in hospitalisations for acute myocardial infarction (MI; heart attack) and a four-fold variation for hospitalisations for atrial fibrillation as a principal diagnosis.

In Australia, cardiovascular conditions are the leading cause of death and are responsible for 13% of hospitalisations. To address rates of cardiovascular hospitalisations, risk factors must be reduced through public health initiatives. System changes are needed to improve access to primary health care for high-risk groups, and primary and secondary prevention for individuals needs to improve. Increasing the health literacy of high-risk groups and their ability to self-manage risk factors is a vital component of any strategy to reduce hospitalisations due to cardiovascular diseases.

Hospitalisation rates for MI are 3 times higher among Aboriginal and Torres Strait Islander Australians than other Australians. Higher rates of hospitalisation for MI are also found in areas of socioeconomic disadvantage. Reducing smoking rates could decrease the number of hospitalisations for MI and atrial fibrillation significantly.

The original intent of this chapter was to examine patterns of use of many more investigations and therapies for cardiovascular disease. However, the available data would not have produced reliable results. For example, difficulties in tracking the care of patients transferred between hospitals meant that accurate pictures of variation in the use of interventions for MI could not be produced. Developing capabilities to use linked data will enable variation in care for patients with cardiac disease to be explored. Collecting more detailed data on cardiac care, ideally through a clinical quality registry, would enable more intensive analysis of treatments and outcomes, helping to guide future improvements in care. Routine review of benchmarked clinical performance and outcomes data through clinical quality registries could also improve cardiac care.

Cardiovascular conditions

Recommendations

2a. State and territory health departments to examine variation in the timeliness and access of patients to appropriate investigations and interventions for suspected acute myocardial infarction.

2b. The Commission to develop a clinical care standard on the management of atrial fibrillation.

Background

This chapter includes information about hospitalisations for:

- Acute MI
- Atrial fibrillation, as a principal diagnosis, and as a principal or secondary diagnosis.

Cardiovascular conditions were the underlying cause of approximately 29% of all deaths in Australia in 2014, and the leading cause of death.[1] Cardiovascular disease is the second leading cause of burden of disease in Australia and was responsible for 13% of hospitalisations in Australia in 2012–13.[2,3] In Australia, cardiovascular conditions are more common in socioeconomically disadvantaged groups, people living in remote areas, and Aboriginal and Torres Strait Islander Australians.[4]

Coronary heart disease (ischaemic heart disease) is the most common form of cardiovascular disease.[4,5] It is the leading cause of death in Australia, accounting for 33,054 deaths in 2012–14.[2,3,5] Coronary heart disease can lead to MI (heart attack) or angina – pain in the chest due to a temporary shortage of blood supply to the heart muscle.

Atrial fibrillation is a type of abnormal heart rhythm, also referred to as arrhythmia.[6] Risk factors for atrial fibrillation include older age, long-term high blood pressure, obesity, coronary heart disease and family history.[7,8] Atrial fibrillation has been estimated to affect 6% of Australian men and 5% of Australian women aged 55 years and over.[9,10] Atrial fibrillation increases the risk of stroke significantly, especially for older people.[6] For example, among people aged 80–89 years, atrial fibrillation increases the risk of stroke by 4.5 times.[10] Treatment for atrial fibrillation may include medications to control the heart's rhythm and rate, blood thinning (anticoagulant) medication to prevent the formation of blood clots and reduce stroke risk, and medication and lifestyle changes to manage the risk factors.[6,10,11]

Heart failure, also a common cardiovascular condition in Australia, is discussed in Chapter 1. Heart failure and atrial fibrillation commonly coexist, and each condition can cause or exacerbate the other.

Modifiable risk factors for cardiovascular conditions include insufficient physical activity, smoking, obesity, poor diet, high cholesterol, high blood pressure and diabetes.[12,13] A substantial proportion of cardiovascular events could be prevented by addressing risk factors from an early age through to adulthood, at both an individual and a population level.[2,14,15] Gaps in preventive care have been identified in Australia. For example, almost 1 million Australians who are at high risk of a cardiovascular event are not receiving the recommended combination of blood pressure–lowering and lipid-lowering medications.[14]

Reducing smoking rates could decrease the number of hospitalisations for MI and atrial fibrillation significantly. Addressing the higher rates of smoking among Aboriginal and Torres Strait Islander Australians, people at socioeconomic disadvantage, and people living in remote areas could help reduce cardiovascular hospitalisations in these groups, in particular. For example, in 2014–15, the rate of daily smoking for the Australian adult population overall was 15%, compared with 41% for Aboriginal and Torres Strait Islander Australians.[16,17] Attention should also be paid to the underlying determinants of smoking, such as psychological distress.[18]

Socioeconomic disadvantage may contribute to cardiovascular hospitalisations through a range of mediators, such as greater disease severity, multiple comorbidities and poor health literacy.[19] Increasing patients' health literacy and ability to self-manage is a vital component of any strategy to reduce hospitalisations due to cardiovascular diseases. Changing the healthcare system to enable people with low health literacy to use it more effectively also has great potential for reducing hospitalisations – for example, by making the system easier to navigate and health information easier to understand.[20]

Higher rates of hospitalisation for cardiovascular disease in rural and remote areas are due to a combination of factors. Overall, people living in rural and remote areas of Australia have higher levels of cardiovascular risk factors and cardiovascular disease, but generally poorer access to healthcare services and less supportive environments for a healthy lifestyle.[21] Some states and territories have a substantially higher proportion of remote areas; the associated challenges to providing health care should therefore be considered when interpreting the variation in rates of cardiovascular hospitalisations between states and territories.

Contributors to cardiovascular disease among Aboriginal and Torres Strait Islander Australians

Premature and preventable deaths from cardiovascular conditions account for 24% of the mortality gap between Aboriginal and Torres Strait Islander Australians and other Australians.[22] The average age for developing cardiovascular conditions is also lower among Aboriginal and Torres Strait Islander Australians than among other Australians.[23] The rate of cardiovascular disease in the 18–34-year age group is 9% for Aboriginal and Torres Strait Islander Australians compared with 4% for other Australians.[23]

The reasons for higher rates of cardiovascular disease among Aboriginal and Torres Strait Islander Australians are complex, but a lack of health services that provide culturally appropriate care, high rates of chronic conditions, and associated risk factors such as smoking and socioeconomic disadvantage play a part.[24,25] Higher rates of cardiovascular disease among Aboriginal and Torres Strait Islander Australians may also reflect gaps in the provision of population health interventions, and the need to strengthen services to detect and treat disease early, and improve chronic disease management.[26]

Cardiovascular conditions

As part of the national Better Cardiac Care for Aboriginal and Torres Strait Islander People project, a set of 21 Better Cardiac Care measures were established to monitor progress in priority areas: primary prevention, timely diagnosis, guideline-based therapy, ongoing care, and diagnosis and management of rheumatic heart disease.[27] The first two national reports on the Better Cardiac Care measures in 2015 and 2016 reported on the 12 measures for which data were available.[27,28] Hospitalisation for cardiac conditions was found to be 1.9 times as high among Aboriginal and Torres Strait Islander Australians as among other Australians. This difference remained similar between 2004–05 and 2013–14.

Routine review of benchmarked clinical performance and outcomes data through clinical quality registries could also improve cardiac care.

Without access to data that links episodes of care received for the same event, there is no precise way to quantify how many people do not have investigations or interventions after hospitalisation for MI.

Future analyses could use data linkage techniques to explore cardiac care and the variation in access to appropriate care. Ideally, these analyses will enable mapping of variations in care across the patient journey from care in the community through to hospital treatment and follow-up.

Why we need better data on cardiac care

The intent of this chapter was to explore the appropriateness of care for people with selected cardiovascular conditions. Analysis of variation in the use of recommended investigations and treatment for MI and atrial fibrillation could provide a window into the underlying reasons for variation in outcomes in people with cardiovascular conditions, and insights into what needs to change and where. The following were identified as important areas of practice to explore variation in care:

- Percutaneous coronary interventions/coronary artery bypass surgery for people who have had an MI
- Angiography to identify where there is a blockage in the heart's blood vessels
- Anticoagulant use to prevent stroke in people with atrial fibrillation.

Currently, routinely collected data are not sufficiently detailed to allow measurement of variations in outcomes after cardiovascular events, and to relate these to the appropriateness and effectiveness of care. Collecting more detailed data on cardiac care, ideally through a clinical quality registry, would enable more intensive analysis of treatments and outcomes, helping to guide future improvements in care.

About the data

Hospital admission data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations per 100,000 people. Because a record is included for each hospitalisation, rather than for each patient, patients hospitalised more than once in the financial year will be counted more than once. For both MI and atrial fibrillation, admitted patients transferred from another hospital have been excluded, so only the initial admission is captured in these data.

The analyses 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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

Australian initiatives

The information in this chapter will complement work already under way to address the rate of hospitalisation for cardiovascular conditions in Australia. These include strategies to address risk factors. At a national level, this work includes:

- The National Strategic Framework for Chronic Conditions, which addresses primary, secondary and tertiary prevention of chronic conditions, recognising that there are often similar underlying principles for the prevention and management of many chronic conditions; it is anticipated that the framework will be publicly available in 2017
- The National Tobacco Strategy 2012–2018 – a framework to reduce tobacco-related harm in Australia
- The Australian Chronic Disease Prevention Alliance – an alliance of five non-government health organisations working together on the primary prevention of chronic disease, with particular emphasis on the shared risk factors of poor nutrition, physical inactivity and obesity
- Medicare Benefits Schedule (MBS) items relating to chronic disease management – an Australian Government initiative that helps general practitioners to manage the health care of people with chronic conditions; it makes MBS rebates available for those requiring multidisciplinary, team-based care from a general practitioner and at least two other healthcare providers
- The Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013–2023, which outlines strategies and actions to be taken to improve health outcomes for Aboriginal and Torres Strait Islander Australians; it will soon be updated to address social and cultural determinants of health
- The Better Cardiac Care for Aboriginal and Torres Strait Islander People project
- The Indigenous Australians' Health Programme, which includes a focus on the prevention, early detection and management of circulatory disease
- MBS incentive payments for general practice health assessments for Aboriginal and Torres Strait Islander patients
- Essential Service Standards for Equitable National Cardiovascular Care for Aboriginal and Torres Strait Islander People
- The Lighthouse Hospital Project – a joint initiative of the Heart Foundation, and the Australian Healthcare and Hospitals Association; this hospital-based project features the Lighthouse Toolkit, a practical workbook for continuous quality improvement that hospitals can implement to improve cultural competence and healthcare services for Aboriginal and Torres Strait Islander Australians with acute coronary syndromes.

Many states and territory initiatives are also in place to reduce hospitalisations for cardiovascular conditions, including:

- Chronic disease self-management programs – for example, Black Swan Health and 360 Health and Community, Western Australia
- Programs to support a healthy lifestyle, such as Active Measures through Arche Health, Western Australia, and Get Healthy, NSW Health
- Victorian Heart Health: Improved Services and Better Outcomes for Victorians policy
- Northern Territory Integrated Cardiac Network Service, including outreach cardiology services, expansion of cardiac diagnostic services (low-risk angioplasty, echocardiograms and angiography), cardiac rehabilitation services in rural and remote communities, patient education, cardiac IT systems, and the establishment of point-of-care systems in remote communities
- For Our People, by Our People program, Derbarl Yerrigan Health Service and the National Health Foundation
- The My Heart My Family Our Culture and Pilbara Aboriginal Heart Health programs, Heart Foundation of Western Australia
- The Medical Outreach Indigenous Chronic Disease Program, Western Australia
- The Queensland Aboriginal and Torres Strait Islander Cardiac Health Strategy 2014–2017
- The Queensland Cardiac Outcomes Registry
- State and territory cardiac networks.

Cardiovascular conditions

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2.1 Acute myocardial infarction hospitalisations 35–84 years

Context

This data item examines hospitalisations for acute myocardial infarction (MI) in people aged 35–84 years based on their place of residence. MI, commonly known as a heart attack, is caused by a blockage in a blood vessel to the heart. The blockage can develop as a result of a build-up of plaque, a substance mostly made of fat, cholesterol and cellular waste products. The lack of blood flow beyond the blockage causes damage to the heart muscle.[1]

Risk factors for MI include[2–4]:

- High blood pressure
- High cholesterol
- Diabetes
- Obesity
- Smoking
- Increasing age
- Male gender
- Family history.

The rate of MI is higher among men than among women. In 2012, 63% of acute coronary events (MI and unstable angina – pain arising from reduced blood flow to heart muscle) among Australians aged 25 years and over occurred in men.[5] The rate of these events increases rapidly with age: the rate among people aged 85 years and over is 6 times as high as the rate among people aged 55–64 years.[5]

Aboriginal and Torres Strait Islander Australians are at higher risk of MI than other Australians as a result of higher rates of risk factors such as smoking, obesity and diabetes, and poorer access to health services.[6,7] Between 2001–02 and 2009–10, the gap between Aboriginal and Torres Strait Islander and non-Indigenous Australians' rates of mortality due to MI narrowed.[8] However, for adults aged 25 years and over in 2009–10, the mortality rate due to MI among Aboriginal and Torres Strait Islander Australians was still double the rate for other Australians.[8]

Acute myocardial infarction hospitalisations 35–84 years

Australia's mortality rate from MI is lower than the average among countries in the Organisation for Economic Co-operation and Development (OECD): 98 versus 117 per 100,000 people in 2013, which may reflect the success of strategies to reduce the rates of MI and deaths following MI.[9] Between 2007 and 2012, the rate of MI decreased in Australia, from 534 to 406 per 100,000 people.[5] Increasing use of medications to reduce blood pressure and cholesterol, and reduction in some risk factors, such as smoking, have contributed to this fall.[5] However, many people at high risk of a cardiovascular event are not receiving recommended blood pressure–lowering and lipid-lowering medication.[10] The rate of daily smoking among people aged 18 years and over in Australia declined from 22% in 1989–90 to 16% in 2011–12, but remains high among Aboriginal and Torres Strait Islander Australians, at 41% in 2014–15.[2,11]

The death rate following MI in Australia has declined steadily since 2000, and is now one of the lowest among OECD countries.[12,13] In Australia in 2013, the death rate after MI was 4.1 per 100 admissions, compared with 7.6 per 100 admissions in the United Kingdom, based on deaths within 30 days in the same hospital as the initial admission for acute MI.[12,13] A more robust measure based on deaths within 30 days of MI, regardless of where they occur, could not be calculated for Australia because linked data were not available.

Despite the improvements for the Australian population as a whole, substantial disparities still exist in Australia. Mortality due to MI increases with remoteness and with socioeconomic disadvantage, and is higher among Aboriginal and Torres Strait Islander Australians than non-Indigenous Australians.[8] A recent study of New South Wales data found that the disparity in MI rates between Aboriginal and Torres Strait Islander Australians and other Australians was particularly high in the younger age groups, and was larger in females than in males.[14] The study also identified significant variation in MI rates by area of residence, both overall and for Aboriginal and Torres Strait Islander Australians, and found that the socioeconomic status of an area accounted for a greater proportion of this variation than its remoteness.[14]

Attempts were made to produce accompanying analyses of variation in use of angiography, percutaneous coronary intervention and coronary artery bypass grafting in people hospitalised with a diagnosis of acute MI. However, these analyses could not be undertaken in a way that would produce reliable results because of difficulties in tracking the care received when patients were transferred between hospitals for management of their MI. Future analyses using data linkage techniques will enable exploration of variation in care for patients with cardiac disease.

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for MI per 100,000 people aged 35–84 years in 2014–15.

People admitted to hospital with an MI are sometimes transferred to other hospitals – for example, for care that cannot be provided in the hospital of initial admission. Records for a patient transferred from another hospital are excluded from the rates presented here. However, repeat admissions (other than interhospital transfers) within the year for one person are counted as separate admissions.

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 32,388 hospitalisations for acute myocardial infarction, representing 252 hospitalisations per 100,000 people aged 35–84 years (the Australian rate).

The number of hospitalisations for acute myocardial infarction across 315† local areas (Statistical Area 3 – SA3) ranged from 105 to 905 per 100,000 people aged 35–84 years. The rate was **8.6 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 205 per 100,000 people aged 35–84 years in Western Australia to 509 in the Northern Territory (Figures 2.3–2.6).

After the highest and lowest 10% of results were excluded and 254 SA3s remained, the number of hospitalisations per 100,000 people aged 35–84 years was 2.6 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

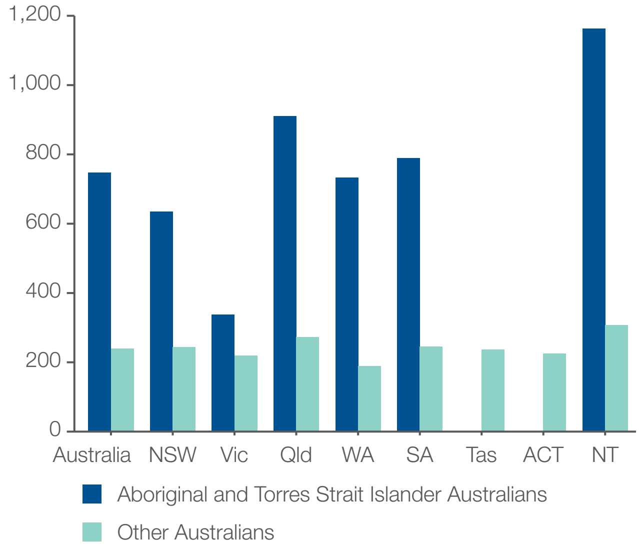
Analysis by remoteness and socioeconomic status

Rates of hospitalisation for MI were markedly higher in outer regional areas and remote areas than in major cities. Across all areas (major cities, inner and outer regional, and remote), rates increased with socioeconomic disadvantage; the greatest differences in rates according to socioeconomic disadvantage were seen in remote areas and in major cities (Figure 2.7).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (748 per 100,000 people) was 3.1 times as high as the rate for other Australians (240 per 100,000). This disparity varied by state and territory, and was greatest in Western Australia (rate for Aboriginal and Torres Strait Islander Australians was 3.9 times as high as for other Australians) and the Northern Territory (rate for Aboriginal and Torres Strait Islander Australians was 3.8 times as high as for other Australians) (Figure 2.1).

Figure 2.1: Number of hospitalisations for acute myocardial infarction per 100,000 people aged 35–84 years, age and sex standardised, by state and territory and Indigenous status, 2014–15



The data for Figure 2.1 are available at www.safetyandquality.gov.au/atlas.

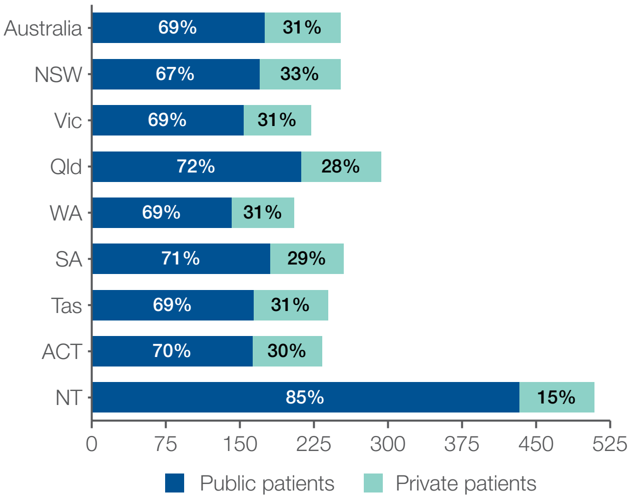
† There are 333 SA3s. For this item, data were suppressed for 18 SA3s due to a small number of hospitalisations and/or population in an area.
Notes:
Some of the published SA3 rates were considered more volatile than others. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
Data for Tas and ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and estimated resident population 30 June 2014.

Acute myocardial infarction hospitalisations 35–84 years

Analysis by patient funding status

Overall, 31% of hospitalisations for MI were for privately funded patients. This proportion varied from 15% in the Northern Territory to 33% in New South Wales (Figure 2.2).

Figure 2.2: Number of hospitalisations for acute myocardial infarction per 100,000 people aged 35–84 years, age and sex standardised, by state and territory and patient funding status, 2014–15



The data for Figure 2.2 are available at www.safetyandquality.gov.au/atlas.

Interpretation

Potential reasons for the variation include differences in:

- Socioeconomic and cultural factors that influence diet and lifestyle
- The prevalence of cardiovascular risk factors, such as high blood pressure, smoking, diabetes, physical inactivity and high cholesterol[2,15,16]
- Management of cardiovascular risk factors, such as availability or use of programs for smoking cessation and weight management, and medicines such as aspirin and statins
- The prevalence of coronary heart disease and comorbidities
- The quality, efficiency and effectiveness of primary health care received, particularly by Aboriginal and Torres Strait Islander Australians
- Secondary prevention to prevent repeat MI
- Community awareness of the signs and symptoms of MI and its treatment
- Rates of detection (for example, by hospital use of high-sensitivity troponin assays)[17]
- Access to specialist care and cardiac outreach programs.

The Northern Territory Integrated Cardiac Network Service was expanded in 2013–14, which may have affected 2014–15 data on MI hospitalisations.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third party payer – for example a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Addressing variation

Variation in MI hospitalisations strongly reflects patterns of cardiovascular risk factors.[18] Primary prevention to reduce these risk factors at a population level, as well as preventive therapies for people at high risk, are important strategies for addressing rates of MI.[10] The higher rate of MI hospitalisations among Aboriginal and Torres Strait Islander Australians underscores the importance of improving prevention of coronary heart disease in this group.[14]

Increasing the health literacy of high-risk groups and people's ability to self-manage risk factors is a vital component of any strategy to reduce hospitalisations due to cardiovascular diseases. Individual health literacy is about a person's skills and abilities, and how these are applied to health and health care.[19] It covers a range of skills, behaviours and activities, such as understanding of what foods are required for healthy eating, motivation to participate in a cardiac rehabilitation support group, and capacity to make an appointment to see a clinician.[20]

Public health initiatives in some Australian states have shown significant reductions in behavioural risk factors for MI. For example, the NSW Get Healthy Information and Coaching Service is a free telephone-based service that targets Aboriginal and Torres Strait Islander Australians, people at socioeconomic disadvantage, and people in rural, regional and remote areas. Participants lost an average of 3.8 kg, and the percentage undertaking the recommended amount of physical activity increased from 34% to 62% after six months of using the service.[21] In rural and remote areas, heart health checks to improve detection of people who are at high risk of MI, and better access to ongoing disease management and risk reduction programs that are well integrated with local services could also help reduce population rates of cardiovascular events.

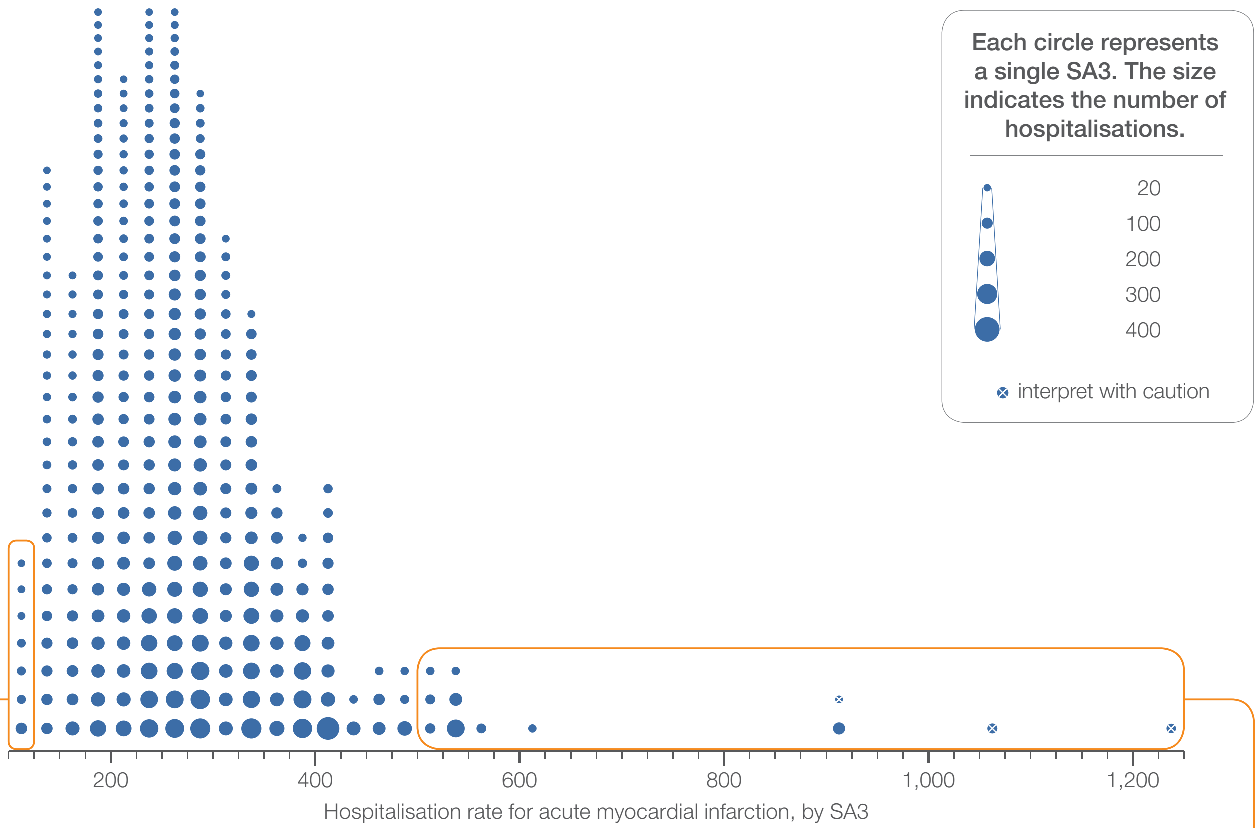
Despite strong evidence of the benefits of preventive medication for people at high absolute cardiovascular risk, many people are not receiving it.[10] Up to 970,000 Australians (13% of the population aged 45–75 years) have a greater than 15% risk of a cardiovascular event in the next five years, but are not receiving recommended therapy with blood pressure–lowering and lipid-lowering medication.[10] Several factors may be contributing to this problem. Prescribing issues may include clinicians using thresholds for blood pressure and cholesterol levels, rather than absolute cardiovascular risk, as the criteria for treatment.[10] Poor patient adherence is a major barrier; it can result from perceptions of risk, mental health problems, social context and cost.[10]

Rapid-access cardiology services are outpatient clinics led by cardiologists that provide rapid assessment and short-term management. Early assessment in rapid-access services appears safe for patients with suspected angina but without high-risk features suggestive of an acute coronary syndrome, and can reduce hospitalisations.[22] This model has been evaluated in the United Kingdom, and pilot studies in the Australian setting are under way.[22]

The development of a national clinical quality registry, leveraging the increasing use of electronic clinical record systems in the acute hospital sector, would be an important step towards addressing the variation in the care and outcomes of MI. Routine use and review of benchmarked clinical performance and outcomes data through a clinical quality registry would provide a mechanism for feedback to clinicians, and the ability to identify and address deviation from best-practice cardiac care.

Acute myocardial infarction hospitalisations 35–84 years

Figure 2.3: Number of hospitalisations for acute myocardial infarction per 100,000 people aged 35–84 years, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Chatswood - Lane Cove	NSW	**105**	58
Kenmore - Brookfield - Moggill	Qld	**110**	30
Norwood - Payneham - St Peters	SA	**112**	26
Leichhardt	NSW	**114**	31
Boroondara	Vic	**117**	112
Pittwater	NSW	**121**	51
Cottesloe - Claremont	WA	**124**	56

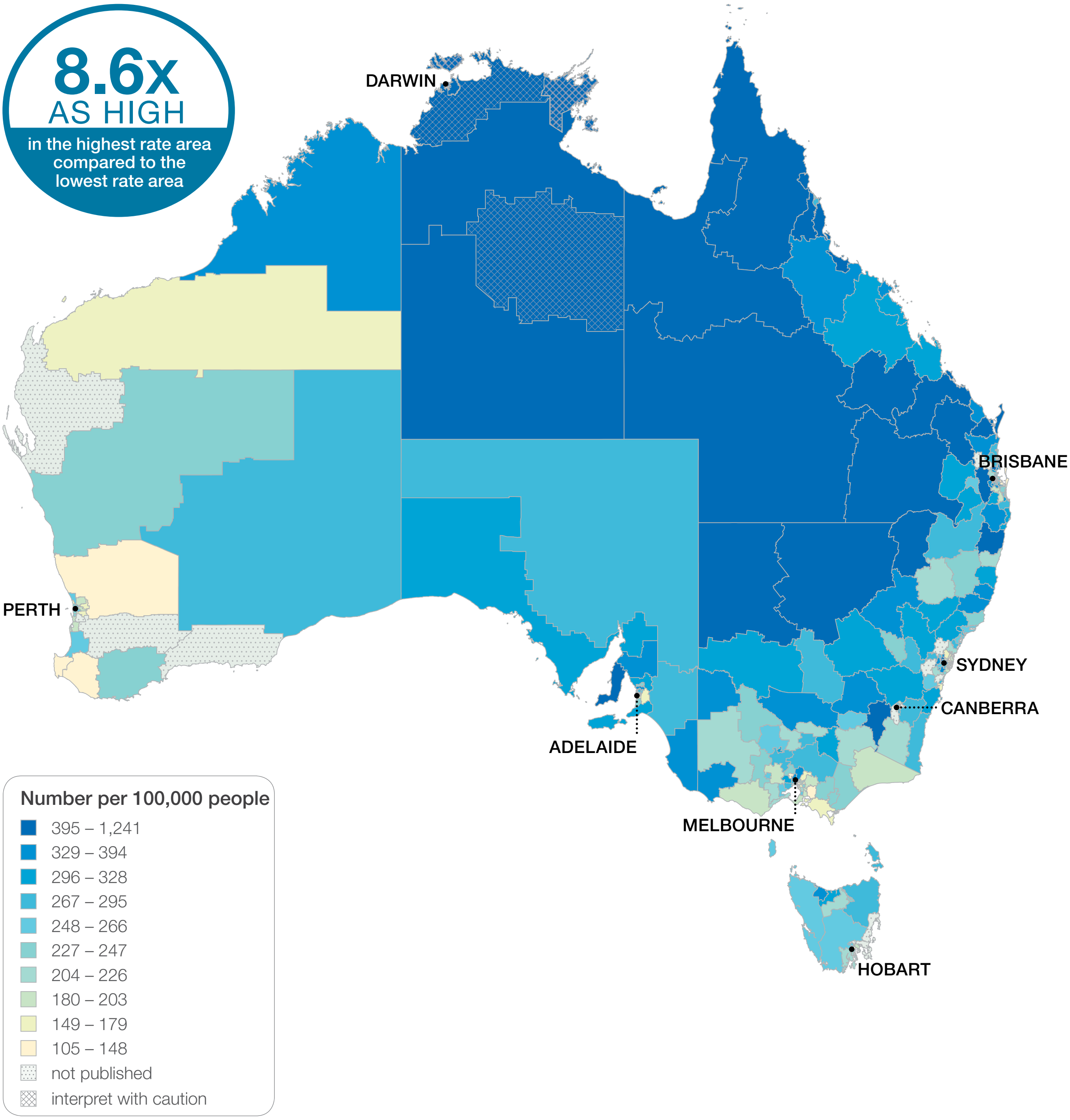
Highest rate areas

SA3	State	Rate	Hospitalisations
East Arnhem	NT	**1,241***	66
Daly - Tiwi - West Arnhem	NT	**1,061***	77
Barkly	NT	**924***	27
Far North	Qld	**905**	124
Port Douglas - Daintree	Qld	**602**	41
Outback - North	Qld	**551**	73
Tablelands (East) - Kuranda	Qld	**545**	140
Katherine	NT	**533**	43
Mount Druitt	NSW	**528**	250
Palmerston	NT	**520**	44
Bourke - Cobar - Coonamble	NSW	**517**	83
Broken Hill and Far West	NSW	**504**	75

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

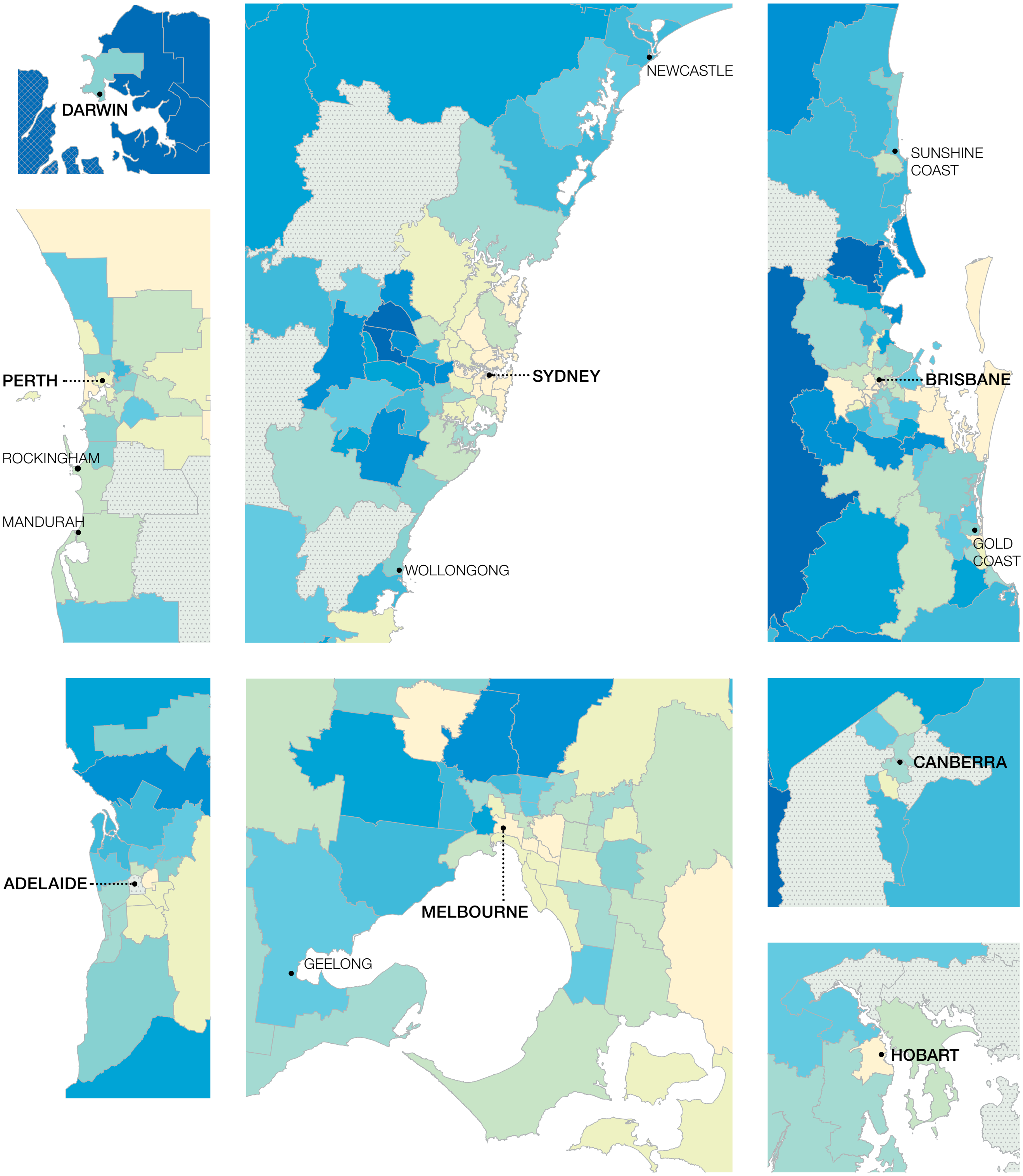
Acute myocardial infarction hospitalisations 35–84 years

Figure 2.4: Number of hospitalisations for acute myocardial infarction per 100,000 people aged 35–84 years, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 2.5: Number of hospitalisations for acute myocardial infarction per 100,000 people aged 35–84 years, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps



Notes:

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Hatching indicates a rate that is considered more volatile than other published rates and should be interpreted with caution.

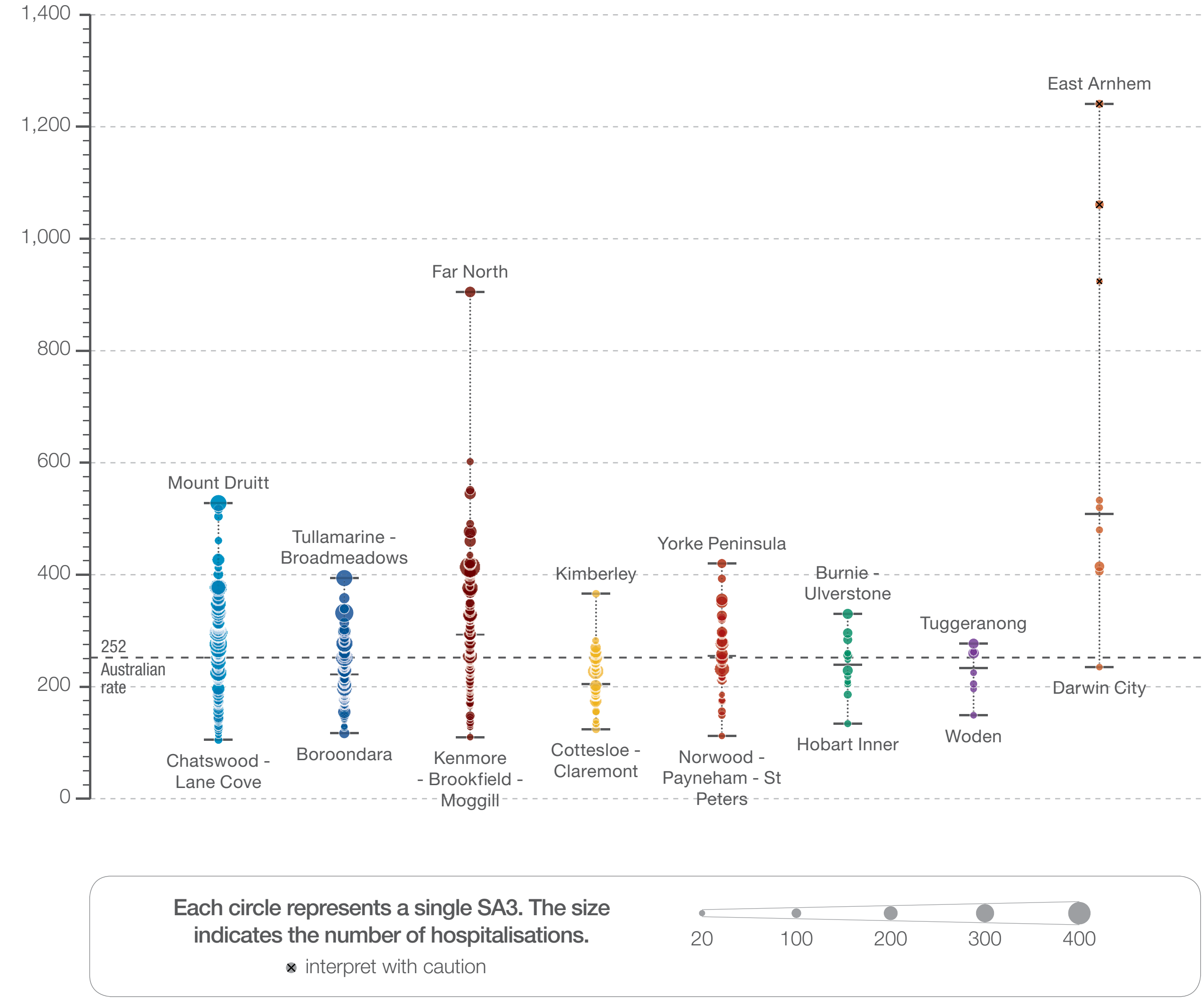
For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Acute myocardial infarction hospitalisations 35–84 years

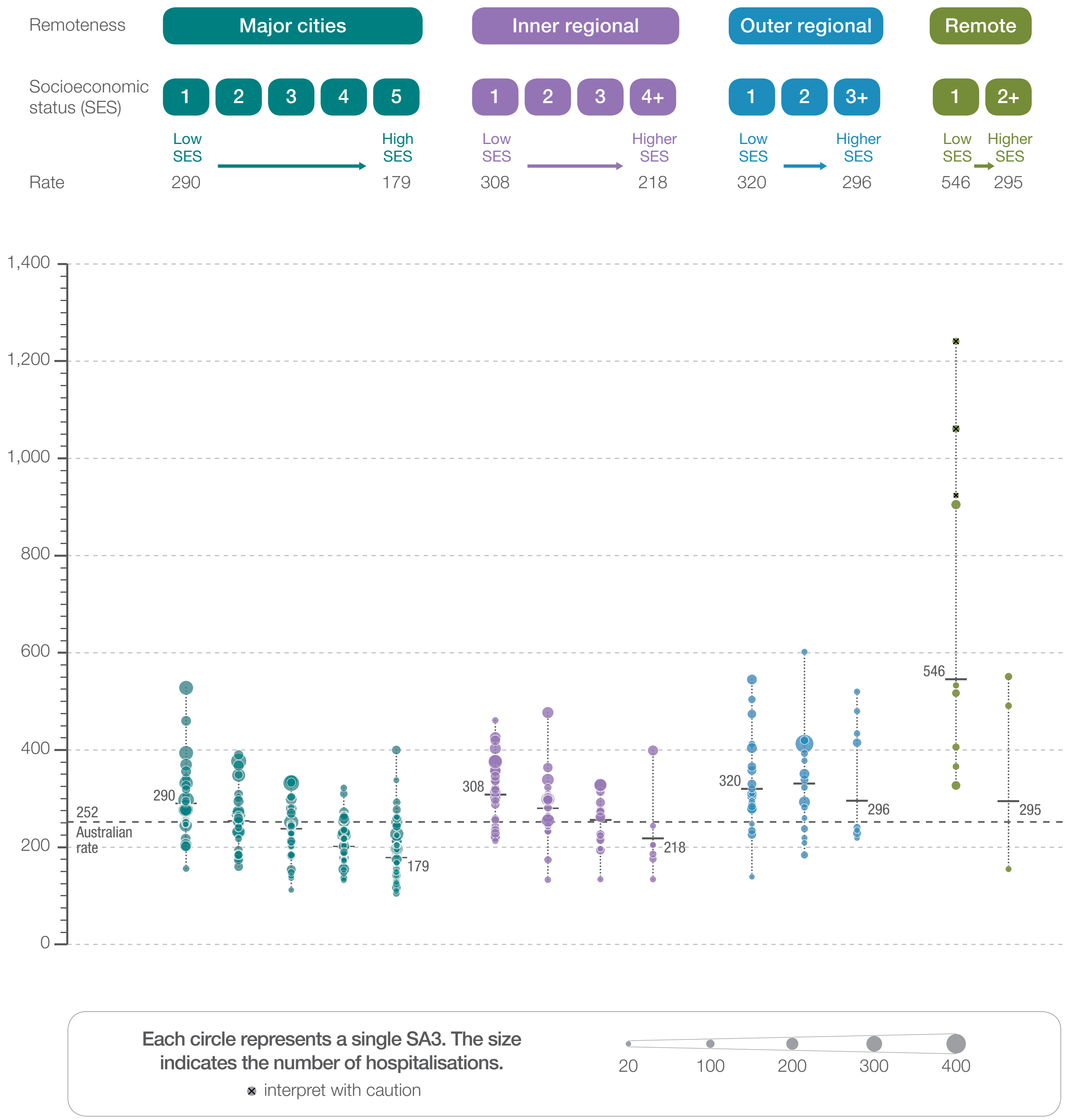
Figure 2.6: Number of hospitalisations for acute myocardial infarction per 100,000 people aged 35–84 years, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	528	394	905	366	420	330	277	1,241*
State/territory	252	222	293	205	255	239	233	509
Lowest rate	105	117	110	124	112	134	149	235
No. hospitalisations	10,712	7,092	7,356	2,644	2,583	803	417	504



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 2.7: Number of hospitalisations for acute myocardial infarction per 100,000 people aged 35–84 years, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Acute myocardial infarction hospitalisations 35–84 years

Resources

- National Heart Foundation of Australia, and Cardiac Society of Australia and New Zealand. Australian clinical guidelines for the management of acute coronary syndromes. NHFA and CSANZ; 2016.
- National Heart Foundation's Australian Heart Maps, and the distribution of risk factors.
- Australian Commission on Safety and Quality in Health Care. Acute coronary syndromes clinical care standard. Sydney: ACSQHC; 2014.
- National Institute for Health and Care Excellence. Acute coronary syndromes in adults. London: NICE; 2014.
- National Institute for Health and Care Excellence: Myocardial infarction: cardiac rehabilitation and prevention of further cardiovascular disease. London: NICE; 2013.
- National Health and Medical Research Council. Recognition and first aid management of heart attack. Canberra: NHMRC; 2012.
- Queensland Cardiac Outcomes Registry. Interventional cardiology: 2015 annual report. Brisbane: QCOR; 2015.
- NSW Ministry of Health. Cardiac monitoring of adult cardiac patients in NSW public hospitals: Sydney: Ministry of Health; 2016. (NSW Health guideline)

Australian initiatives

The information in this chapter will complement work already under way to address the rate of hospitalisation for MI in Australia. An MI is an acute event, whereas management of underlying cardiovascular disease and risk factors for disease is an ongoing issue. Work aimed at decreasing the burden of disease and hospitalisations includes:

- Medicare Benefits Schedule (MBS) items relating to chronic disease management – an Australian Government initiative that helps general practitioners to manage the health care of people with chronic conditions; it makes MBS rebates available for those requiring multidisciplinary, team-based care from a general practitioner and at least two other healthcare providers
- The Better Cardiac Care for Aboriginal and Torres Strait Islander People project, Australian Health Ministers' Advisory Council
- Essential Service Standards for Equitable National Cardiovascular Care for Aboriginal and Torres Strait Islander People
- The Indigenous Australians' Health Programme, which includes a focus on the prevention, early detection and management of circulatory disease
- MBS incentive payments for general practice health assessments for Aboriginal and Torres Strait Islander patients
- The Lighthouse Hospital Project – a joint initiative of the Heart Foundation, and the Australian Healthcare and Hospitals Association; this hospital-based project features the Lighthouse Toolkit, a practical workbook for continuous quality improvement that hospitals can implement to improve cultural competence and healthcare services for Aboriginal and Torres Strait Islander Australians with acute coronary syndromes
- The National Strategic Framework for Chronic Conditions, which addresses primary, secondary and tertiary prevention of chronic conditions; it is anticipated that the framework will be publicly available in 2017.

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

- Design, service and infrastructure plan for Victoria's cardiac system, Victorian Government
- State Cardiac Reperfusion Strategy, NSW Agency for Clinical Innovation
- For Our People, by Our People, Derbarl Yerrigan Health Service and the National Health Foundation
- The My Heart My Family Our Culture and Pilbara Aboriginal Health programs, Heart Foundation of Western Australia
- The Medical Outreach Indigenous Chronic Disease Program, Western Australia
- The Queensland Aboriginal and Torres Strait Islander Cardiac Health Strategy 2014–2017
- The Queensland Cardiac Outcomes Registry
- State and territory cardiac networks.

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2.2 Atrial fibrillation hospitalisations 35 years and over

Context

This data item examines hospitalisations for atrial fibrillation in people aged 35 years and over based on their place of residence.

Atrial fibrillation is one type of abnormal heart rhythm, also referred to as an arrhythmia.[1] Atrial fibrillation begins in the upper heart chambers and causes them to quiver (fibrillate) instead of beating normally, meaning that the heart does not pump blood around the body as efficiently as it should. Blood clots can form, blocking the blood supply to vital organs.[1] Some people with atrial fibrillation experience symptoms such as fatigue and dizziness, but others may be unaware that they have this condition and are at risk of adverse outcomes without treatment.

Atrial fibrillation has been estimated to affect 6% of Australian men and 5% of Australian women aged 55 years and over.[2] Risk factors for atrial fibrillation include older age, long-term high blood pressure, overweight and obesity, obstructive sleep apnoea, coronary heart disease, valvular heart disease, diabetes, chronic kidney disease, exposure to stimulants such as alcohol, and family history.[3,4]

Many patients have both heart failure and atrial fibrillation; risk factors for the two conditions are similar, and each condition can cause or worsen the other.[4] For people with atrial fibrillation, coexisting heart failure increases the risk of hospitalisation for cardiovascular and other causes, and the risk of mortality.[4,5]

Atrial fibrillation increases the risk of stroke, especially for older people and those with other comorbidities.[1,4] For example, among people aged 80–89 years, atrial fibrillation increases the risk of stroke by 4.5 times.[3] Treatment for atrial fibrillation may include medications to control the heart's rate, blood thinning (anticoagulant) medication to prevent the formation of blood clots and reduce stroke risk, and medication and lifestyle changes to manage the risk factors.[1,3,6]

Atrial fibrillation hospitalisations 35 years and over

For people with serious or prolonged episodes of atrial fibrillation, electrical or pharmacological cardioversion may be used to return the heart to a normal rhythm.[1,3] To maintain normal rhythm after cardioversion, either long-term medications or, sometimes, surgery may be used. Selected patients with atrial fibrillation can benefit from catheter ablation, a procedure that delivers an electric current to the site of arrhythmias to restore and maintain normal rhythm.[7]

Between 1993 and 2007, the rate of hospitalisation for atrial fibrillation in Australia increased by 155%.[8] Similar rises have been reported in other high-income countries.[9] The ageing population may explain part of this rise. Other likely contributors include increases in overweight and obesity, increases in cardiovascular risk factors, and the increased survival rates for people with coronary artery disease and heart failure.[2,10]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for atrial fibrillation as a principal diagnosis per 100,000 people aged 35 years and over in 2014–15. These rates include paroxysmal, chronic and persistent atrial fibrillation.

People admitted to hospital with atrial fibrillation are sometimes transferred to other hospitals – for example, for care that cannot be provided in the hospital of initial admission. Transfers from other hospitals are excluded from the rates presented here. However, repeat admissions (other than interhospital transfers) within the year for one person are counted as separate admissions.

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 58,608 hospitalisations for atrial fibrillation as a principal diagnosis, representing 430 hospitalisations per 100,000 people aged 35 years and over (the Australian rate).

The number of hospitalisations for atrial fibrillation as a principal diagnosis across 322† local areas (Statistical Area 3 – SA3) ranged from 192 to 740 per 100,000 people aged 35 years and over. The rate was **3.9 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 362 per 100,000 people aged 35 years and over in Tasmania to 537 in the Northern Territory (Figures 2.10–2.13).

After the highest and lowest 10% of results were excluded and 259 SA3s remained, the number of hospitalisations per 100,000 people aged 35 years and over was 1.7 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

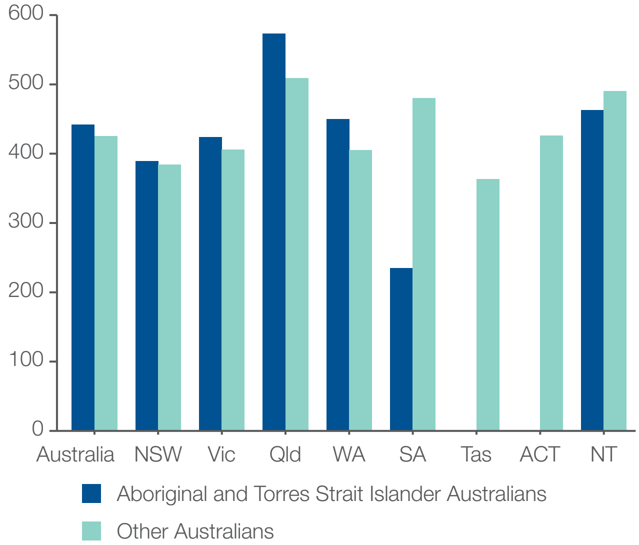
Analysis for remoteness and socioeconomic status

Rates decreased with socioeconomic disadvantage across major cities and regional areas. However, in remote areas, rates increased with socioeconomic disadvantage (Figure 2.14).

Analysis by Aboriginal and Torres Strait Islander status

The rate was similar for both Aboriginal and Torres Strait Islander Australians (442 per 100,000 people) and other Australians (425 per 100,000 people) (Figure 2.8).

Figure 2.8: Number of hospitalisations for atrial fibrillation (principal diagnosis) per 100,000 people aged 35 years and over, age and sex standardised, by state and territory and Indigenous status, 2014–15



The data for Figure 2.8 are available at www.safetyandquality.gov.au/atlas.

† There are 333 SA3s. For this item, data were suppressed for 11 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

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

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Data for Tas and ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.

Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.

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

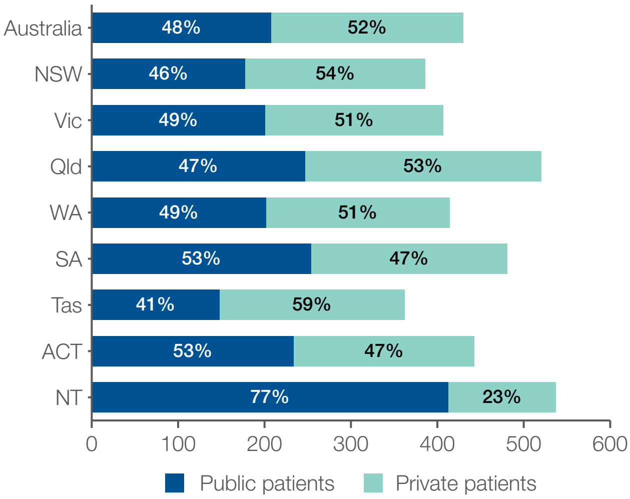
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Atrial fibrillation hospitalisations 35 years and over

Analysis by patient funding status

Overall, 52% of hospitalisations for atrial fibrillation as a principal diagnosis were for privately funded patients. This proportion varied from 23% in the Northern Territory to 59% in Tasmania (Figure 2.9).

Figure 2.9: Number of hospitalisations for atrial fibrillation (principal diagnosis) per 100,000 people aged 35 years and over, age and sex standardised, by state and territory and patient funding status, 2014–15



The data for Figure 2.9 are available at www.safetyandquality.gov.au/atlas.

Additional analysis

Atrial fibrillation hospitalisations, principal or additional diagnosis

The data item relates only to people admitted to hospital with atrial fibrillation as a principal diagnosis. However, more people are admitted with atrial fibrillation as an additional diagnosis. In 2014–15, there were 180,548 hospitalisations for atrial fibrillation as either a principal or additional diagnosis, representing 1,292 hospitalisations per 100,000 people aged 35 years and over (the Australian rate).

The number of hospitalisations with atrial fibrillation as either a principal or additional diagnosis across 324^ local areas (SA3s) ranged from 898 to 2,169 per 100,000 people aged 35 years and over. The rate was **2.4 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 1,129 per 100,000 people aged 35 years and over in Western Australia, to 1,999 in the Northern Territory.

For admissions where atrial fibrillation was either a principal or additional diagnosis, minimal variation was seen within metropolitan and regional areas according to socioeconomic disadvantage. A relatively higher rate was observed in remote areas at most socioeconomic disadvantage.

The rate of atrial fibrillation as either a principal or additional diagnosis was 1.4 times as high for Aboriginal and Torres Strait Islander Australians as for other Australians.

There are no data visualisations for atrial fibrillation as a principal or additional diagnosis; however rates by SA3 for 2014–15 are available online at www.safetyandquality.gov.au/atlas.

^ There are 333 SA3s. For this item, data were suppressed for nine SA3s due to a small number of hospitalisations and/or population in an area.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third party payer, for example a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third party payer.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Interpretation

Potential reasons for the variation include differences in:

- The prevalence of risk factors such as coronary artery disease, diabetes, hypertension, heart failure and obesity
- Health literacy and the ability to self-manage cardiovascular conditions
- Rates of diagnosis of atrial fibrillation
- Access to effective, culturally appropriate primary care and cardiac care for Aboriginal and Torres Strait Islander Australians
- Use of therapies and lifestyle interventions to manage or prevent arrhythmias
- The availability and use of pathways and guidelines for managing atrial fibrillation in the community
- Admission practices, both in emergency departments and in primary care[11]
- Levels of private health insurance and access to private hospitals
- Access to cardioelectrophysiologists, specialist physicians, and services that provide specialist management of heart rhythm disorders.

The Victorian Heart Health: Improved Services and Better Outcomes for Victorians policy, released in 2014–15, may have had an effect on subsequent atrial fibrillation hospitalisations in Victoria.

Expansion of the Northern Territory Integrated Cardiac Network Service in 2013–14 may have resulted in a plateauing of hospitalisation rates for atrial fibrillation in 2014–15.

This analysis shows lower rates of hospitalisation for atrial fibrillation as a principal diagnosis among people in areas of socioeconomic disadvantage in major cities and regional communities. Further investigation should involve exploring patterns of elective and emergency hospitalisations, and any variation in management of this condition.

The patterns seen in this analysis may reflect lower rates of recognition and diagnosis of atrial fibrillation among people living in socioeconomically disadvantaged areas, and lower access to private hospitals for elective investigation and management.

Addressing variation

An increased focus on primary prevention through reducing cardiovascular risk factors, including obesity and hypertension, is important for reducing overall rates of atrial fibrillation. Improving symptom control and management of comorbid conditions – particularly heart failure – should be targeted to improve quality of life and reduce hospitalisations among people with atrial fibrillation.[5]

Greater access to primary care and specialist cardiac clinics for patients with atrial fibrillation could provide patients with more advice and support to improve medication adherence and management of risk factors.[12] People in rural and remote areas face a number of barriers to accessing cardiac services, such as the cost of travel.[12] Initiatives are needed to increase access to cardiac specialist services in rural and remote locations.

Selected patients with atrial fibrillation can be managed in the emergency department rather than through hospitalisation, without increasing the rate of short-term readmission.[11]

Ways to improve access to specialised advice for people living in rural and remote communities include expansion of telehealth facilities and outreach cardiology clinic services.

Between 10% and 30% of people with atrial fibrillation are undiagnosed, and are therefore not receiving therapy to prevent stroke.[13] On average, Aboriginal and Torres Strait Islander Australians develop atrial fibrillation almost 20 years younger than do non-Indigenous Australians.[14] A trial of opportunistic screening for atrial fibrillation among Aboriginal and Torres Strait Islander Australians in the Northern Territory is currently under way.[14]

Atrial fibrillation hospitalisations 35 years and over

A key issue in management of atrial fibrillation is preventing the serious consequences of blood clots that can form as a result of irregular heartbeats. Greater use of anticoagulant medication in appropriate patients would reduce the burden of death and disability caused by stroke in people with atrial fibrillation. Approximately one-third of people who had an ischaemic stroke had previously known or newly diagnosed atrial fibrillation in a Swedish study.[15] Anticoagulant medication reduces the risk of stroke by approximately two-thirds, but only 40–60% of patients who are appropriate candidates receive anticoagulant therapy. In addition, some patients who are at moderate to high risk of stroke receive antiplatelet therapy (for example, aspirin) rather than more effective anticoagulant therapy.

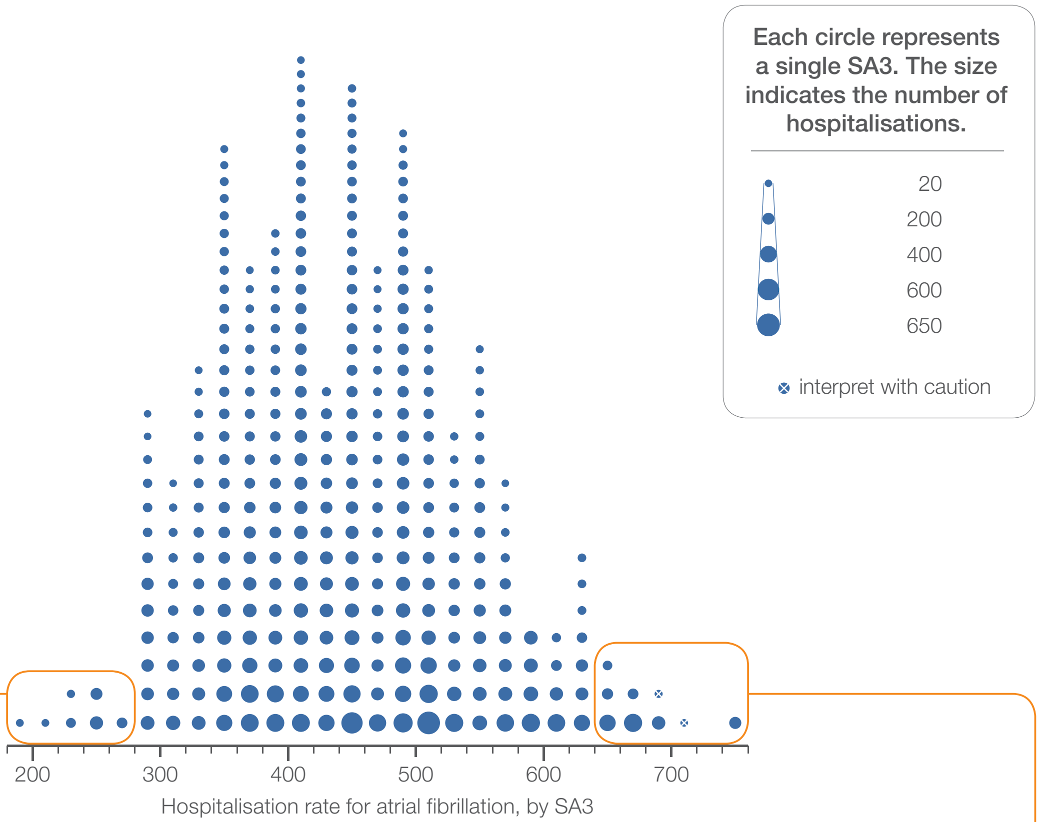
There are barriers to the use of anticoagulants. For example, use of warfarin requires frequent monitoring, and all anticoagulants are associated with a risk of bleeding, although this is generally outweighed by the benefit of anticoagulant therapy in reducing overall stroke incidence.[13] Finding ways to improve risk assessment and remove or reduce prescribing barriers so that anticoagulants are used, where clinically appropriate, could lead to significant health gains.[13]

Warfarin has been the mainstay of anticoagulant therapy for many years. From 2011, novel oral anticoagulants, also known as non–vitamin K oral anticoagulants, added to the options available for stroke prevention in people with atrial fibrillation in Australia. In the year after novel oral anticoagulants were listed on the Pharmaceutical Benefits Scheme, the overall rate of anticoagulant therapy increased, while the rate of warfarin use decreased.[16] Both types of anticoagulant therapy require careful patient selection and routine clinical monitoring to minimise the risks of clots and bleeding.[17]

Future analyses of variation should focus on geographic differences in use of therapies for atrial fibrillation. Examination of the prevalence and management of risk factors such as diabetes, hypertension and obesity could reveal further drivers of variation. The extent to which atrial fibrillation is a factor in hospitalisation for stroke should also be explored. Use of linked datasets for future analyses would help throw light on variations in use of effective primary and secondary prevention.

A clinical care standard on risk assessment and management of atrial fibrillation would be valuable, particularly for general practitioners in regional and remote areas, where access to specialist care is limited.

Figure 2.10: Number of hospitalisations for atrial fibrillation (principal diagnosis) per 100,000 people aged 35 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Meander Valley - West Tamar	Tas	**192**	36
Broken Hill and Far West	NSW	**216**	34
Launceston	Tas	**230**	121
Wollondilly	NSW	**234**	52
Hurstville	NSW	**252**	202
Fairfield	NSW	**256**	256
Tamworth - Gunnedah	NSW	**268**	152

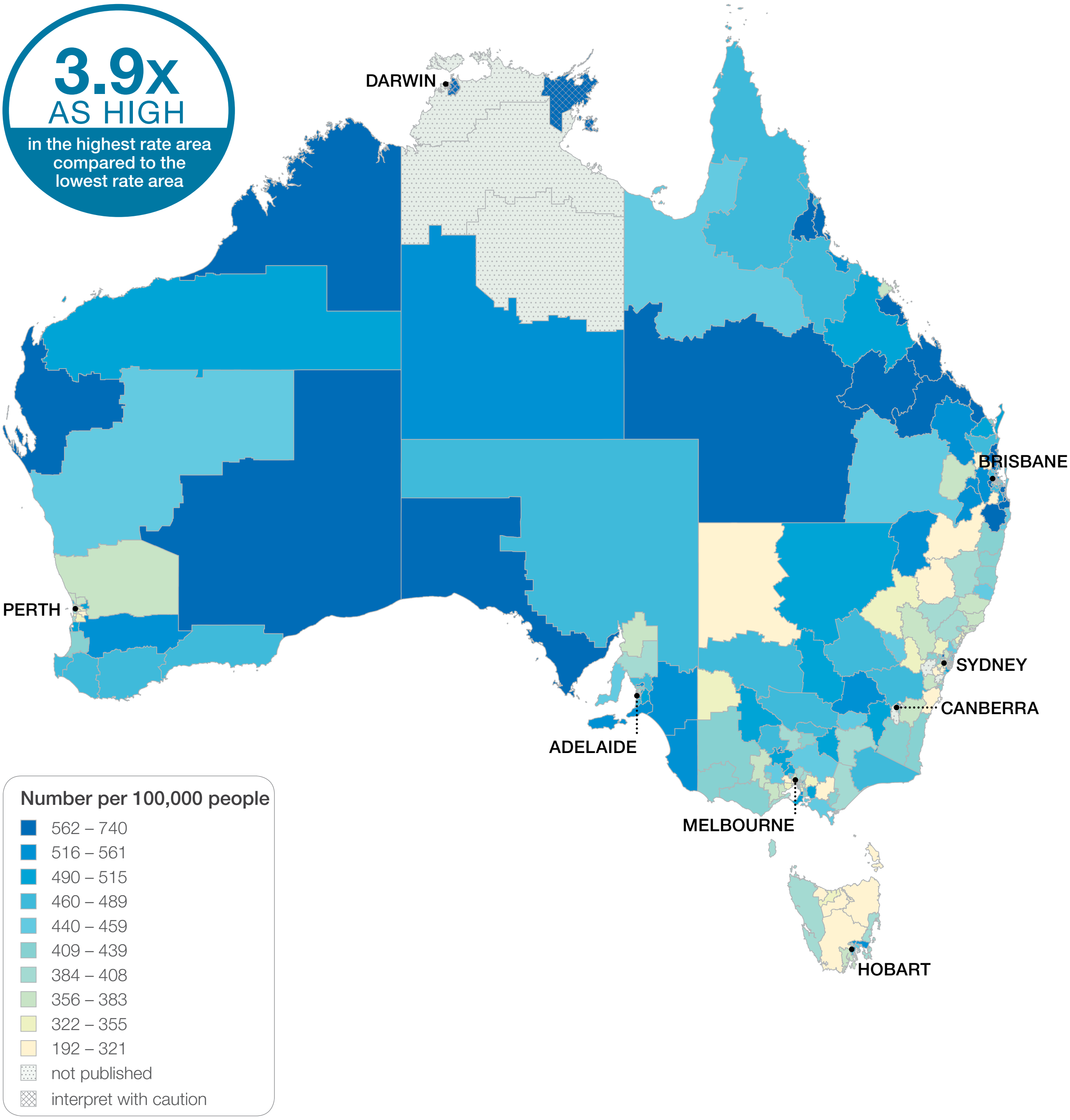
Highest rate areas

SA3	State	Rate	Hospitalisations
Tablelands (East) - Kuranda	Qld	**740**	209
East Arnhem	NT	**704***	28
Gladstone - Biloela	Qld	**685**	265
Litchfield	NT	**683***	45
Cairns - North	Qld	**675**	154
Rockhampton	Qld	**665**	460
Surfers Paradise	Qld	**656**	175
Caloundra	Qld	**647**	387
Prospect - Walkerville	SA	**642**	108

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

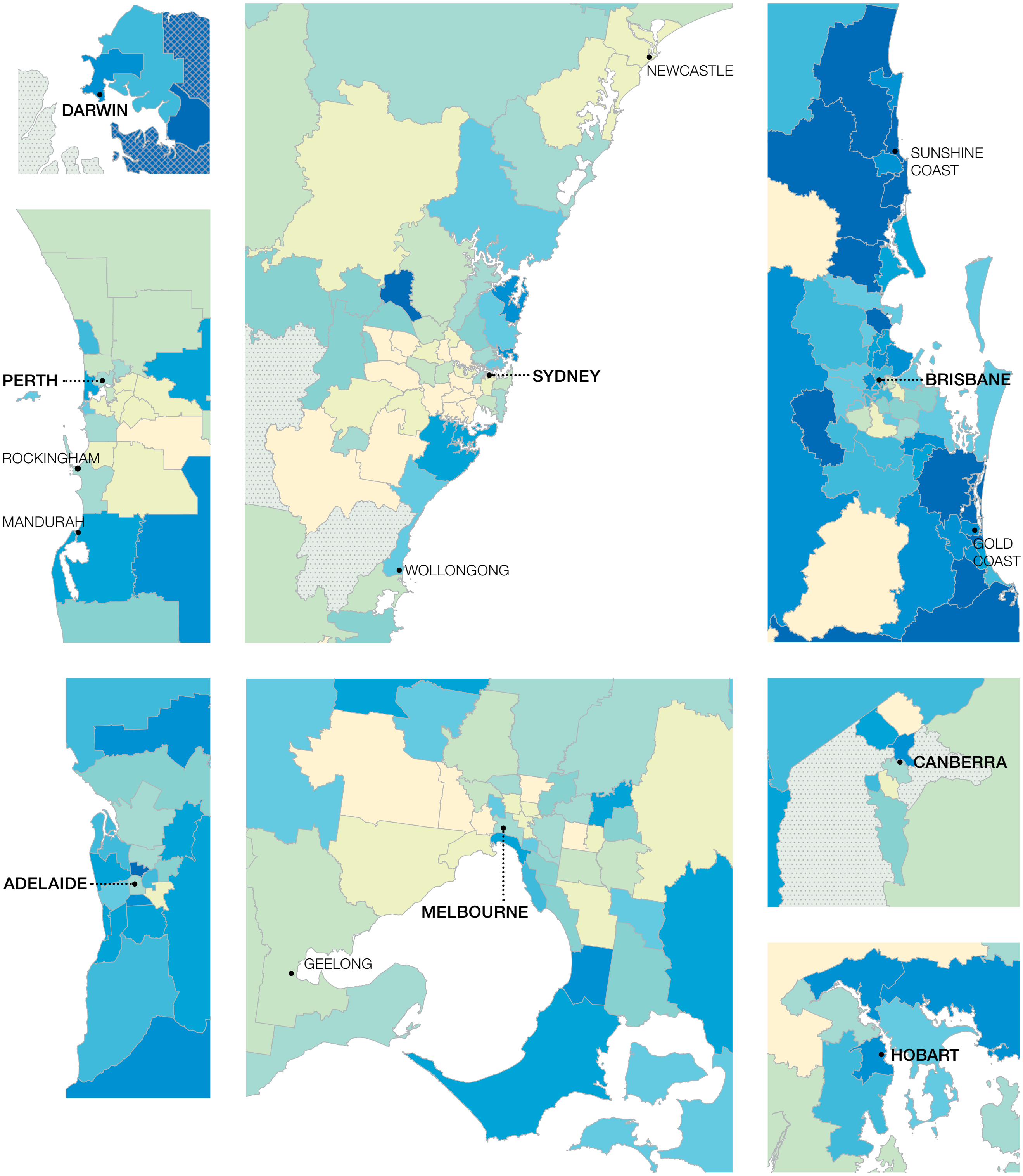
Atrial fibrillation hospitalisations 35 years and over

Figure 2.11: Number of hospitalisations for atrial fibrillation (principal diagnosis) per 100,000 people aged 35 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 2.12: Number of hospitalisations for atrial fibrillation (principal diagnosis) per 100,000 people aged 35 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps

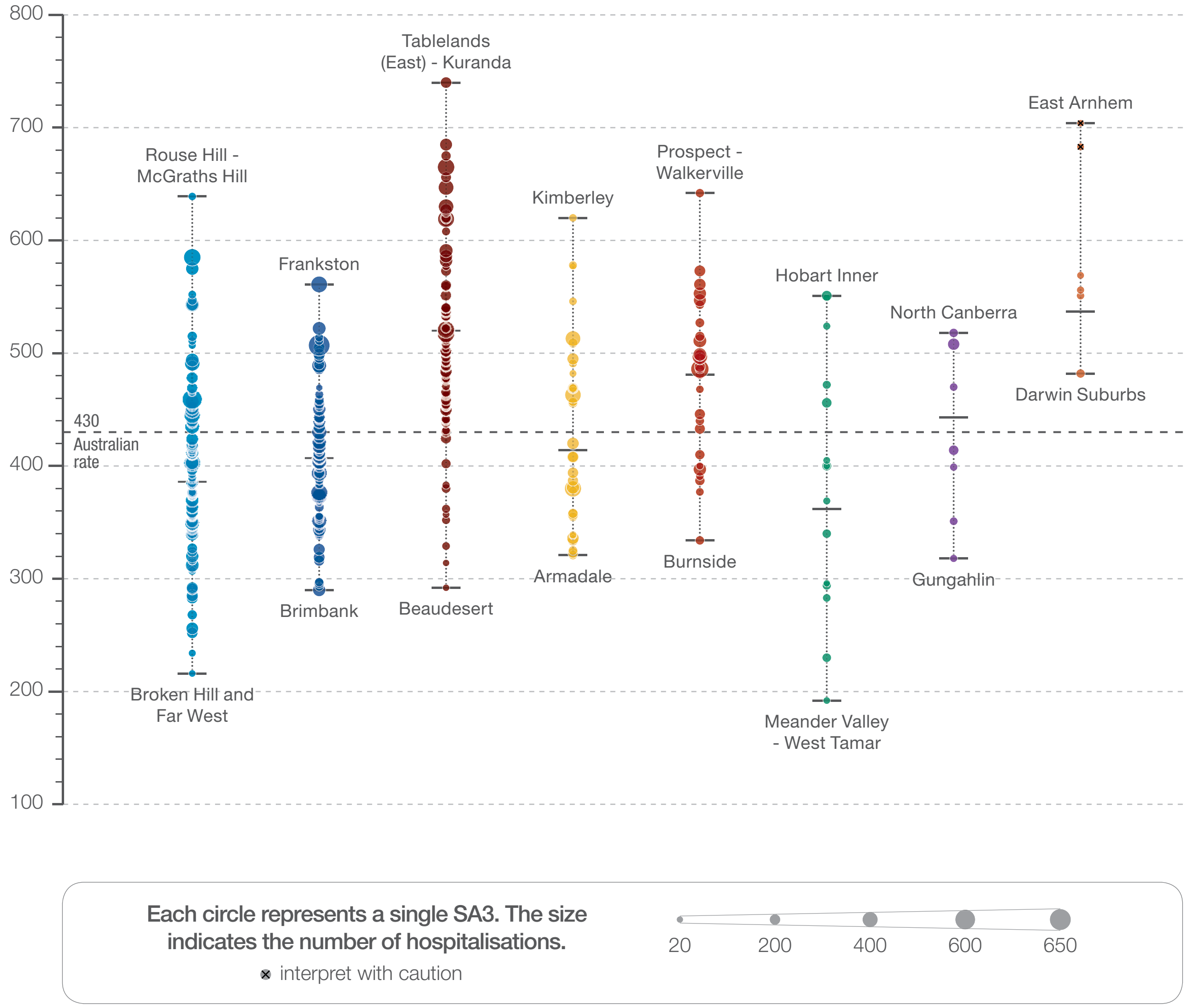


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Atrial fibrillation hospitalisations 35 years and over

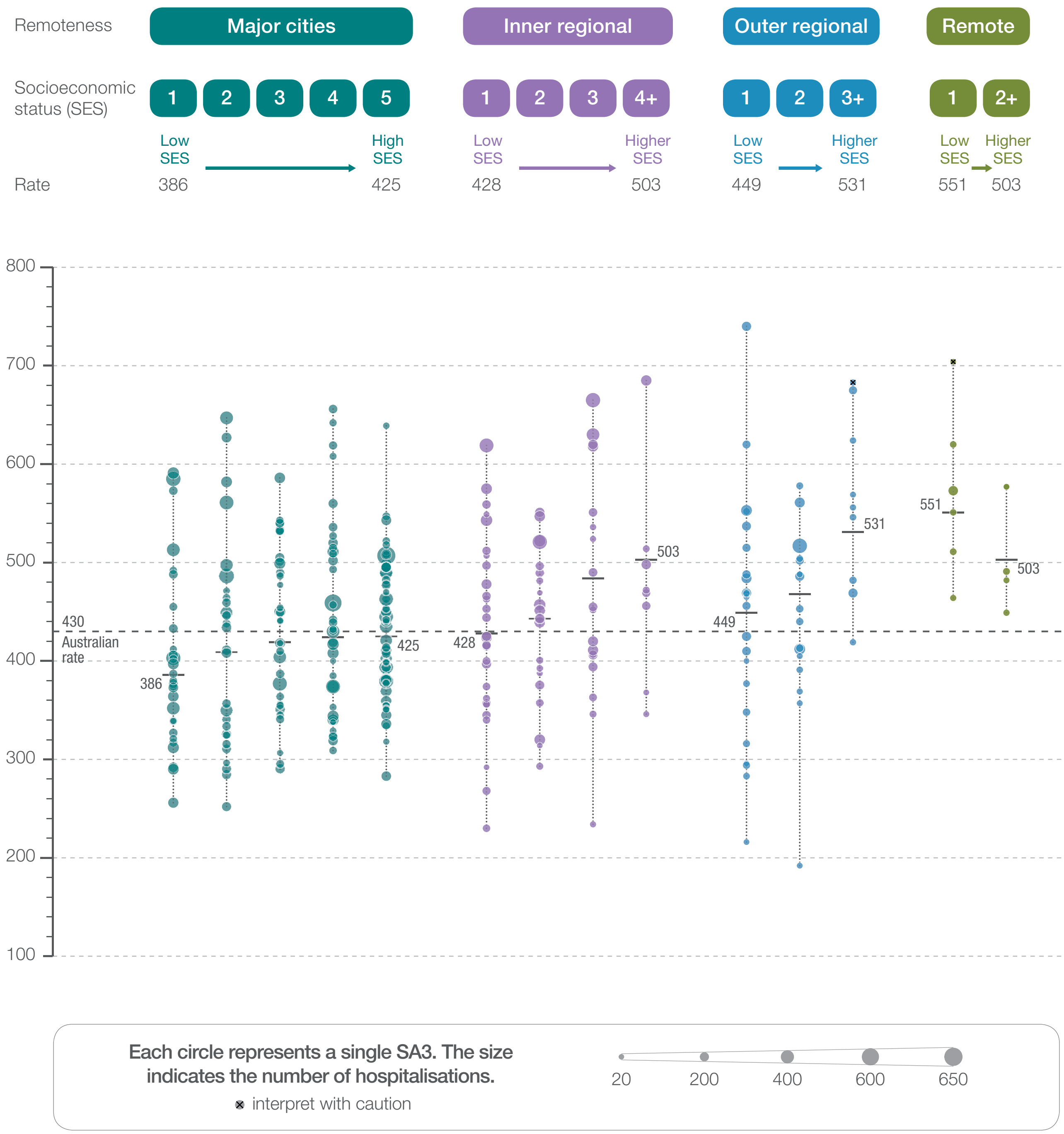
Figure 2.13: **Number of hospitalisations for atrial fibrillation (principal diagnosis) per 100,000 people aged 35 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15**

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	639	561	740	620	642	551	518	704*
State/territory	386	407	520	414	481	362	443	537
Lowest rate	216	290	292	321	334	192	318	482
No. hospitalisations	17,523	13,887	13,613	5,574	5,319	1,278	813	437



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 2.14: Number of hospitalisations for atrial fibrillation (principal diagnosis) per 100,000 people aged 35 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Atrial fibrillation hospitalisations 35 years and over

Resources

- Department of Health, Western Australia. Quick reference guide: atrial fibrillation information for the health practitioner. Perth: Department of Health; 2014.
- NSW Therapeutic Advisory Group Inc. National QUM indicators for Australian hospitals. Set 1: Antithrombotic therapy, data collection tools. Sydney: NSW TAG; 2014.
- National Institute for Health and Care Excellence. Atrial fibrillation: management. London: NICE; 2014. (clinical guideline).
- Management of atrial fibrillation: European Society of Cardiology Clinical Practice Guidelines.[4]
- 2014 American College of Cardiology/American Heart Association/Heart Rhythm Society *Guideline for the Management of Patients with Atrial Fibrillation*, executive summary.
- NPS MedicineWise. Good anticoagulant practice. Sydney: NPS MedicineWise; 2013.
- New oral anticoagulants: a practical guide on prescription, laboratory testing and peri-procedural/bleeding management, 2014.[21]
- Atrial fibrillation – Understanding abnormal heart rhythm, patient information, Heart Foundation of Australia.

Australian initiatives

The information in this chapter will complement work already under way to address the rate of hospitalisation for atrial fibrillation in Australia. This work includes:

- Medicare Benefits Schedule (MBS) items for chronic disease management – an Australian Government initiative that helps general practitioners to manage the health care of people with chronic conditions; it makes MBS rebates available for those requiring multidisciplinary, team-based care from a general practitioner and at least two other healthcare providers
- The Better Cardiac Care for Aboriginal and Torres Strait Islander People project, Australian Health Ministers' Advisory Council
- Essential Service Standards for Equitable National Cardiovascular Care for Aboriginal and Torres Strait Islander People
- The National Strategic Framework for Chronic Conditions, which addresses primary, secondary and tertiary prevention of chronic conditions; it is anticipated that the framework will be publicly available in 2017.

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

- Design, service and infrastructure plan for Victoria's cardiac system, Victorian Government
- South Australian data collections
- State and territory cardiac networks.

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Chapter 3
Women's health and maternity

At a glance

This chapter examines variation in three women's healthcare interventions and two maternity care items. Analysis by Statistical Area Level 3 (SA3) showed marked rate differences across Australia in hysterectomy, endometrial ablation, cervical loop excision and cervical laser ablation, and third- and fourth-degree perineal tears.

Hysterectomy (surgical removal of the uterus – womb) and endometrial ablation (surgical removal of the inner lining of the uterus) are commonly used to treat heavy menstrual bleeding. The hysterectomy rate in Australia is one of the highest reported in the Organisation for Economic Co-operation and Development (OECD), and there is concern that hysterectomy may be overused to treat benign conditions.[1-3]

This Atlas observed a seven-fold difference between the lowest and highest rates of hysterectomy and a 21-fold difference in rates of endometrial ablation. The finding extends understanding of variation from the first Atlas[4], and confirms there is marked variation in use of each procedure across Australia. Higher rates of hysterectomy in some areas could be due, in part, to lower use of less invasive treatments for heavy menstrual bleeding. Although hysterectomy stops menstrual bleeding in all women, it is a major surgical procedure.[5]

Pharmaceutical treatment is recommended as the first-line treatment for heavy menstrual bleeding, and endometrial ablation as the first surgical option, if appropriate and the woman prefers it.[5-7] Improving access to these effective treatments may help some women avoid the need for hysterectomy.[8]

This Atlas observed an 18-fold variation in rates of cervical loop excision or cervical laser ablation. Expanding availability of these precancer treatments in outpatient settings and ensuring use consistent with guidelines may reduce this variation.

In selected women aged 20–34 years, the Atlas observed a three-fold variation in caesarean section rates. Australia has a higher rate of caesarean section than the OECD reported average.[9] Ensuring that young women with uncomplicated pregnancies have information and access to services that support their choices for first birth will help ensure the appropriate use of caesarean section.

In all women giving birth vaginally, the Atlas observed a 12-fold variation in rates of third- and fourth-degree perineal tears. Developing an agreed national standard of care to minimise the risk of perineal trauma in childbirth is a priority.

Women's health and maternity

Recommendations

Hysterectomy and endometrial ablation

3a. The Medicare Benefits Schedule (MBS) Review Taskforce to ensure that MBS item descriptors relating to treatments for heavy menstrual bleeding are aligned with the care described in the Heavy Menstrual Bleeding Clinical Care Standard.

3b. State and territory health departments to ensure that women who have heavy menstrual bleeding have been offered clinically appropriate treatment options, as described in the Heavy Menstrual Bleeding Clinical Care Standard, before they are placed on a waiting list for hysterectomy.

3c. Relevant professional colleges to include intrauterine device insertion within their advanced training programs. They should also review incentives for clinicians to participate in continuing professional development training programs on intrauterine device insertion, and access to such programs, to increase the number of clinicians skilled in insertion of the levonorgestrel intrauterine system.

Cervical loop excision and cervical laser ablation

3d. State and territory health departments to implement outpatient models of care for cervical loop excision and cervical laser ablation to ensure that, if clinically appropriate, patients can be offered treatment in outpatient settings.

Caesarean section

3e. The Commission to work with relevant colleges and specialist societies to develop decision support tools on birth options for pregnant women aged 34 years and under without complications for birth.

3f. Maternity health services to ensure regular clinical review of perinatal data (National Core Maternity Indicators and additional data from perinatal datasets) by a multidisciplinary team that includes neonatologists.

3g. The Australian Institute of Health and Welfare, in collaboration with data providers and other stakeholders, to investigate ways of improving reporting of caesarean section rates according to obstetric and neonatal risk factors, such as use of the Robson classification.

3h. The Commission to refer the Atlas findings to the Community Care and Population Health Principal Committee of the Australian Health Ministers' Advisory Council for consideration in relation to the inclusion of caesarean section <39 weeks (273 days) without obstetric or medical indication as a National Core Maternity Indicator (as described in the AIHW report *National Core Maternity Indicators 2010–2013*, released in 2016).

Third- and fourth-degree perineal tears

3i. Relevant medical and midwifery professional colleges to develop, agree on and disseminate an agreed model of care for the second stage of labour to minimise the risk of severe perineal trauma.

3j. The Commission to work with Women's Healthcare Australasia, and relevant colleges and specialist societies to develop a clinical care standard on perineal care during vaginal birth, to improve national consistency of best practice for the prevention, recognition and management of severe perineal trauma.

Background

This chapter examines variation in hospitalisations for:

- Hysterectomy
- Endometrial ablation
- Cervical loop excision or cervical laser ablation
- Caesarean section in selected women aged 20–34 years
- Third- and fourth-degree perineal tears.

Hysterectomy and endometrial ablation

Hysterectomy – surgical removal of the uterus – is used to treat a number of benign conditions, as well as gynaecological cancers. There has been concern since the 1970s and 1980s about rising rates of hysterectomy for benign conditions, such as menstrual bleeding disorders, and the considerable variability in rates across Australia[10] and internationally.[11] This concern has led to ongoing examination of variation in hysterectomy rates by the OECD, and annual reporting of hysterectomy rates by the Australian Institute of Health and Welfare (AIHW).[11,12] Although hysterectomy rates have fallen in Australia since the 1980s, Australian rates are markedly higher than those in comparable OECD countries, such as New Zealand and England.[11]

Since the 1980s, the range of effective treatments for heavy menstrual bleeding has expanded. Endometrial ablation was introduced in the late 1980s. It is a less invasive surgical procedure for treating heavy menstrual bleeding than hysterectomy, and involves the removal of the inner lining of the uterus (endometrium) but not the uterus itself, using various surgical techniques. Published data on endometrial ablation rates in Australia are limited, and the impact of newer methods of endometrial ablation on overall endometrial ablation rates in Australia has not been examined.

Exploring variation in hysterectomy and endometrial ablation rates is a tool for investigating the appropriateness of care for heavy menstrual bleeding. Affecting 1 in 4 women, heavy menstrual bleeding can substantially interfere with a woman's social and physical wellbeing.[13] Although hysterectomy will be the most appropriate clinical choice for some women, or may be their preference, it is important that all women with heavy menstrual bleeding have the choice of, and are fully informed about, all effective treatments suitable for them. These treatments may help them avoid the need for hysterectomy.[8]

Limited guidance is available in Australia on the management of heavy menstrual bleeding. Guidelines from the United Kingdom and Canada recommend pharmaceutical treatments, such as the levonorgestrel uterine system, as the first-line treatment once large fibroids and malignancies have been ruled out.[5,7] Endometrial ablation is recommended for heavy menstrual bleeding that is having a severe impact on quality of life for women who no longer wish to conceive.[5] Hysterectomy is recommended for heavy menstrual bleeding if less invasive options are unsatisfactory, inappropriate or not desired by the woman.[5,7] Hysterectomy stops menstrual bleeding in all women and also permanently stops fertility. Although an effective treatment, it is associated with the risks of major surgery.[5]

Cervical loop excision and cervical laser ablation in cancer prevention

The current National Cervical Screening Program (NCSP), introduced in 1991, aims to prevent cervical cancer through routine screening of all women aged 20–69 years to detect and remove precancerous cells from the cervix (neck of the womb).[14] Cervical loop excision and cervical laser ablation are the main procedures for removing cervical precancers detected by cervical screening or other examinations. These treatments, along with ongoing monitoring, prevent precancer from developing into cancer.

Women's health and maternity

Since the current NCSP was introduced, there has been a marked reduction in both the incidence of cervical cancer and mortality from the disease.[14] Most cervical cell abnormalities detected by screening are low-grade abnormalities[14] and do not require treatment.[15,16] High-grade cervical abnormalities (or cervical precancers) confirmed by a further examination (colposcopy) and testing require treatment to prevent the development of cancer. The effective targeting of treatments to confirmed cervical precancers has no doubt contributed to the success of the NCSP, but there has been limited analysis of treatment rates at a national level.

Exploring variation in precancer treatment rates is a first step towards examining the appropriateness of management and adherence to guideline-recommended care. Appropriate use of these treatments is particularly important for young women who wish to conceive in the future because cervical loop excision and cervical laser ablation are associated with an increased risk of premature births.[17] Although the national system of state-based Pap smear registers records results of cervical screening and provides a reminder function for follow-up of screen-detected abnormalities, it does not currently collect data on treatments received for cervical precancers.

Cervical loop excision and cervical laser ablation are the main treatments for cervical precancer, and can be performed in outpatient settings under a local anaesthetic.[18,19] The Atlas has been limited to measuring the number of these procedures performed for admitted patients, including women admitted to hospitals or day surgery facilities. Therefore, some variation resulting from uncounted outpatient activity was expected.

A number of initiatives are under way and planned to improve the appropriateness of management for cervical precancers. The Colposcopy Quality Improvement Program (C-QuIP), set up in 2009 by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, aims to improve the care of women who are referred for colposcopy and treatment of screen-detected abnormalities. The C-QuIP offers all medical practitioners in Australia and New Zealand who are currently practising colposcopy the opportunity to be certified in this field, and for certification and recertification to be used as part of their college's continual professional development requirements.[20]

From 1 December 2017, the National Cancer Screening Register will require colposcopists to send colposcopy data to the register. In return, they will receive aggregated reports about the tests and treatments they have administered as part of the NCSP.[21]

Renewed National Cervical Screening Program

The renewed NCSP, to be introduced on 1 December 2017, will offer screening to all women aged 25–74 years every five years using a primary human papillomavirus (HPV) test.[22] This change has been made because a review of the evidence showed that an HPV test performed every five years was more effective than the program it will replace, was just as safe, and was estimated to result in a greater than 20% reduction in incidence of, and mortality from, cervical cancer in Australian women.[23-25] Modelling suggests that there may be an overall increase in colposcopy following introduction of the renewed NCSP. There may also be a small decrease (5%) in treatments for HPV-vaccinated women and a small increase (6%) in treatments for HPV-unvaccinated women.[26]

Caesarean section in selected women aged 20–34 years

A caesarean section is an operation in which a baby is born through an incision in the mother's abdomen and uterus.[27] Caesarean section can be lifesaving, but is associated with small risks of serious adverse effects for the mother and the baby, and for subsequent births.[28]

Recent attention has focused on the potential effects of early planned caesarean section (<39 weeks) on neonatal respiratory function.[29,30] This has led to recommendations for planned caesarean section at approximately 39 weeks gestation or later in uncomplicated singleton (one baby) pregnancies.[28,31,32] Early planned caesarean section has also been associated with increased risk of childhood developmental delay[33] and attention-deficit/hyperactivity disorder (ADHD).[34]

The rate of caesarean section in Australia has risen steadily since the early 1990s[35], a trend seen in nearly all comparable OECD countries.[9] The increasing age of first-birth mothers is commonly put forward as a reason for this rise[36], with older mothers having increased risks of obstetric complications and adverse outcomes.[37] However, there are indications that the rate of caesarean section is increasing in younger women (aged 20–34 years)[38], and that this may not be due to medical reasons.[39,40] Younger women are more likely to have a subsequent birth, and data show that, for most, the birth method chosen for the first birth will set the course for the future.[41]

These considerations have led to concern about the growing numbers of women at prime age for an uncomplicated vaginal birth (that is, 20–34 years) having their first baby by caesarean section for non-medical reasons.[39,40] Exploring variation in caesarean section for first births in a subset of these women who, along with their babies, are potentially at low risk from vaginal birth is a logical first step in investigating the appropriate use of the procedure, and supporting women to make informed choices about their maternity care.

Selected women are those aged 20–34 years who gave birth for the first time to a single baby of gestational age at birth between 37 and 41 completed weeks, with vertex presentation (baby's head at the cervix).

Third- and fourth-degree perineal tears

Perineal tears are a common complication of vaginal birth. For most affected women, tears are minor.[41] A small proportion of women experience severe tears, which, for some, can have lifelong consequences.[42] Prevention, timely detection and appropriate repair of perineal tears are important to minimise the risk of these injuries and their complications, such as infection, blood loss, pain and incontinence.[42,43]

In Australia and in comparable countries, the rate of third- and fourth-degree perineal tears has increased over the past two decades.[44-48] The reasons for this rise are not fully understood, but improved recognition and reporting[38,49], as well as changes in risk factors and practices, may contribute.[48,50]

Third- and fourth-degree perineal tears are recognised as a significant complication of maternity care, in Australia and internationally. In Australia, third- and fourth-degree perineal tears for all vaginal births and for all vaginal first births are National Core Maternity Indicators. The purpose of the National Core Maternity Indicators is to monitor safety and quality of maternity care to ensure that there is continual improvement in the quality of maternity services.

Exploring variation in third- and fourth-degree perineal tears is the first step in investigating potential causes, and improving the quality of prevention, detection and treatment of these injuries.

Women's health and maternity

About the data

For the women's health items (hysterectomy, endometrial ablation, and cervical loop excision or cervical laser ablation), data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations per 100,000 women.

For the maternity items (caesarean section in selected women aged 20–34 years, and third- and fourth-degree perineal tears), data are sourced from the AIHW National Perinatal Data Collection, and include both public and private hospitals. Rates for each item are based on:

- The number of selected women who had a caesarean section per 1,000 selected women aged 20–34 years; selected women are women aged 20–34 years who met all of these criteria: gave birth for the first time, singleton pregnancy (carried one baby), baby's head positioned at the cervix, and baby of gestational age 37–41 completed weeks at birth
- The number of third- and fourth-degree perineal tears per 1,000 women who gave birth vaginally; data include instrument-assisted births, unassisted (non-instrumental) births and episiotomies.

For all items, the analysis and maps are based on the residential address of the patient and not the location of the hospital. Rates are age standardised to allow comparisons between populations with different age structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen. For some indicators, data are aggregated over three years to provide sufficient numbers to support reporting at the local level.

Factors influencing population-based hospitalisation rates include incidence and prevalence of risk factors and disease, hospital admission practices, bed availability, and patient social factors such as the availability of carers, the availability of other treatment options, treatment compliance and travel distance.

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3.1 Hysterectomy hospitalisations 15 years and over

Context

This data item examines hysterectomy rates for women without gynaecological cancer aged 15 years and over based on their place of residence. The first *Australian Atlas of Healthcare Variation* (first Atlas) examined variation in hysterectomy and endometrial ablation combined, and found that the rate was 5.2 times as high in the area with the highest rate as in the area with the lowest rate.[1] Further analysis to separately explore variation in hysterectomy and endometrial ablation was recommended.

Hysterectomy is an operation to remove the uterus (womb) through vaginal, abdominal or laparoscopic (keyhole) surgery.[2] The procedure sometimes includes removal of the ovaries and fallopian tubes.[2] The vast majority of hysterectomies are done for benign gynaecological conditions.[3,4] Of these, heavy menstrual bleeding is the most common, followed by uterine fibroids (leiomyoma) and pelvic organ prolapse, and, less commonly, endometriosis and adenomyosis (conditions in which the cells lining the uterus grow outside the uterus, or in the uterine muscle, respectively).[4-6]

Hysterectomy rates and variation in Australia

Hysterectomy rates have fallen worldwide since the 1980s, including in Australia.[5,7,8] For example, the rate decreased by 45% in New South Wales between 1981 and 2010–2012.[5] The introduction of alternative treatment options for heavy menstrual bleeding, such as effective oral hormone treatments and the levonorgestrel intrauterine system (IUS), is likely to account for some of this decline.[5]

Despite the fall in rates since the 1980s peak, there is concern that hysterectomy may be overused in Australia for the treatment of noncancer conditions.[5,8] The hysterectomy rate is higher in Australia than in most other comparable countries in the Organisation for Economic Co-operation and Development (OECD). The rate (including cancer diagnosis) in 2008 per 100,000 women (OECD standardised population) was 230 in Australia, compared with 178 and 149 in New Zealand and England, respectively.[9] Further, the variation across Australia in the rates of hysterectomy and endometrial ablation combined for 2012–13 identified in the first Atlas suggests that non-surgical alternatives for heavy menstrual bleeding and other noncancer conditions might not be consistently used.[1]

Hysterectomy hospitalisations 15 years and over

Living in a rural or regional area has been linked to higher hysterectomy rates in Western Australia[8], New South Wales[10] and nationally.[1,9] In the first Atlas, rates of hysterectomy and endometrial ablation combined were markedly higher in inner and outer regional areas than in major cities or remote areas.[1] Socioeconomic disadvantage, having only public health cover and non-Indigenous status were associated with increased risk of having a hysterectomy for menstrual disorders in Western Australia during the period 1981–2003.[8] No clear effect of socioeconomic disadvantage on the rate of endometrial ablation and hysterectomy was identified in the first Atlas.[1]

Place of hysterectomy in the treatment of heavy menstrual bleeding

Although hysterectomy is a definitive treatment for heavy menstrual bleeding, there are a number of less invasive and effective alternatives once malignancies and large fibroids have been ruled out. A recent study in the United Kingdom found that, at five years follow-up, pharmaceutical treatment for heavy menstrual bleeding was effective in eliminating the need for surgery in up to 80% of women without serious uterine pathology.[11] In a 1998 Finnish study, two-thirds of women who had the levonorgestrel IUS inserted cancelled surgery for a hysterectomy, compared with 14% in a control group.[12] In all treatment decisions, patient preference, severity of bleeding, age, contraindications to pharmaceutical management and desire for future fertility are key considerations.[2]

Guidelines on the management of heavy menstrual bleeding recommend starting with pharmaceutical treatments (hormonal and non-hormonal), which are also the treatments of choice for women who wish to preserve fertility.[2,13,14] Of these, the levonorgestrel IUS, a long-acting contraceptive device, is the most effective[15], reducing menstrual blood loss by about 90% and improving quality of life to a similar extent to hysterectomy.[14,16] The device can be inserted by clinicians trained in the technique, including general practitioners and registered nurses, as well as gynaecologists.[17,18] The device, which requires refitting every five years, releases a low dose of a progesterone hormone, which acts to thin the endometrium (the inner lining of the uterus)and also provides contraception.[14]

Oral treatments, which can also be prescribed in primary care, include hormonal options, such as cyclic oral progestogen and the combined oral contraceptive pill. Non-hormonal alternatives include non-steroidal anti-inflammatory drugs and tranexamic acid.[2]

Endometrial ablation (see page 173) is recommended as the first surgical option for heavy menstrual bleeding, unless fibroids and polyps are present.[2] It involves removal of the endometrium, but not the uterus itself. It is suitable only for women who no longer wish to conceive and is recommended if pharmaceutical options have failed or if symptoms are causing a severe impact on quality of life.[2] Use of contraception or tubal occlusion is required because pregnancy is still possible in some women.[2] In Australia, endometrial ablation is usually done under general anaesthetic in a day surgery by a gynaecologist. However, newer techniques can be done under local anaesthetic as an office-based procedure.[19,20]

Regardless of the endometrial ablation technique, recovery time is shorter than for hysterectomy, and there are fewer postoperative complications.[16] Although endometrial ablation is effective for most women (73–85%), some require further surgical treatment for persistent bleeding.[19]

Hysterectomy is recommended if other options fail or are inappropriate, or if the woman chooses it.[2,13,14] Although hysterectomy stops menstrual bleeding in all women, it is a major surgical procedure. Hysterectomy is done by a gynaecologist or other surgeon and requires a general anaesthetic. Many women require hospitalisation for three days[21], and four to six weeks recovery time before they can return to work.[22,23] Short-term complications include infection, bleeding, bowel or urinary tract injury, and general surgery complications.[4,16] Longer-term complications depend partly on the approach to surgery but include urinary incontinence, pelvic organ prolapse and, if the ovaries are removed, early menopause.[2,24,25] Hysterectomy is also associated with the second highest rate of unplanned readmissions to the same hospital after surgery in Australia, of the procedures monitored by the Australian Institute of Health and Welfare.[26]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for hysterectomy per 100,000 women aged 15 years and over without diagnosis of a gynaecological cancer, in 2014–15. The denominator is the total female population of Australia aged 15 years and over, including women who have already had a hysterectomy.

The analysis and maps are based on the residential address of the patient and not the location of the hospital. Rates are age standardised to allow comparison between populations with different age structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 27,586 hospitalisations for hysterectomy, representing 290 hospitalisations per 100,000 women aged 15 years and over without diagnosis of a gynaecological cancer (the Australian rate).

The number of hospitalisations for hysterectomy across 309† local areas (Statistical Area 3 – SA3) ranged from 115 to 763 per 100,000 women aged 15 years and over. The rate was **6.6 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 224 per 100,000 women aged 15 years and over in the Australian Capital Territory to 327 in Queensland (Figures 3.3–3.6).

After the highest and lowest 10% of results were excluded and 248 SA3s remained, the number of hospitalisations per 100,000 women aged 15 years and over was 2.1 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

Preliminary analysis conducted by the Commission of hospitalisations over the three-year period 2012–13 to 2014–15, indicates that the rate of hysterectomy increased by 9 hospitalisations per 100,000 women aged 15 years and over. The age-standardised rates were 281, 295 and 290 hospitalisations for hysterectomy per 100,000 women aged 15 years and over for 2012–13, 2013–14 and 2014–15, respectively. The magnitude of variation increased during the three years, but this may not indicate a trend because this figure is sensitive to fluctuations in outlier SA3s. Differences between the rate of hospitalisations for hysterectomy in the areas with the lowest and highest rates were 4.7, 5.5 and 6.6 for 2012–13, 2013–14 and 2014–15, respectively.

For comparison with hospitalisations for endometrial ablation, see page 173.

† There are 333 SA3s. For this item, data were suppressed for 24 SA3s due to a small number of hospitalisations and/or population in an area.

Hysterectomy hospitalisations 15 years and over

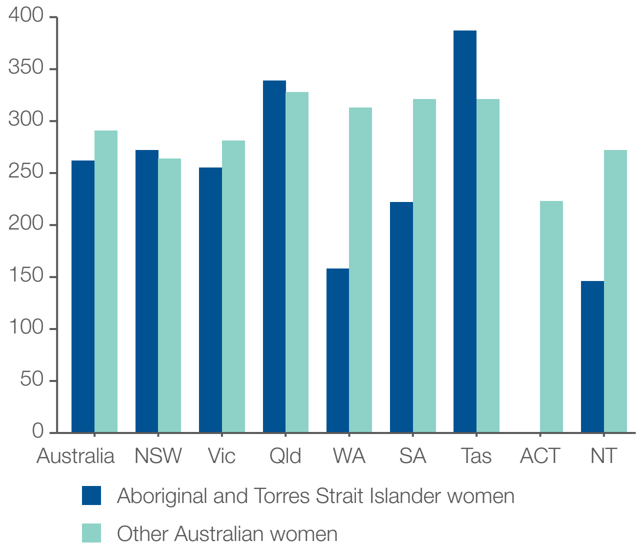
Analysis by remoteness and socioeconomic status

Rates of hysterectomy were markedly higher in inner and outer regional areas than in major cities or remote areas. Rates of hysterectomy tended to increase with socioeconomic disadvantage, although the reverse was seen in remote areas (Figure 3.7).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander women (262 per 100,000 women) was about 10% lower than the rate for other Australian women (291 per 100,000 women). Data for Aboriginal and Torres Strait Islander women are presented for all states and territories except the Australian Capital Territory, because of the small number of hospitalisations there (Figure 3.1).

Figure 3.1: Number of hospitalisations for hysterectomy per 100,000 women aged 15 years and over, age standardised, by state and territory and Indigenous status, 2014–15

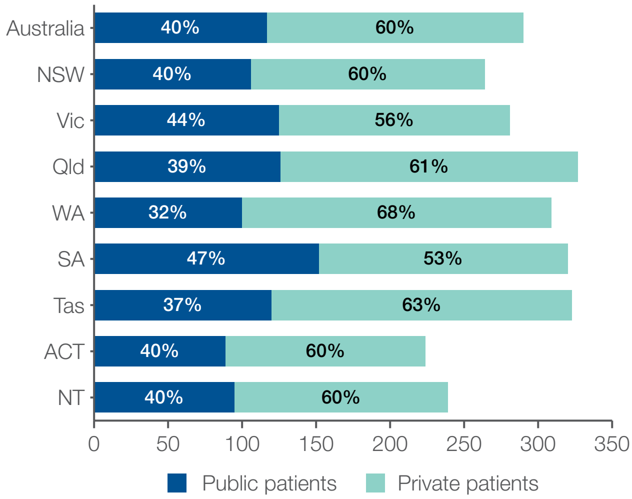


The data for Figure 3.1 are available at www.safetyandquality.gov.au/atlas.

Analysis by patient funding status

Overall, 60% of hospitalisations for hysterectomy were for privately funded patients. This proportion varied from 53% in South Australia to 68% in Western Australia (Figure 3.2).

Figure 3.2: Number of hospitalisations for hysterectomy per 100,000 women aged 15 years and over, age standardised, by state and territory and patient funding status, 2014–15



The data for Figure 3.2 are available at www.safetyandquality.gov.au/atlas.

Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Interpretation

Potential reasons for the variation include differences in:

- Patient education and awareness of treatment options
- Patient preferences and values (for example, ‘fix the problem for good’, a value that may be stronger in regional than in metropolitan areas)
- Patient social factors (for example, travel distance, adherence to treatment)
- Patient perception of how heavy menstrual bleeding affects their quality of life
- Patient ability to pay out-of-pocket expenses for other treatments (for example, gap payments for fitting of a levonorgestrel IUS or for endometrial ablation)
- General practitioner training in, and capacity to undertake, levonorgestrel IUS insertion
- Access of general practitioners to training in levonorgestrel IUS insertion – rural and regional general practitioners might have less access to such training
- Patient numbers required to maintain skills and techniques in providing hysterectomy alternatives (such as the levonorgestrel IUS or endometrial ablation)
- Clinician preferences
- Criteria used by general practitioners for referral to specialists
- Specialist training in endometrial ablation techniques
- Thresholds applied by clinicians to use hysterectomy – the threshold might be lower for women with private health coverage
- Clinician awareness of guideline-recommended management of heavy menstrual bleeding
- Access to services that can provide the levonorgestrel IUS or endometrial ablation
- Access to primary care services, and to specialists for Aboriginal and Torres Strait Islander women and women living in remote areas
- Private health insurance coverage
- Socioeconomic disadvantage, which might be greater in remote areas.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in the area. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, 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.

Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient’s area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Hysterectomy hospitalisations 15 years and over

Specific populations

The lower rate of hysterectomy for benign gynaecological conditions for Aboriginal and Torres Strait Islander women compared with non-Indigenous women has been previously observed in Western Australia (1981–2003).[8] In the Western Australian report, Aboriginal and Torres Strait Islander women had a higher rate of hysterectomy for gynaecological cancer than non-Indigenous women.[8]

The discrepancy in hysterectomy rates may be a sign of late recognition and undertreatment of gynaecological conditions more broadly for Aboriginal and Torres Strait Islander women, rather than a difference in prevalence of uterine conditions. Aboriginal and Torres Strait Islander women have a higher incidence of, and mortality from, gynaecological cancers, and lower rates of cervical screening than non-Indigenous women[27,28], suggesting that access to appropriate care is a potential contributor to low rates of treatment for gynaecological procedures overall. Similarly, access to appropriate and affordable care may partly explain the low rates of hysterectomy seen in remote areas, particularly areas of socioeconomic disadvantage.

It has also been suggested that Aboriginal and Torres Strait Islander women may have a higher threshold for undergoing hysterectomy for benign gynaecological conditions.[8] If this is the case, the higher proportion of Aboriginal and Torres Strait Islander women living in remote areas could contribute to the lower rates seen in these areas.

The higher rates of hysterectomy in regional areas compared with major cities may reflect a combination of factors, including the availability of alternative treatments in non-metropolitan areas, and differences in the needs and preferences of women. For example, women in rural areas may be less willing to trial therapies, particularly if they have to travel long distances to access specialist care.

Addressing variation

Exploring variation in the use of the levonorgestrel IUS and oral treatments for heavy menstrual bleeding, including mapping use against rates of hysterectomy and endometrial ablation, may be helpful in focusing efforts to improve appropriateness of care. Examining patient funding status for hysterectomy rates by remoteness category may be helpful in determining the contribution of private health coverage to the rates seen in regional areas.

More equitable access to hysterectomy alternatives, such as oral treatments, the levonorgestrel IUS and endometrial ablation, may help address the variation in hysterectomy rates between metropolitan and non-metropolitan areas, and between areas of differing socioeconomic disadvantage. International comparison data indicate that Australia has a low use of intrauterine device contraceptives (for any indication), such as levonorgestrel IUS, compared with France, Austria and the United States.[29]

Expanding access to practical training in levonorgestrel IUS insertion for general practitioners, particularly those working in regional and remote areas, and introducing further financial incentives may increase use of this device.[30,31] Currently, courses are run by family planning organisations in each state and territory for medical practitioners (and, in some states, for registered nurses) on insertion of intrauterine contraceptive devices, including the levonorgestrel IUS.[18] Even for those who undergo training, insufficient patient numbers to maintain skills and inadequate remuneration for insertion have been identified as barriers to uptake.[31] In the United Kingdom, a financial incentive scheme increased the uptake of long-acting reversible contraceptives, including the levonorgestrel IUS.[32]

Additional strategies for improving access to the levonorgestrel IUS include[31]:

- Providing training in levonorgestrel IUS insertion at general practices
- Implementing referral pathways within Primary Health Networks to general practitioners trained in levonorgestrel IUS insertion
- Expanding designated intrauterine device clinics at family planning centres, in public hospital outpatient departments and in outreach clinics
- Expanding training in levonorgestrel IUS insertion to eligible registered nurses.

Provision of culturally appropriate information about heavy menstrual bleeding and its treatments, access to culturally safe primary care services (including access to female general practitioners who have undergone cultural awareness training), and clear referral pathways to specialists may help address the gap between Aboriginal and Torres Strait Islander women and other Australian women.

A lack of a national guideline or standard on management of heavy menstrual bleeding may contribute to variation in criteria used by clinicians to recommend treatment. *Therapeutic Guidelines: Endocrinology* provides guidance on pharmaceutical treatments, but has limited coverage of surgical options.[33] Internationally, the United Kingdom has a quality standard with indicators[34] and a clinical guideline[2], and the United States and Canada also have clinical guidelines on management of abnormal uterine bleeding.[14,35]

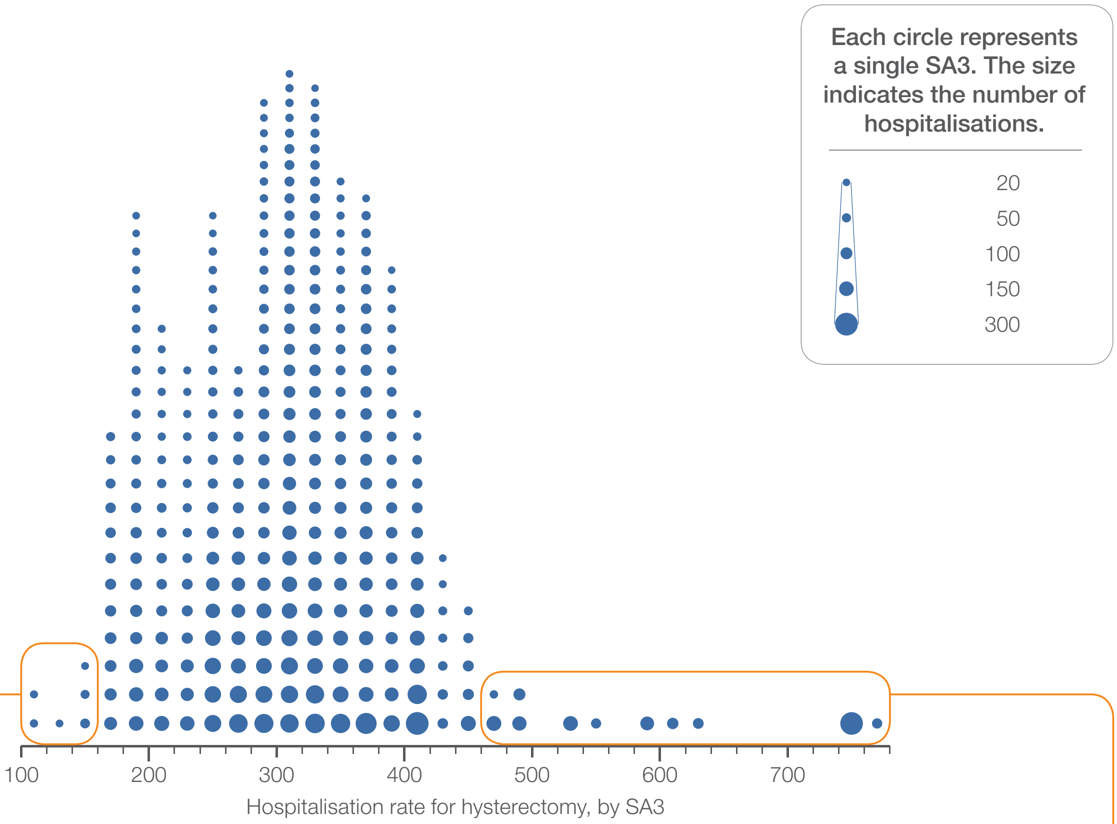
The Commission is currently working with clinical experts and consumers, including representatives from the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG), and the Royal Australian College of General Practitioners, to develop a national clinical care standard and associated indicators on heavy menstrual bleeding.

Providing patient information on heavy menstrual bleeding that supports shared decision-making, such as decision tools, structured interviews and option grids, as well as promoting shared decision-making to clinicians, may help some women avoid unnecessary surgery.[36] RANZCOG is currently updating a patient information leaflet on heavy menstrual bleeding, and the Commission is developing a decision support tool to support women's understanding of treatment options for heavy menstrual bleeding.

Some states and territories are investigating variation in hysterectomy rates and length of stay. The NSW Clinical Excellence Commission has examined hysterectomy rates for non-malignancy (2010–2014)[10], and the Reducing Unwarranted Clinical Variation Taskforce of the NSW Agency for Clinical Innovation is currently examining variations in length of stay for key procedures, including hysterectomy.

Hysterectomy hospitalisations 15 years and over

Figure 3.3: Number of hospitalisations for hysterectomy per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Gungahlin	ACT	**115**	30
Melbourne City	Vic	**119**	34
Manly	NSW	**134**	24
North Canberra	ACT	**144**	26
Pittwater	NSW	**150**	47
Port Phillip	Vic	**156**	62

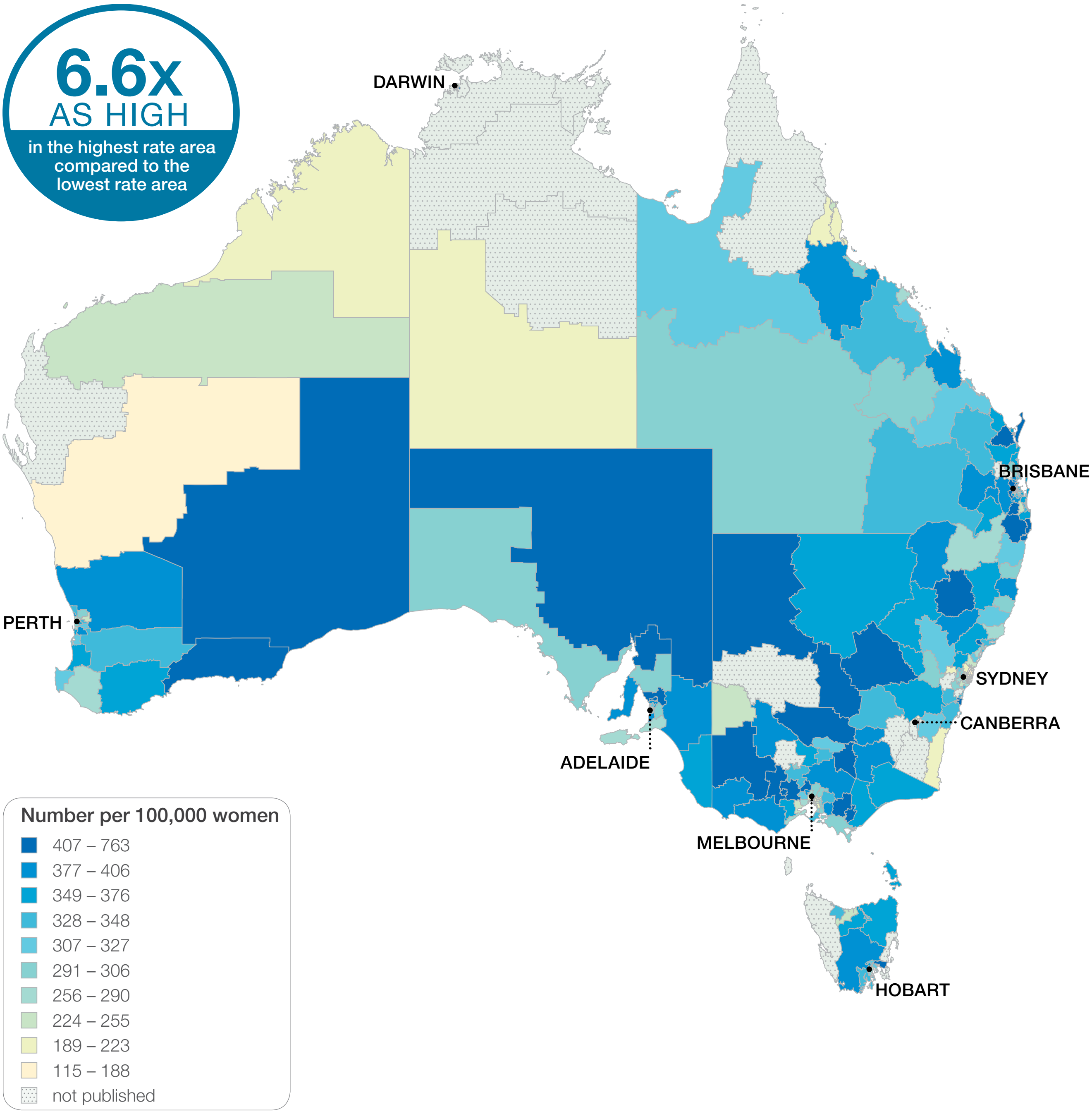
Highest rate areas

SA3	State	Rate	Hospitalisations
Maryborough - Pyrenees	Vic	**763**	70
Ballarat	Vic	**744**	298
Creswick - Daylesford - Ballan	Vic	**639**	79
Goldfields	WA	**614**	91
Grampians	Vic	**597**	135
Macedon Ranges	Vic	**546**	68
Richmond Valley - Hinterland	NSW	**522**	152
Lachlan Valley	NSW	**495**	102
Latrobe Valley	Vic	**481**	144
Broken Hill and Far West	NSW	**476**	36
Tamworth - Gunnedah	NSW	**467**	155

Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

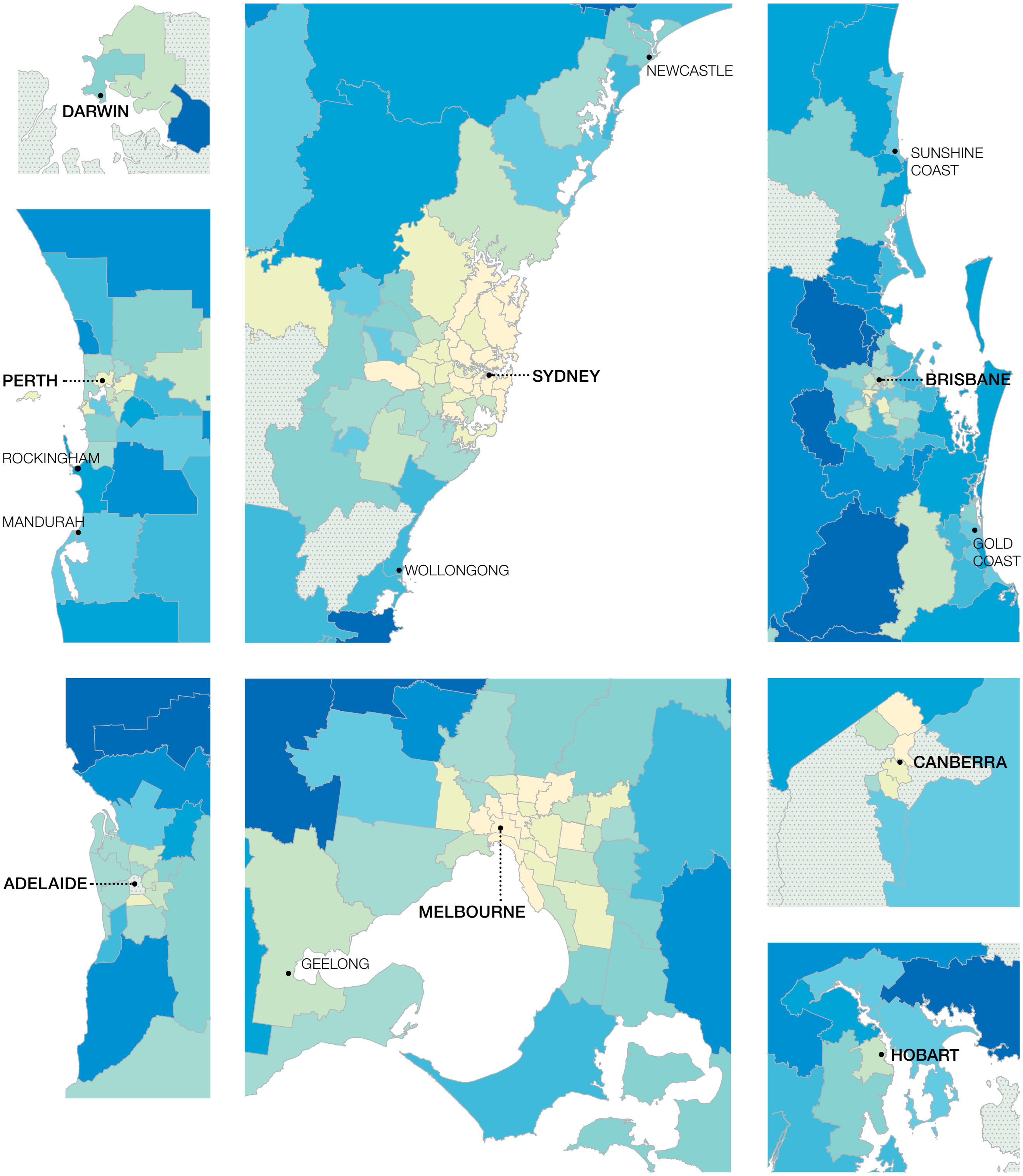
Hysterectomy hospitalisations 15 years and over

Figure 3.4: Number of hospitalisations for hysterectomy per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 3.5: Number of hospitalisations for hysterectomy per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps

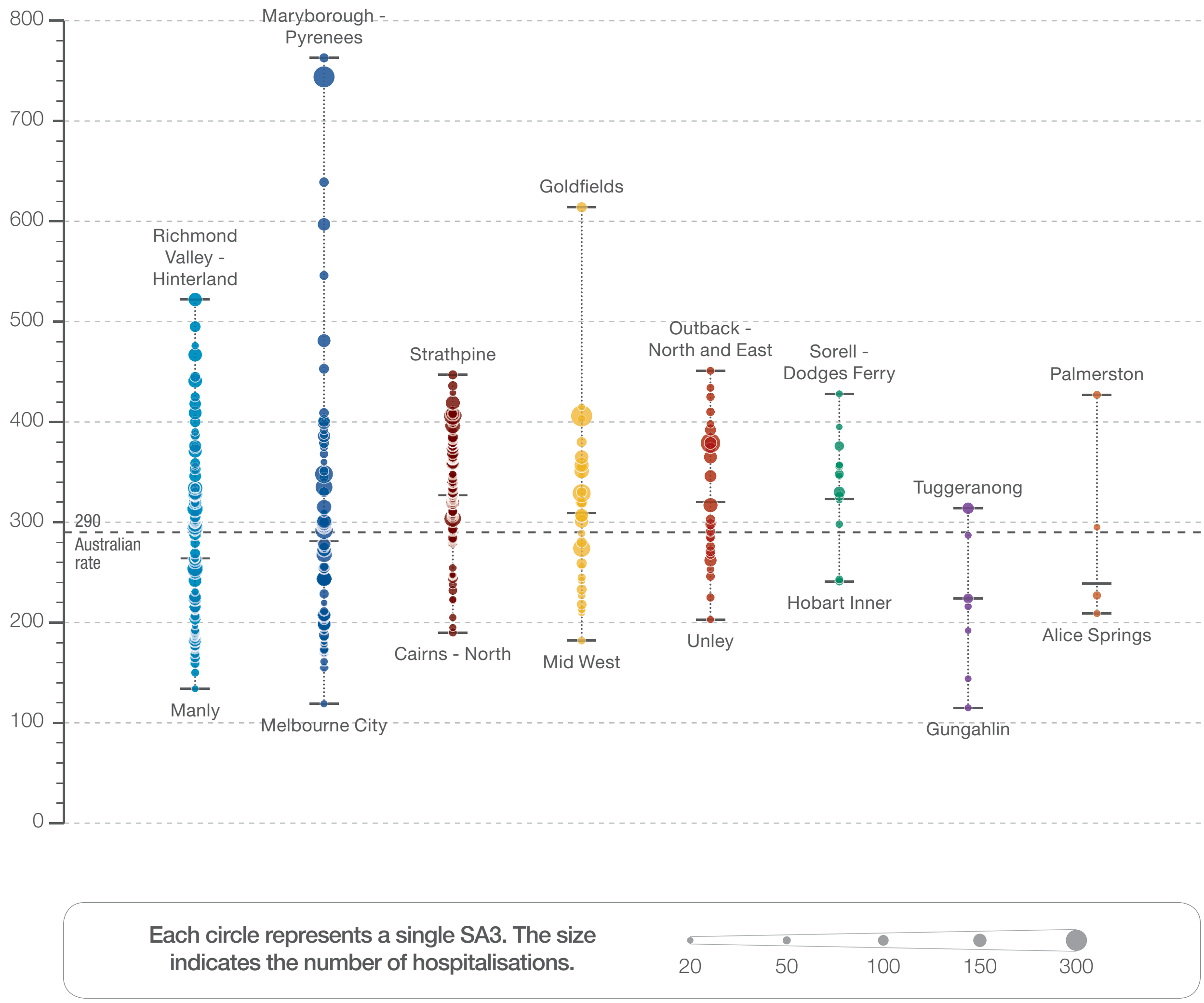


Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Hysterectomy hospitalisations 15 years and over

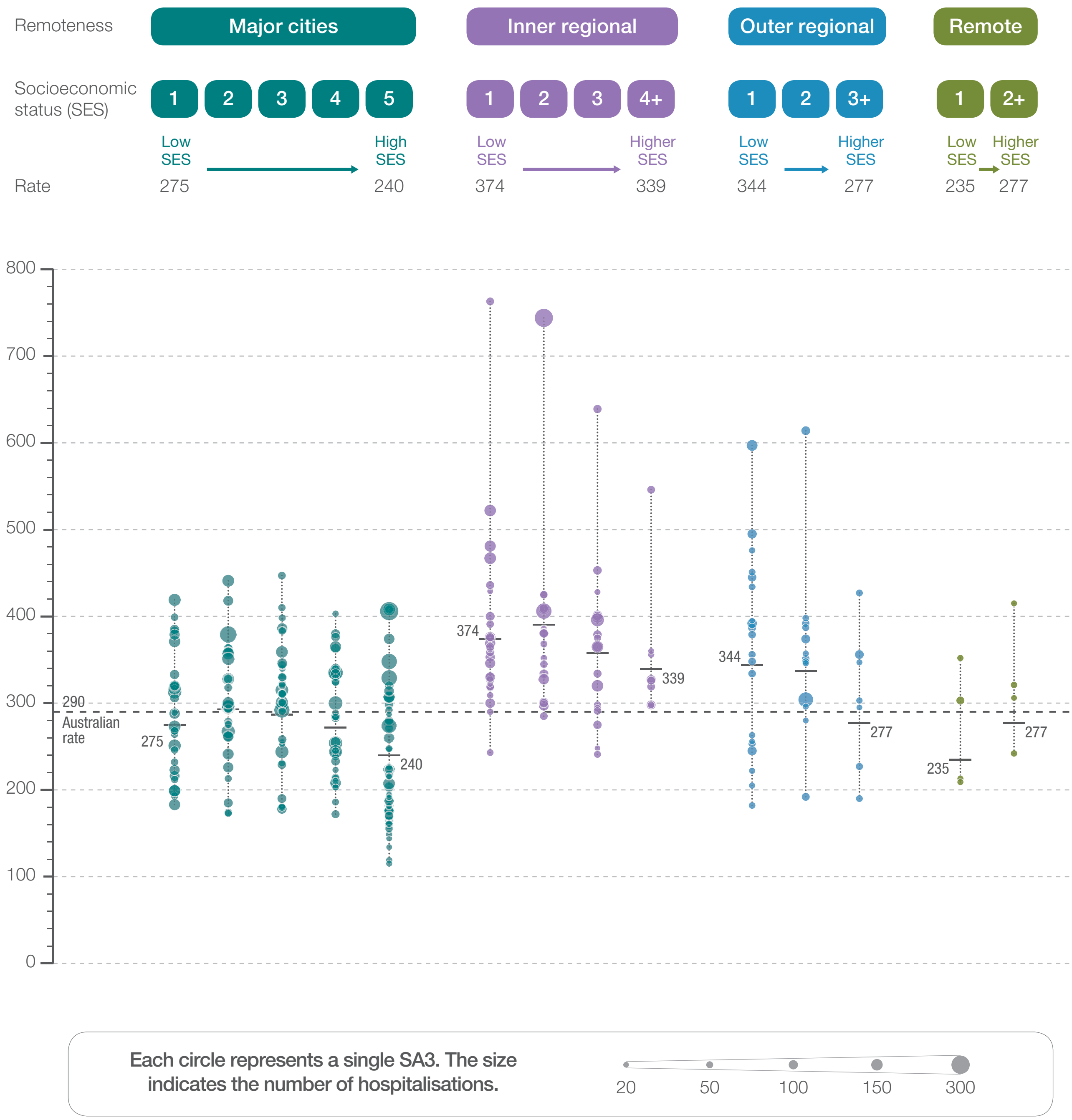
Figure 3.6: Number of hospitalisations for hysterectomy per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	522	763	447	614	451	428	314	427
State/territory	264	281	327	309	320	323	224	239
Lowest rate	134	119	190	182	203	241	115	209
No. hospitalisations	8,058	6,750	6,193	3,113	2,228	674	337	211



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 3.7: Number of hospitalisations for hysterectomy per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Hysterectomy hospitalisations 15 years and over

Resources

- National Collaborating Centre for Women's and Children's Health. Heavy menstrual bleeding. Clinical guideline (National Institute for Health and Clinical Excellence). London: Royal College of Obstetricians and Gynaecologists; 2007.

Australian initiatives

The information in this chapter will complement work already under way to improve management of heavy menstrual bleeding in Australia. At a national level, this work includes:

- Heavy menstrual bleeding Clinical Care Standard (planned for publication late 2017), Australian Commission on Safety and Quality in Health Care. www.safetyandquality.gov.au/our-work/clinical-care-standards/heavy-menstrual-bleeding
- Heavy menstrual bleeding patient information leaflet (in development), RANZCOG.

Some states and territory initiatives are also in place, including:

- NSW Clinical Excellence Commission data collection on hysterectomy rates for non-malignancy (2010–2014)[10]
- NSW Agency for Clinical Innovation Reducing Unwarranted Clinical Variation Taskforce examination of variation in length of stay for key procedures, including hysterectomy.

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3.2 Endometrial ablation hospitalisations 15 years and over

Context

This data item examines endometrial ablation rates for women without gynaecological cancer aged 15 years and over based on their place of residence. The first *Australian Atlas of Healthcare Variation* (first Atlas) examined variation in hysterectomy and endometrial ablation combined, and found that the rate was 5.2 times as high in the area with the highest rate as in the area with the lowest rate.[1] Further analysis to separately explore variation in hysterectomy and endometrial ablation was recommended.

Endometrial ablation is an operation to remove the inner lining (endometrium) of the womb (uterus). The procedure, which leaves the womb in place, is recommended as the first surgical option for heavy menstrual bleeding if pharmaceutical options fail or if symptoms are causing a severe impact on quality of life.[2] It is suitable only for women who no longer wish to conceive, and who have a uterus that is not greatly enlarged and does not contain large fibroids.[2]

Endometrial ablation rates and variation in Australia

First introduced in Australia in the late 1980s[3], techniques for endometrial ablation have included resectoscopic methods and newer non-resectoscopic methods. Resectoscopic methods (for example, heated wire loop) use a device (hysteroscope) to view the endometrium. Newer non-resectoscopic methods (for example, bipolar radiofrequency ablation, thermal balloon) do not require direct viewing of the endometrium.[2]

In the first Atlas, combined rates of hysterectomy and endometrial ablation were markedly higher in inner and outer regional areas than in major cities or remote areas.[1] However, without an analysis of each item separately, it was unclear whether the rates of surgery in these areas were due to greater use of endometrial ablation, hysterectomy or both.

Endometrial ablation hospitalisations 15 years and over

Apart from the first Atlas, there are limited Australian data on patterns of endometrial ablation. Unlike hysterectomy, rates of this procedure are not routinely reported. New South Wales research suggested that the introduction of endometrial ablation resulted in an initial decline in hysterectomy rates, but then rates of both procedures peaked in the mid-1990s and then declined by the end of that decade.[3] The rate of endometrial ablation in New South Wales peaked at 172 per 100,000 women in 1994–95 and declined to 158 per 100,000 women in 1999–2000.[3]

In England, between 2004 and 2006, about 60% of surgical procedures for heavy menstrual bleeding were for endometrial ablation. This proportion varied markedly across different areas, ranging from 46% to 75%.[4] The number of endometrial ablations had increased from the late 1990s after a decline mid-decade; the turnaround was attributed, in part, to the introduction of non-resectoscopic techniques. These techniques, while not suitable for all patients, are equally effective but have fewer risks of complication than resectoscopic methods of ablation.[5-7] In addition, they take less time, are technically easier to perform and can be done in an office setting under local anaesthetic.[6,8,9]

Place of endometrial ablation in treatment of heavy menstrual bleeding

Guidelines on the management of heavy menstrual bleeding recommend starting with pharmaceutical treatments (hormonal and non-hormonal), once malignancies and large fibroids are ruled out.[2,7,10] In all treatment decisions, patient preference, severity of bleeding, age, contraindications to medical management and desire for future fertility are key considerations.[2]

Of the pharmaceutical options for heavy menstrual bleeding, the levonorgestrel intrauterine system (IUS), a long-acting contraceptive device, is the most effective[11], reducing menstrual loss by about 90%.[7,12] The device can be inserted by clinicians trained in the technique, including general practitioners and registered nurses, as well as gynaecologists.[13,14] The device, which requires refitting every five years, releases a low dose of a progesterone hormone, which acts to thin the endometrium and also provides contraception.[7]

Oral treatments, which can also be prescribed in primary care, include cyclic oral progestogen and the combined oral contraceptive pill. Non-hormonal alternatives include non-steroidal anti-inflammatory drugs and tranexamic acid.[2]

Endometrial ablation is recommended as the first surgical option for heavy menstrual bleeding, unless fibroids and polyps are present.[2] It involves removal of the endometrium, but not the uterus itself. It is suitable only for women who no longer wish to conceive, and is recommended if pharmaceutical options have failed or if symptoms are causing a severe impact on quality of life.[2] Use of contraception or tubal occlusion is required because pregnancy is still possible in some women.[2] Although endometrial ablation is effective for most women (73–85%), some require further surgical treatment for persistent bleeding.[6]

Regardless of the method of ablation, recovery time is shorter for endometrial ablation than for hysterectomy, and there are fewer postoperative complications.[12] Following endometrial ablation, most women can be discharged after three to four hours, or sooner if they have a local anaesthetic rather than a general anaesthetic, and can return to work after two to five days.[15] Short-term complications of resectoscopic methods include uterine perforation, haemorrhage, fluid overload and infection. Short-term complications of non-resectoscopic methods include nausea, vomiting, uterine cramping and pain.[12]

Hysterectomy (see page 157) is recommended for heavy menstrual bleeding if other options fail or are inappropriate, or if the woman chooses it.[2,7,16] Although hysterectomy stops menstrual bleeding in all women, it is a major surgical procedure. Hysterectomy is done by a gynaecologist or other surgeon and requires a general anaesthetic. Many women require hospitalisation for three days[17], and four to six weeks recovery time before they can return to work.[18,19]

Short-term complications include infection, bleeding, bowel or urinary tract injury, and general surgery complications.[12,20] Longer-term complications depend partly on the approach to surgery but include urinary incontinence, pelvic organ prolapse and, if the ovaries are removed, early menopause.[2,21,22] Hysterectomy is also associated with the second highest rate of unplanned readmissions to the same hospital after surgery in Australia, of the procedures monitored by the Australian Institute of Health and Welfare.[23]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for endometrial ablation per 100,000 women aged 15 years and over, over the three-year period 2012–13 to 2014–15.

Data are aggregated over three years to provide sufficient numbers to support reporting at the local level. The number of hospitalisations and the summed population over three years are used to provide an average rate. This is comparable to a rate based on data collected over one year. Because a record is included for each hospitalisation for endometrial ablation, rather than for each patient, patients hospitalised for this procedure more than once in these financial years will be counted more than once. The denominator is the total female population of Australia aged 15 years and over, including women who have already had a hysterectomy or endometrial ablation.

The analysis and maps are based on the residential address of the patient and not the location of the hospital. Rates are age standardised to allow comparison between populations with different age structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

Over the three-year period 2012–13 to 2014–15, there were 28,606 hospitalisations for endometrial ablation, representing an average rate of 108 hospitalisations per 100,000 women aged 15 years and over (the Australian rate).

The number of hospitalisations for endometrial ablation across 317† local areas (Statistical Area 3 – SA3) ranged from 19 to 390 per 100,000 women aged 15 years and over. The rate was **20.5 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 64 per 100,000 women aged 15 years and over in the Northern Territory to 151 in Western Australia (Figures 3.10–3.13).

After the highest and lowest 10% of results were excluded and 255 SA3s remained, the number of hospitalisations per 100,000 women aged 15 years and over was 4.2 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 of endometrial ablation were markedly higher in inner and outer regional areas than in major cities or remote areas. The rates in remote areas were lower than in major cities. There was no clear pattern according to socioeconomic disadvantage (Figure 3.14).

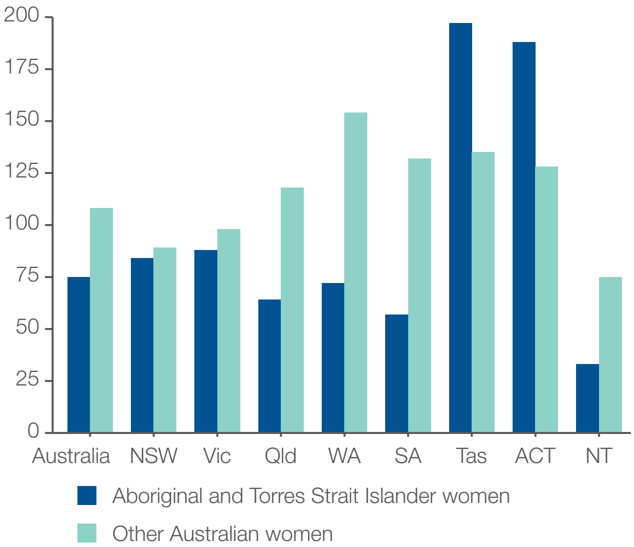
† There are 333 SA3s. For this item, data were suppressed for 16 SA3s due to a small number of hospitalisations and/or population in an area.

Endometrial ablation hospitalisations 15 years and over

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander women (75 per 100,000 women) was about 30% lower than the rate for other Australian women (108 per 100,000 women) (Figure 3.8).

Figure 3.8: Number of hospitalisations for endometrial ablation per 100,000 women aged 15 years and over, age standardised, by state and territory and Indigenous status, 2012–13 to 2014–15

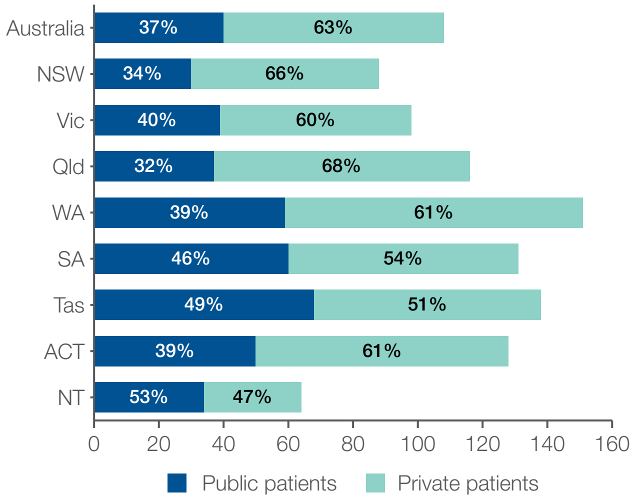


The data for Figure 3.8 are available at www.safetyandquality.gov.au/atlas.

Analysis by patient funding status

Overall, 63% of hospitalisations for endometrial ablation were for privately funded patients. This proportion varied from 47% in the Northern Territory to 68% in Queensland (Figure 3.9).

Figure 3.9: Number of hospitalisations for endometrial ablation per 100,000 women aged 15 years and over, age standardised, by state and territory and patient funding status, 2012–13 to 2014–15



The data for Figure 3.9 are available at www.safetyandquality.gov.au/atlas.

Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Interpretation

Potential reasons for the variation include differences in:

- Patient education and awareness of treatment options
- Patient preferences and values (for example, 'fix the problem for good', a value that may be stronger in regional areas than in metropolitan areas)
- Patient social factors (for example, travel distance, adherence to treatment)
- Patient perception of how heavy menstrual bleeding affects their quality of life
- Patient ability to pay out-of-pocket expenses for other treatments (for example, gap payments for fitting of a levonorgestrel IUS or for endometrial ablation)
- General practitioner training in, and capacity to undertake, levonorgestrel IUS insertion
- Criteria used by general practitioners for referral to specialists
- Clinician preferences
- Specialist training in endometrial ablation techniques
- Specialist uptake of non-resectoscopic methods of endometrial ablation
- Thresholds applied by clinicians to use endometrial ablation – the threshold might be lower for women with private health coverage
- Clinician awareness of guideline-recommended management of heavy menstrual bleeding
- Access to services that can provide the levonorgestrel IUS or endometrial ablation
- Access to primary care services, and to specialists for Aboriginal and Torres Strait Islander women and women living in remote areas
- Access of general practitioners to training in levonorgestrel IUS insertion – rural and regional general practitioners might have less access to such training
- Private health insurance coverage.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in the area. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, 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.

Comparison with hysterectomy

In comparing the two items, there are limitations to be kept in mind. Endometrial ablation is used to treat heavy menstrual bleeding. Hysterectomy is used to treat a wider range of benign gynaecological conditions, notably pelvic organ prolapse, that are included in the hysterectomy data item (see page 157). The hysterectomy data item was based on hospitalisations during the year 2014–15, whereas the endometrial ablation data item was based on hospitalisations over the three years 2012–13 to 2014–15. To assist with comparison of the two items, rates by SA3 for hysterectomy for 2012–13 and 2013–14 are available online at www.safetyandquality.gov.au/atlas.

Preliminary analysis conducted by the Commission of hospitalisations over the three-year period 2012–13 to 2014–15, indicates that the magnitude of variation for endometrial ablation across SA3s was much more marked than that for hysterectomy, suggesting less consistent use of endometrial ablation across Australia. For endometrial ablation, the highest SA3 rate was 20.5 times the lowest rate (2012–13 to 2014–15); for hysterectomy, the highest SA3 rate was 6.6 times the lowest rate in 2014–15, and 5.5 times and 4.7 times the lowest rate, respectively, in 2013–14 and 2012–13.

Endometrial ablation hospitalisations 15 years and over

The number of hospitalisations for endometrial ablation (28,606) was about a third of the number of hospitalisations for hysterectomy (81,226) over the three-year period 2012–13 to 2014–15. Similarly, the rate of endometrial ablation (108 per 100,000 women aged 15 years and over) was about a third of the rate for hysterectomy (281, 295 and 290 per 100,000 women aged 15 years and over, for 2012–13, 2013–14 and 2014–15, respectively).

Specific populations

The pattern of higher rates of endometrial ablation in inner and outer regions compared with major cities and remote areas was similar to that observed for hysterectomy (see page 157). This suggests that the higher combined rate of these surgical procedures in regional areas seen in the first Atlas might be explained by a higher use of both procedures, rather than endometrial ablation replacing hysterectomy. However, a number of SA3s were exceptions to this pattern, with some having higher rates of endometrial ablation and lower rates of hysterectomy (for example, Mid-West, Western Australia), and some having higher hysterectomy rates and lower endometrial ablation rates (for example, Tamworth–Gunnedah, New South Wales).

Possible explanations for this pattern of higher surgery rates in regional areas include greater access in major cities to pharmaceutical treatments for heavy menstrual bleeding, particularly the levonorgestrel IUS, which requires a clinician trained in insertion. Other potential contributors include differences in access to specialists trained in endometrial ablation techniques, the range of ablative techniques offered, clinician preferences, and patient preferences and values. For example, women in rural areas may be less willing to trial therapies, particularly if they have to travel long distances to access specialist care.

This Atlas identified a large discrepancy in rates of endometrial ablation for Aboriginal and Torres Strait Islander women compared with other Australian women. Particularly marked were the gaps in Queensland, South Australia, Western Australia and the Northern Territory, in which rates for Aboriginal and Torres Strait Islander women were about half the rates for other Australian women. The discrepancy was even greater than that seen with hysterectomy (see page 157).

The discrepancy may be a sign of late recognition and undertreatment of gynaecological conditions more broadly for Aboriginal and Torres Strait Islander women, rather than a difference in prevalence of heavy menstrual bleeding. Aboriginal and Torres Strait Islander women have a higher incidence of, and mortality from, gynaecological cancers, and lower rates of cervical screening than non-Indigenous women[24,25], suggesting that access to appropriate care is a potential contributor to low rates of treatment for gynaecological procedures overall. Similarly, access to appropriate care may partly explain the low rates of endometrial ablation seen in remote areas.

It has also been suggested that Aboriginal and Torres Strait Islander women may have a higher threshold than non-Indigenous women for undergoing hysterectomy for benign gynaecological conditions.[26] It is uncertain whether this may also apply to other surgical interventions for treating heavy menstrual bleeding. If it does, the higher proportion of Aboriginal and Torres Strait Islander women living in remote areas could contribute to the lower rates seen in these areas.

Addressing variation

Exploring variation in the use of the levonorgestrel IUS and oral treatments for heavy menstrual bleeding, including mapping use against rates of hysterectomy and endometrial ablation, may be helpful in focusing efforts to improve appropriateness of care for this condition.

More widespread use of pharmaceutical treatments for heavy menstrual bleeding, such as oral treatments or the levonorgestrel IUS, may help address the variation in endometrial ablation rates between metropolitan and non-metropolitan areas. International comparison data indicate that Australia has a low use of intrauterine device contraceptives (for any indication), such as the levonorgestrel IUS, compared with France, Austria and the United States.[27]

Expanding access to practical training in levonorgestrel IUS insertion for general practitioners, particularly those working in regional and remote areas, and introducing further financial incentives may increase use of this device.[28,29] Currently, courses are run by family planning organisations in each state and territory for medical practitioners (and, in some states, for registered nurses) on insertion of intrauterine contraceptive devices, including the levonorgestrel IUS.[30] Even for those who undergo training, insufficient patient numbers to maintain skills and inadequate remuneration for insertion have been identified as barriers to uptake.[29] In the United Kingdom, a financial incentive scheme increased the uptake of long-acting reversible contraceptives, including the levonorgestrel IUS.[31]

Additional strategies for improving access to the levonorgestrel IUS include[29]:

- Providing training in levonorgestrel IUS insertion at general practices
- Implementing referral pathways within Primary Health Networks to general practitioners trained in levonorgestrel IUS insertion
- Expanding designated intrauterine device clinics at family planning centres, in public hospital outpatient departments and in outreach clinics
- Expanding training in levonorgestrel IUS insertion to eligible registered nurses.

Expanding access to endometrial ablation, particularly to the newer non-resectoscopic (second-generation) methods, may help address the wide variation seen in endometrial ablation between local areas. Comparison of the Australian rate identified in this Atlas (108 hospitalisations per 100,000 women) with available data on rates of endometrial ablation – that is, New South Wales data from 1999–2000 (158 hospitalisations per 100,000 women) – suggests that the use of endometrial ablation has stabilised or declined.[3]

The effectiveness of different endometrial ablation methods is similar.[5] However, compared with resectoscopic methods, newer non-resectoscopic methods have fewer complications, have shorter operative times, are technically easier to perform, and result in patients' quicker return to normal activities.[2,5]

In Australia, endometrial ablation is usually done under general anaesthetic in a day surgery by a gynaecologist, but many non-resectoscopic methods can be done under local anaesthetic as an office-based procedure.[5-9] Undertaking these procedures in outpatient settings for low-risk patients has been found to be cost-effective in the United Kingdom. As a result of the advantages of non-resectoscopic methods, the guidelines of the National Institute for Health and Clinical Excellence (United Kingdom) recommend that all women considering endometrial ablation have access to these methods, and that they are used where no structural or histological pathologies, such as polyps and fibroids, are present.[2] Maintaining access to resectoscopic (first-generation) methods is also important because these methods are recommended for assessment and biopsy if polyps, fibroids or other pathology are present.[2,6]

Endometrial ablation hospitalisations 15 years and over

The substantially lower rate of endometrial ablation among Aboriginal and Torres Strait Islander women, compared with other Australian women, could be addressed by providing:

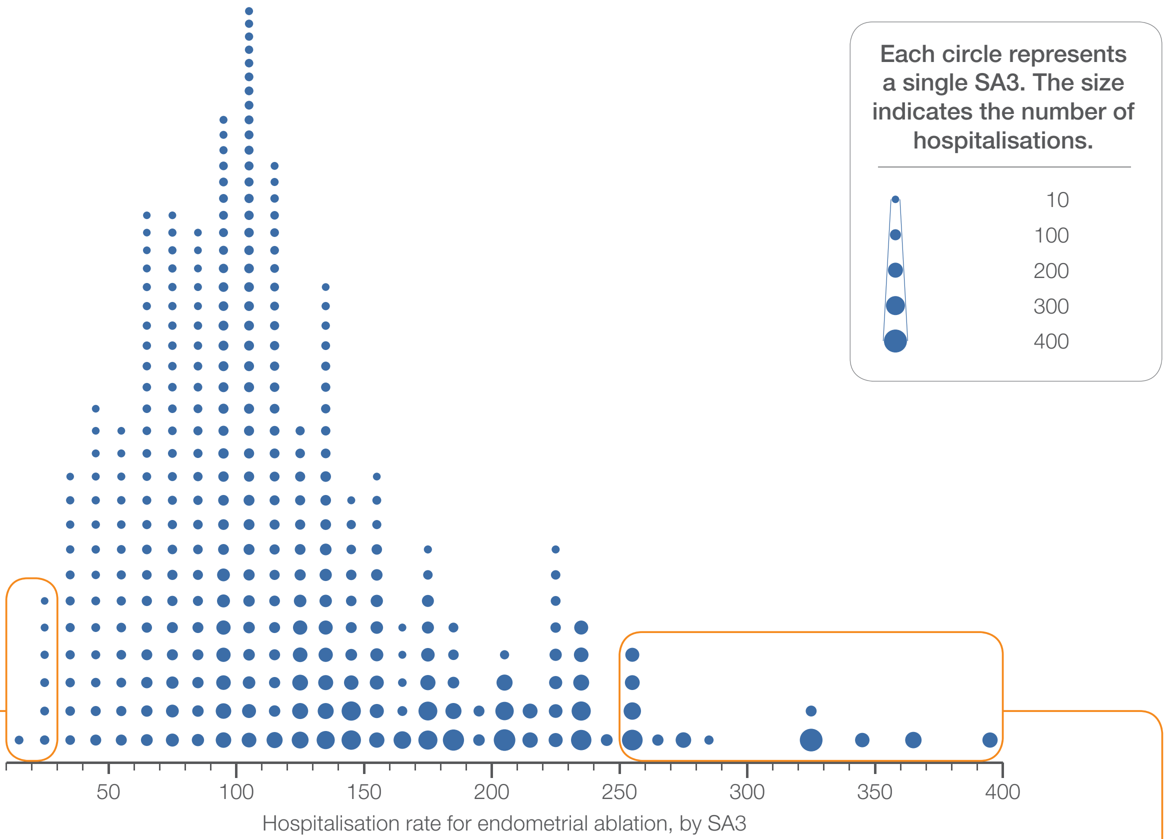
- Culturally appropriate information about heavy menstrual bleeding and its treatments
- Access to culturally safe primary care services, including access to female general practitioners who have undergone cultural awareness training
- Clear referral pathways to specialists.

A lack of a national guideline or standard on management of heavy menstrual bleeding may contribute to variation in criteria used by clinicians to recommend treatment. *Therapeutic Guidelines: Endocrinology* provides guidance on pharmaceutical treatments, but has limited coverage of surgical options.[32] Internationally, the United Kingdom has a quality standard with indicators[33] and a clinical guideline[2], and the United States and Canada also have clinical guidelines on management of abnormal uterine bleeding.[7,10]

The Commission is currently working with clinical experts and consumers, including representatives from the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) and the Royal Australian College of General Practitioners, to develop a national clinical care standard and associated indicators on heavy menstrual bleeding.

Providing patient information on heavy menstrual bleeding that supports shared decision-making, such as decision tools, structured interviews and option grids, as well as promoting shared decision-making to clinicians, may help some women avoid unnecessary surgery.[34] RANZCOG is currently updating a patient information leaflet on heavy menstrual bleeding, and the Commission is developing a decision support tool to support women's understanding of treatment options for heavy menstrual bleeding.

Figure 3.10: **Number of hospitalisations for endometrial ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15**



Lowest rate areas

SA3	State	Rate	Hospitalisations
Fairfield	NSW	19	42
Maribyrnong	Vic	22	21
Bathurst	NSW	26	13
Yarra	Vic	27	31
Sydney Inner City	NSW	28	58
Blacktown	NSW	29	44
Parramatta	NSW	29	44

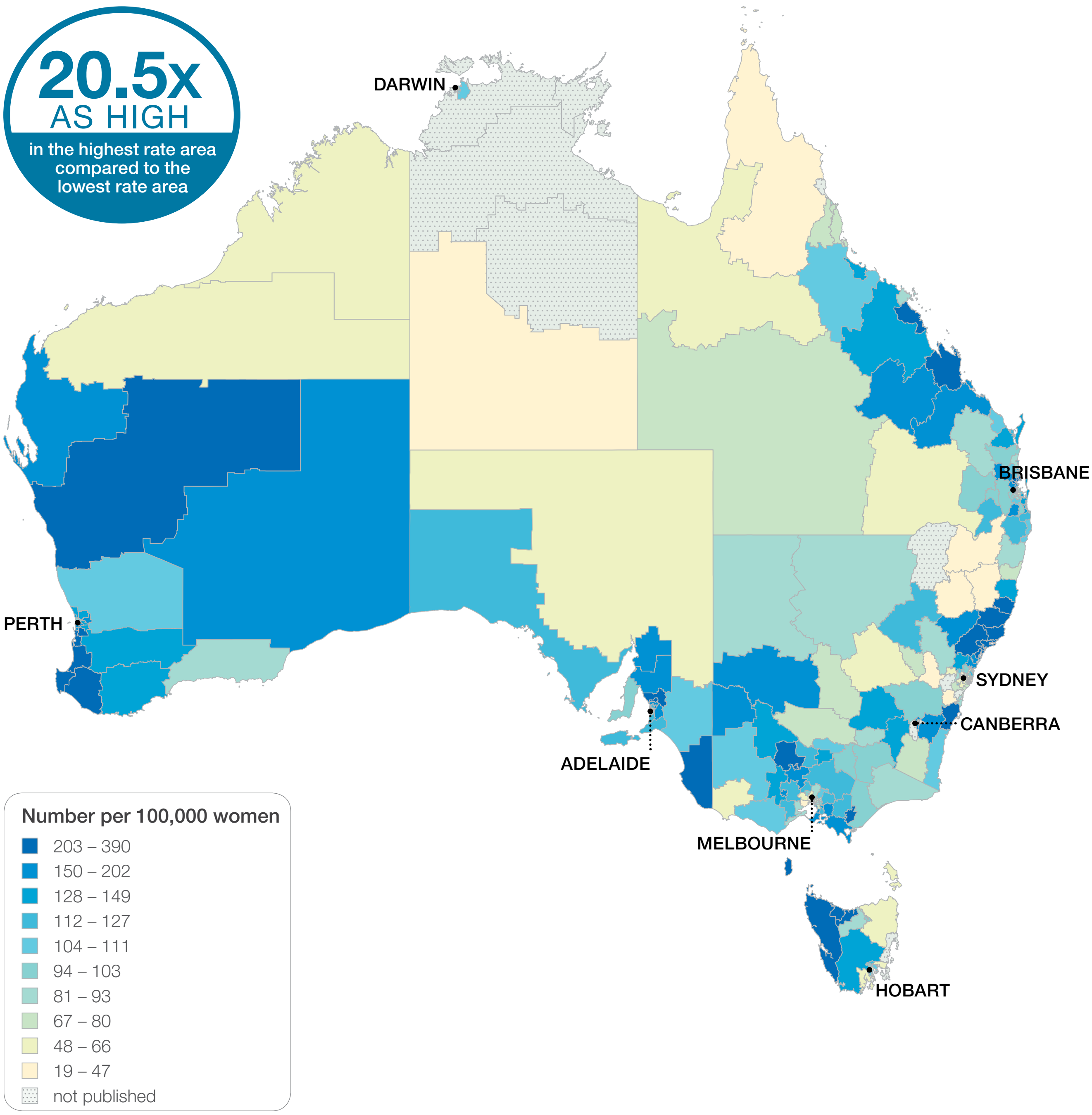
Highest rate areas

SA3	State	Rate	Hospitalisations
Burnie - Ulverstone	Tas	390	205
Mid West	WA	361	235
Taree - Gloucester	NSW	342	185
Bunbury	WA	327	393
Great Lakes	NSW	325	96
West Coast	Tas	280	54
Latrobe Valley	Vic	271	213
Gawler - Two Wells	SA	264	106
Lake Macquarie - East	NSW	254	342
Mandurah	WA	254	259
Caboolture	Qld	252	174
Lake Macquarie - West	NSW	250	195

Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

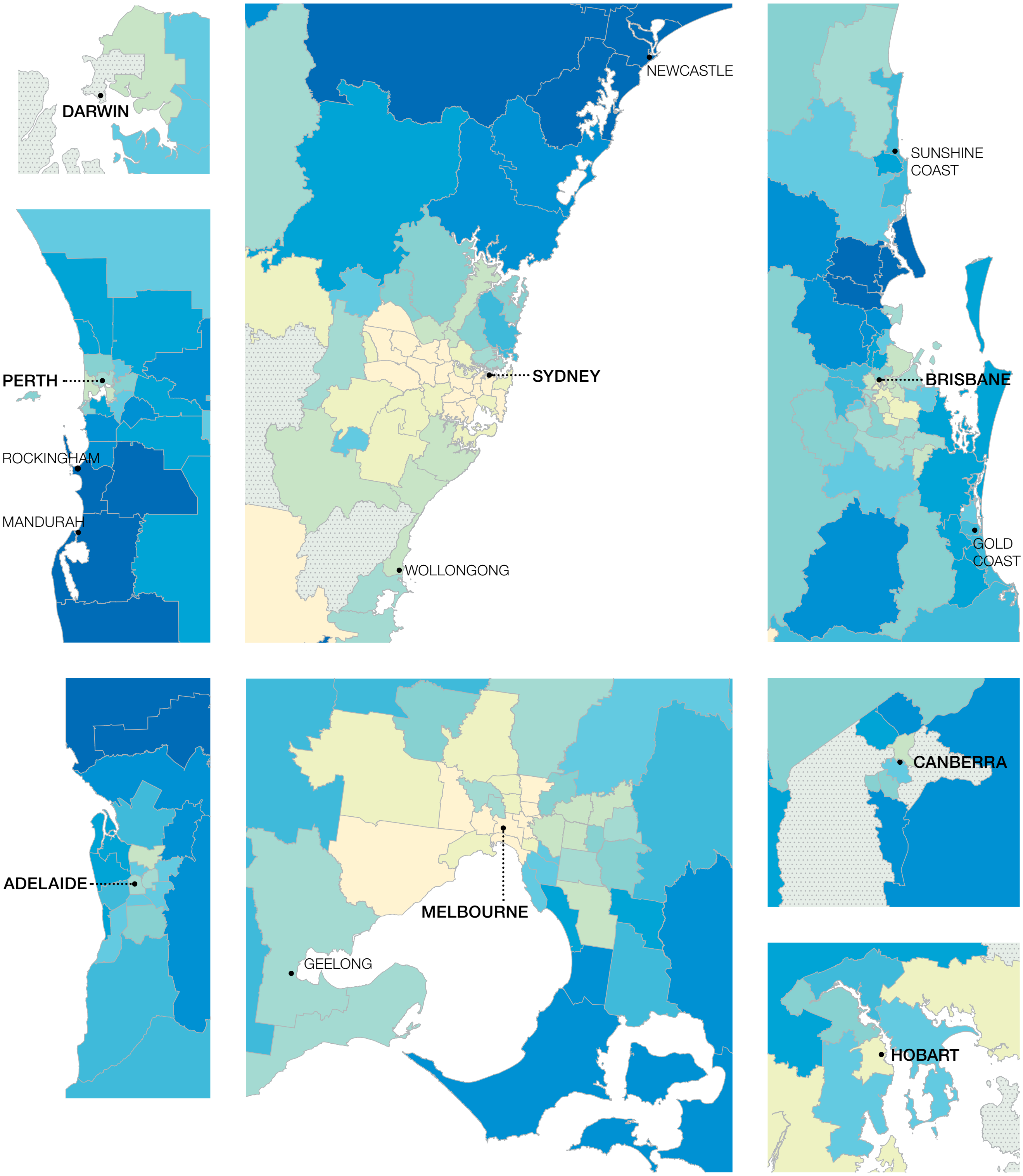
Endometrial ablation hospitalisations 15 years and over

Figure 3.11: Number of hospitalisations for endometrial ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15: Australia map



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Figure 3.12: Number of hospitalisations for endometrial ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15: capital city area maps

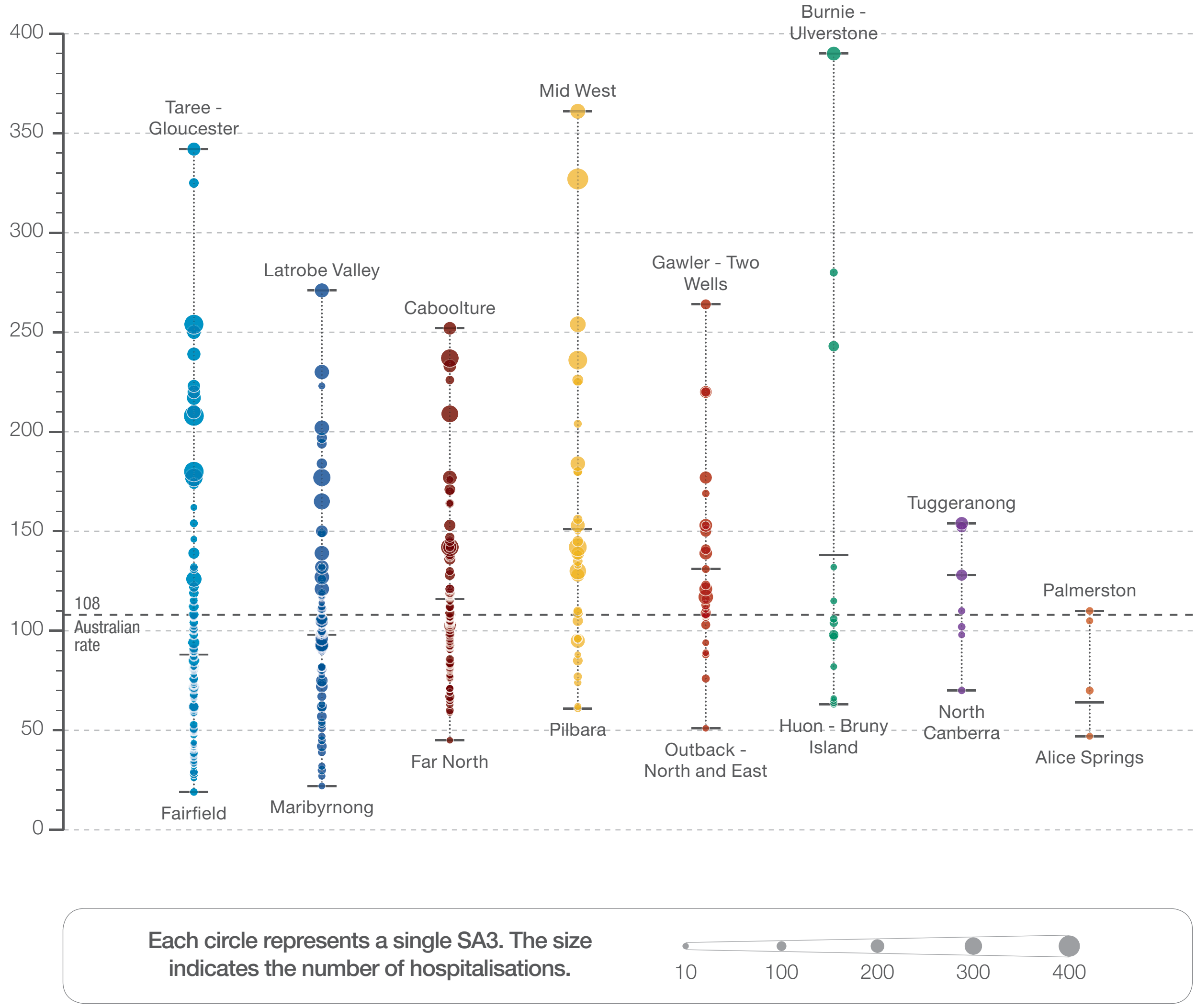


Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Endometrial ablation hospitalisations 15 years and over

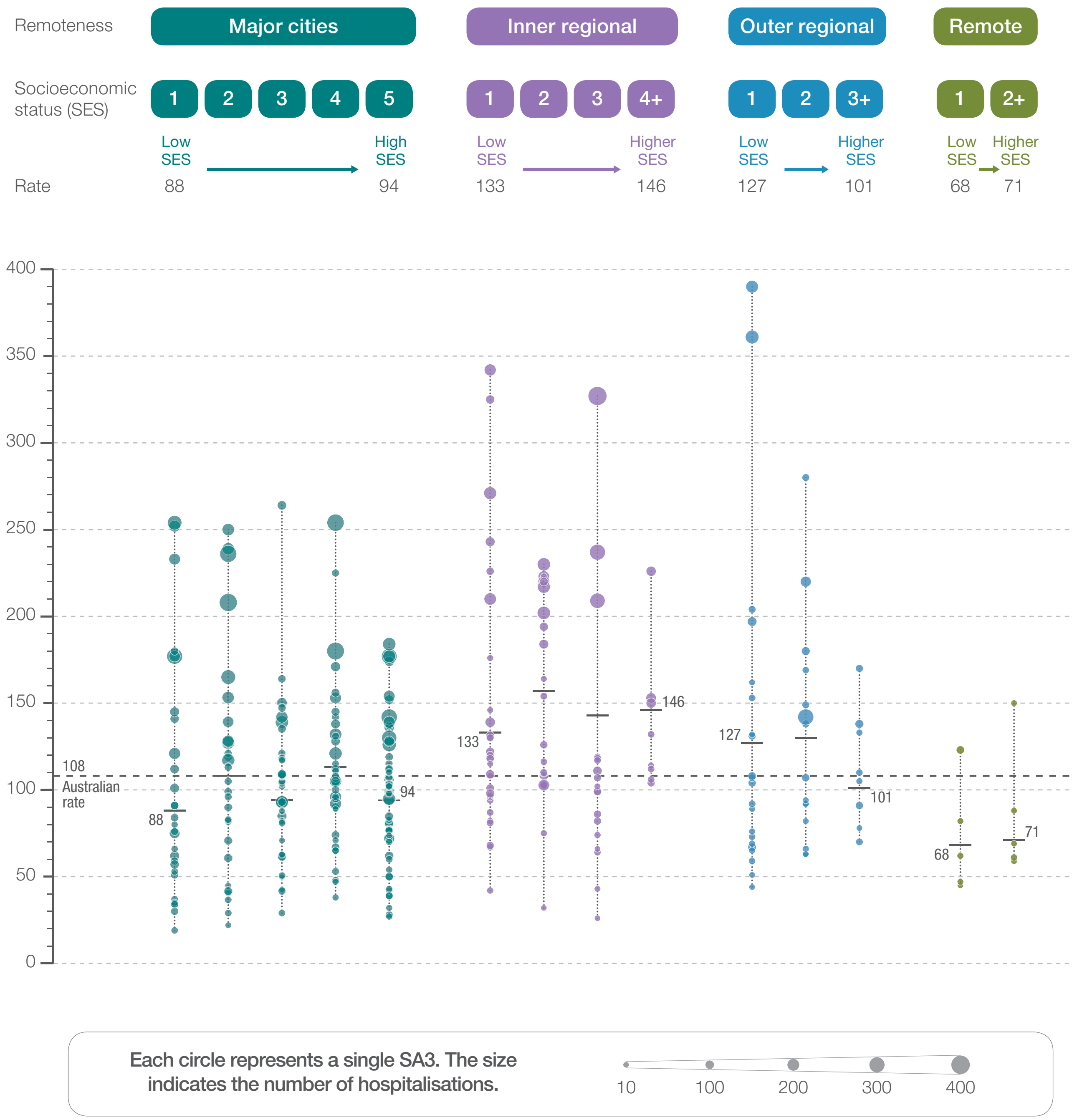
Figure 3.13: Number of hospitalisations for endometrial ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), state and territory, 2012–13 to 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	342	271	252	361	264	390	154	110
State/territory	88	98	116	151	131	138	128	64
Lowest rate	19	22	45	61	51	63	70	47
No. hospitalisations	7,503	6,540	6,212	4,341	2,457	778	572	177



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Figure 3.14: Number of hospitalisations for endometrial ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2012–13 to 2014–15



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Endometrial ablation hospitalisations 15 years and over

Resources

- National Collaborating Centre for Women's and Children's Health. Heavy menstrual bleeding. Clinical guideline (National Institute for Health and Clinical Excellence). London: Royal College of Obstetricians and Gynaecologists; 2007.

Australian initiatives

The information in this chapter will complement work already under way to improve management of heavy menstrual bleeding in Australia. At a national level, this work includes:

- Heavy menstrual bleeding Clinical Care Standard (planned for publication late 2017), Australian Commission on Safety and Quality in Health Care. www.safetyandquality.gov.au/our-work/clinical-care-standards/heavy-menstrual-bleeding
- Heavy menstrual bleeding patient information leaflet (in development), RANZCOG.

Some states and territory initiatives are also in place, including:

- NSW Clinical Excellence Commission data collection on hysterectomy rates for non-malignancy (2010–2014)[35]
- NSW Agency for Clinical Innovation Reducing Unwarranted Clinical Variation Taskforce examination of variation in length of stay for key procedures, including hysterectomy.

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3.3 Cervical loop excision or laser ablation hospitalisations 15 years and over

Context

This data item examines hospitalisations for cervical loop excision and cervical laser ablation without diagnosis of a gynaecological cancer for women aged 15 years and over based on their place of residence.

The current National Cervical Screening Program (NCSP) aims to prevent cervical cancer through routine screening of women aged 20–69 years to detect and remove precancerous cells from the cervix (neck of the womb).[1] Cervical loop excision and cervical laser ablation are used to treat precancerous cells that have been detected through cervical screening or other examinations.[2]

Both techniques are effective in treating cervical precancer[3], and can be done in outpatient settings under local anaesthetic or as an inpatient procedure.[2,4] Cervical laser ablation uses laser therapy to destroy the abnormal cells.[2,4] Cervical loop excision uses a thin loop of wire, heated by an electrical current, to cut away abnormal cells. This removed tissue can then be sent for examination, which makes loop excision a preferred option in many circumstances.

Most cervical abnormalities detected by a Pap test are low grade.[1] Because these commonly disappear, guidelines recommend monitoring only, for most low-grade abnormalities.[5,6] In contrast, women with high-grade cervical abnormalities require referral for a colposcopy (examination of the cervix).[5,6] At a colposcopy, a biopsy (sample of cells) can be taken for histology testing (examination of cells under a microscope).[2,4,5] Histology testing is used to confirm diagnosis and is required before treatment can start.[5]

Guidelines recommend that high-grade cervical lesions confirmed by histology are treated before they develop into cancer.[5-9] Cervical loop excision and cervical laser ablation are effective for treating the most common of these lesions: moderate or severe cervical intraepithelial neoplasia (CIN II or CIN III).[3,7]

Cervical loop excision or laser ablation hospitalisations 15 years and over

In 2014, 16,505 women in Australia aged 20–69 years were diagnosed with a high-grade abnormality of the cervix, confirmed by histology testing.[1] These abnormalities include abnormalities of the squamous cells, most commonly CIN II or CIN III, and high-grade abnormalities of the glandular cells, such as endocervical dysplasia and adenocarcinoma.[1] In 2016 in Australia, an estimated 903 women will be diagnosed with cervical cancer and 250 women will die from cervical cancer.[1]

There is little doubt about the effectiveness of the NCSP. Diagnoses and deaths from cervical cancer have halved since the introduction of the program in 1991.[1] Almost 80% of cervical cancer now occurs in women who have never been screened or were not screened regularly.[1]

The incidence of cervical cancer in Australia is highest in remote and very remote areas.[1] Similarly, mortality rates for cervical cancer are higher in very remote areas (4.7 deaths per 100,000 women in 2009–2013), compared with major cities and inner regional areas (1.8 and 1.9 deaths per 100,000 women, respectively, in 2009–2013), although it should be noted that mortality rates in remote and very remote areas are both based on just 13 and 12 deaths, respectively.[1] The higher proportion of Aboriginal and Torres Strait Islander women in very remote areas probably contributes to these higher rates, because Aboriginal and Torres Strait Islander women have more than twice the incidence of cervical cancer as non-Indigenous women and four times the mortality.[1]

Most cases of cervical cancer are caused by human papillomavirus (HPV).[4] Risk factors for cervical cancer include persistent undetected HPV infection, socioeconomic disadvantage, lower education level, smoking, possible dietary deficiencies, weakened immune system, oral contraception, lack of regular screening, earlier age at first intercourse, having children early and giving birth to five or more children.[4,10,11]

The National HPV Vaccination Program began in Australia in 2007 with vaccination of 12–13-year-old girls. HPV vaccination reduces the risk of high-grade cervical abnormalities and, potentially, cervical cancer. Vaccination does not entirely eliminate these risks. Cervical screening is recommended whether a woman has been vaccinated or not.[12] From 1 December 2017, the renewed NCSP will offer screening to all women aged 25–74 years every five years using a primary HPV test.[13] This change has been made because a review of the evidence showed that an HPV test performed every five years was more effective than the Pap test procedure under the current NCSP program, was just as safe, and was estimated to result in a greater than 20% reduction in incidence of, and mortality from, cervical cancer in Australian women.[14-16] The renewed NCSP will also provide the option of self-collection of HPV samples for underscreened and never-screened women aged 30 years and over (25 years and over for Aboriginal and Torres Strait Islander women). Self-collection of samples is supported by international evidence that this practice can increase screening among these groups.[10,16]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for cervical loop excision or cervical laser ablation per 100,000 women aged 15 years and over, over the three-year period 2012–13 to 2014–15.

Data are aggregated over three years to provide sufficient numbers to support reporting at the local level. The number of hospitalisations and the summed population over three years are used to provide an average rate. This is comparable to a rate based on data collected over one year.

The analysis and maps are based on the residential address of the patient and not the location of the hospital. Rates are age standardised to allow comparison between populations with different age structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

There is currently no way of reporting all cervical loop excision and cervical laser ablation procedures in Australia. This data item does not include outpatient activity. Although another data source, the Medicare Benefits Schedule, includes outpatient activity for private patients, it does not include outpatient activity for public patients. Further, national data on outpatient activity in public hospitals do not include data on procedures.

What do the data show?

Magnitude of variation

Over the three-year period 2012–13 to 2014–15, there were 43,920 hospitalisations for cervical loop excision or laser ablation, representing an average rate of 161 hospitalisations per 100,000 women aged 15 years and over (the Australian rate).

The number of hospitalisations for cervical loop excision or laser ablation across 323† local areas (Statistical Area 3 – SA3) ranged from 23 to 408 per 100,000 women aged 15 years and over. The rate was **17.7 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 101 per 100,000 women aged 15 years and over in the Australian Capital Territory to 202 in the Northern Territory (Figures 3.17–3.20).

After the highest and lowest 10% of results were excluded and 260 SA3s remained, the number of hospitalisations per 100,000 women aged 15 years and over was 2.1 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 of cervical loop excision or cervical laser ablation were markedly higher in inner and outer regional areas, and remote areas than in major cities. Rates tended to decrease with socioeconomic disadvantage in major cities, but there was no clear pattern according to socioeconomic disadvantage in other categories of remoteness (Figure 3.21).

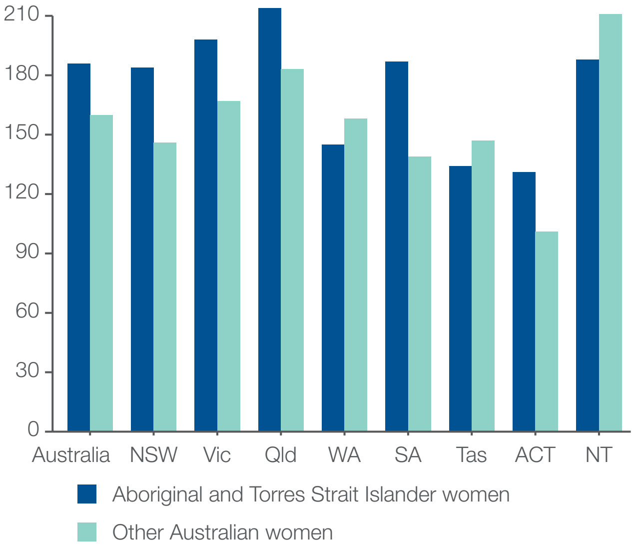
† There are 333 SA3s. For this item, data were suppressed for 10 SA3s due to a small number of hospitalisations and/or population in an area.

Cervical loop excision or laser ablation hospitalisations 15 years and over

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander women (186 per 100,000) was 1.2 times as high as the rate for other Australian women (160 per 100,000). However, this pattern varied according to state and territory. Aboriginal and Torres Strait Islander women had lower procedure rates than other women in the Northern Territory, Western Australia and Tasmania, and higher rates in all other states and territories (Figure 3.15).

Figure 3.15: Number of hospitalisations for cervical loop excision or laser ablation per 100,000 women aged 15 years and over, age standardised, by state and territory and Indigenous status, 2012–13 to 2014–15

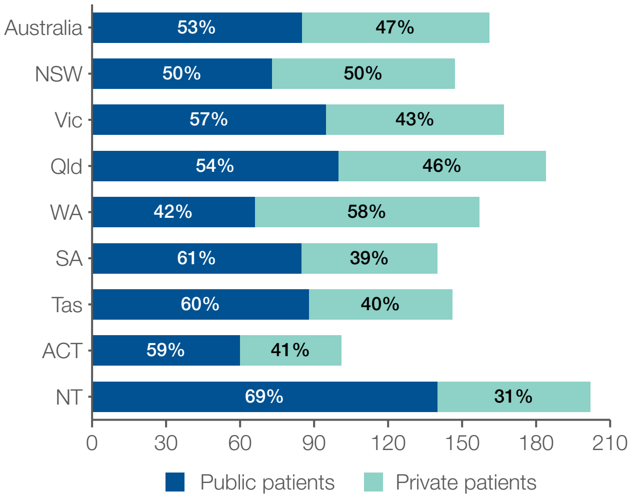


The data for Figure 3.15 are available at www.safetyandquality.gov.au/atlas.

Analysis by patient funding status

Overall, 47% of hospitalisations for cervical loop excision or cervical laser ablation were for privately funded patients. This proportion varied from 31% in the Northern Territory to 58% in Western Australia (Figure 3.16).

Figure 3.16: Number of hospitalisations for cervical loop excision or laser ablation per 100,000 women aged 15 years and over, age standardised, by state and territory and patient funding status, 2012–13 to 2014–15



The data for Figure 3.16 are available at www.safetyandquality.gov.au/atlas.

Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third party payer, for example a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third party payer.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Interpretation

Potential reasons for the variation include differences in:

- The prevalence of risk factors for HPV-induced cervical disease
- Cervical screening participation rates
- The distance patients need to travel to services ('see and treat' practices in remote areas)
- Clinician adherence to criteria for referral to a colposcopist
- Colposcopist adherence to guidelines on the management of cervical lesions
- Access to female general practitioners in remote areas
- Access to colposcopy services
- Access to culturally safe cervical screening practices for Aboriginal and Torres Strait Islander women
- Models of care, such as whether care is provided in inpatient or outpatient settings
- Private health insurance coverage.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in the area. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, 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.

Both procedures examined in this item can be done in outpatient settings under local anaesthetic.[2,4] Since outpatient procedures cannot be included in this data item, it is unclear to what extent the variation in the number of hospitalisations may reflect variation in the number of procedures performed in outpatient settings. Given the number of women with histologically confirmed high-grade abnormalities between 2012 and 2015 (about 51,000)[1,17,18], the number of cervical loop excision and cervical laser ablation hospitalisations over this period (43,920) suggests that most women with high-grade cervical lesions were admitted for treatment.

Where patients must travel long distances to access treatment, such as in remote and regional areas, there may be a greater tendency to admit patients overnight rather than have them travel home straight after the procedure. In areas where outpatient services are provided for these procedures, this practice may account for some of the observed difference in hospitalisation rates between regional and major city areas.

Other than the setting for the procedure, the geographic variations seen may reflect a combination of factors, such as differences in the prevalence of risk factors for cervical cancer, cervical screening participation rates, access to colposcopy services, and adherence to guidelines on the management of cervical abnormalities.[10]

Cervical loop excision or laser ablation hospitalisations 15 years and over

Addressing variation

Participation in cervical screening has a direct effect on the incidence of cervical cancer.[1] In 2013–14, the participation rate for the NCSP was 58%.[1] Participation was lowest in very remote areas (52%) and highest in inner regional areas (59%). It also varied according to socioeconomic disadvantage, with participation lowest for women at most socioeconomic disadvantage (52%) and highest for those at most socioeconomic advantage (64%).[1] Available evidence on participation in cervical screening by Aboriginal and Torres Strait Islander women suggests that they are underscreened.[1,10] The variation among states and territories in the hospitalisation rate for cervical loop excision and cervical laser ablation in Aboriginal and Torres Strait Islander women may reflect patterns of underscreening in remote populations.

A number of initiatives aim to increase participation of Aboriginal and Torres Strait Islander women in cervical screening. These include employment of Aboriginal and Torres Strait Islander health workers; outreach clinics in remote areas; development of principles, standards and guidelines for cervical screening in Aboriginal and Torres Strait Islander women; and an Aboriginal and Torres Strait Islander primary healthcare national performance indicator for cervical screening.[1,19] Ensuring culturally safe environments for examinations and treatments, with colposcopies done by female gynaecologists (for example, Aboriginal medical services), are other initiatives.[20]

Improving uptake of HPV vaccination for Aboriginal and Torres Strait Islander children is also a priority for reducing the incidence of cervical cancer in Aboriginal and Torres Strait Islander women.[10]

Increasing access to outpatient models of care for colposcopy is likely to improve patient satisfaction with treatment. In the United Kingdom, the National Health Service Cervical Screening Programme recommends that local cervical treatment procedures are offered with local anaesthesia, where appropriate, and that 80% of women are managed as outpatients with local anaesthesia.[9]

Improving data collection and reporting on diagnosis, treatment and outcomes for women with cervical lesions is likely to improve the consistent delivery of guideline-recommended care. Currently, the national system of state-based Pap smear registers records results of cervical screening, and provides a reminder for women and a means of following up screen-detected abnormalities. The register does not collect data on treatments received by women with histologically confirmed high-grade cervical lesions. Although linked data from state registers and the National Hospital Morbidity Database are informative[10], the data do not include treatments received in outpatient settings.

Initiatives are planned to improve data collection on the treatment of cervical lesions. The Colposcopy Quality Improvement Program (C-QuIP) is an initiative of the Royal Australian and New Zealand College of Obstetricians and Gynaecologists that aims to improve the care of women who are referred for colposcopy and treatment of screen-detected abnormalities. The C-QuIP was set up in 2009, prompted by concern about potential overuse of excisional treatments in young women whose family is not yet complete.[21] The C-QuIP offers all medical practitioners in Australia and New Zealand who are currently practising colposcopy the opportunity to be certified in this field, and for certification and recertification to be used as part of their college's continual professional development requirements.[22]

From December 2017, the National Cancer Screening Register will require colposcopists to send colposcopy data to the register. In return, they will receive aggregated reports about the tests and treatments they have administered as part of the NCSP. These reports will assist clinicians to participate in the C-QuIP program (to be renamed the Cervical Quality Improvement Program).[23]

Initial modelling suggested that colposcopy referral rates are likely to increase and treatment rates are likely to decrease after implementation of the renewed NCSP on 1 December 2017.[15] Further modelling based on planned updates to the clinical management guidelines suggests that, in the long term, there is likely to be a small increase (6%) in the treatment rate for unvaccinated women and a small decrease (5%) in the rate for vaccinated women.[24] Over time, rates of colposcopy are expected to decrease as the size of the HPV-vaccinated population increases.[16]

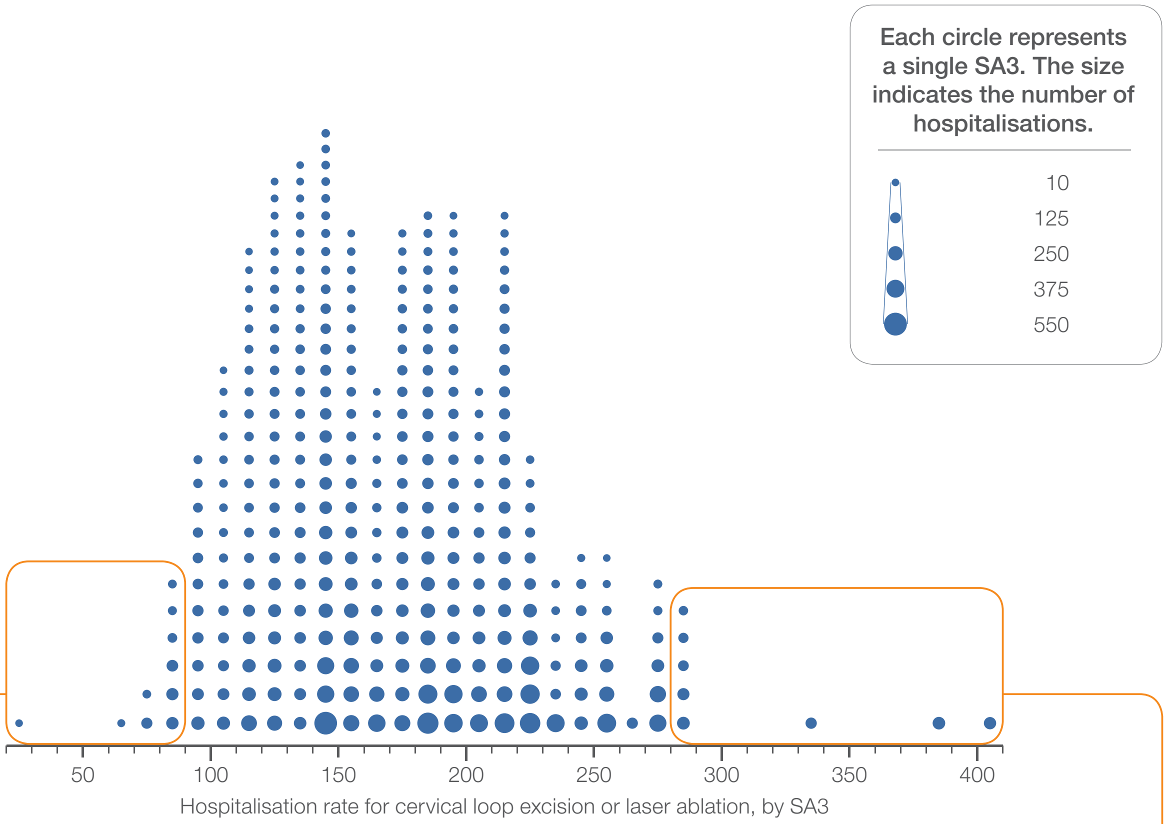
Using data from registers and other sources to map rates of vaccination, screening, colposcopy, histology detection and treatment could help determine the contribution of healthcare factors and risk-factor prevalence to variation in treatment rates. This analysis may also help to focus efforts to improve the appropriateness of care.

Audit and feedback of register data on colposcopic assessments, treatments and outcomes could improve the appropriateness of treatment selection. Of the cervical loop excision or cervical loop ablation hospitalisations in 2014–15, about 92% were cervical loop excisions (data not shown). This proportion is consistent with international trends. Both procedures are effective in treating cervical precancer[3]; however, excisional methods allow diagnostic examination of the removed tissue and evaluation of areas around the excision, and, for these reasons, are preferred for most patients.[9,25]

Both excisional and ablative cervical treatments have been associated with increased risk of preterm birth and low birth weight compared with no treatment in women with CIN.[26] The increased risk of adverse obstetric outcomes appears to be associated with depth and dimensions of the tissue removed. Although excisional methods are associated with a higher risk of adverse obstetric outcomes than ablative methods, the increased risk of small-depth excisions compared with just having CIN remains uncertain and is likely to be small.[26] The risk can be minimised by reducing the depth and dimension of tissue removed.[26]

Cervical loop excision or laser ablation hospitalisations 15 years and over

Figure 3.17: Number of hospitalisations for cervical loop excision or laser ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Goldfields	WA	23	14
Woden	ACT	67	26
Carlingford	NSW	70	52
Merrylands - Guildford	NSW	77	137
Dandenong	Vic	81	175
Parramatta	NSW	81	155
Coffs Harbour	NSW	82	63
Goulburn - Yass	NSW	82	56
Auburn	NSW	85	86
Strathfield - Burwood - Ashfield	NSW	88	180

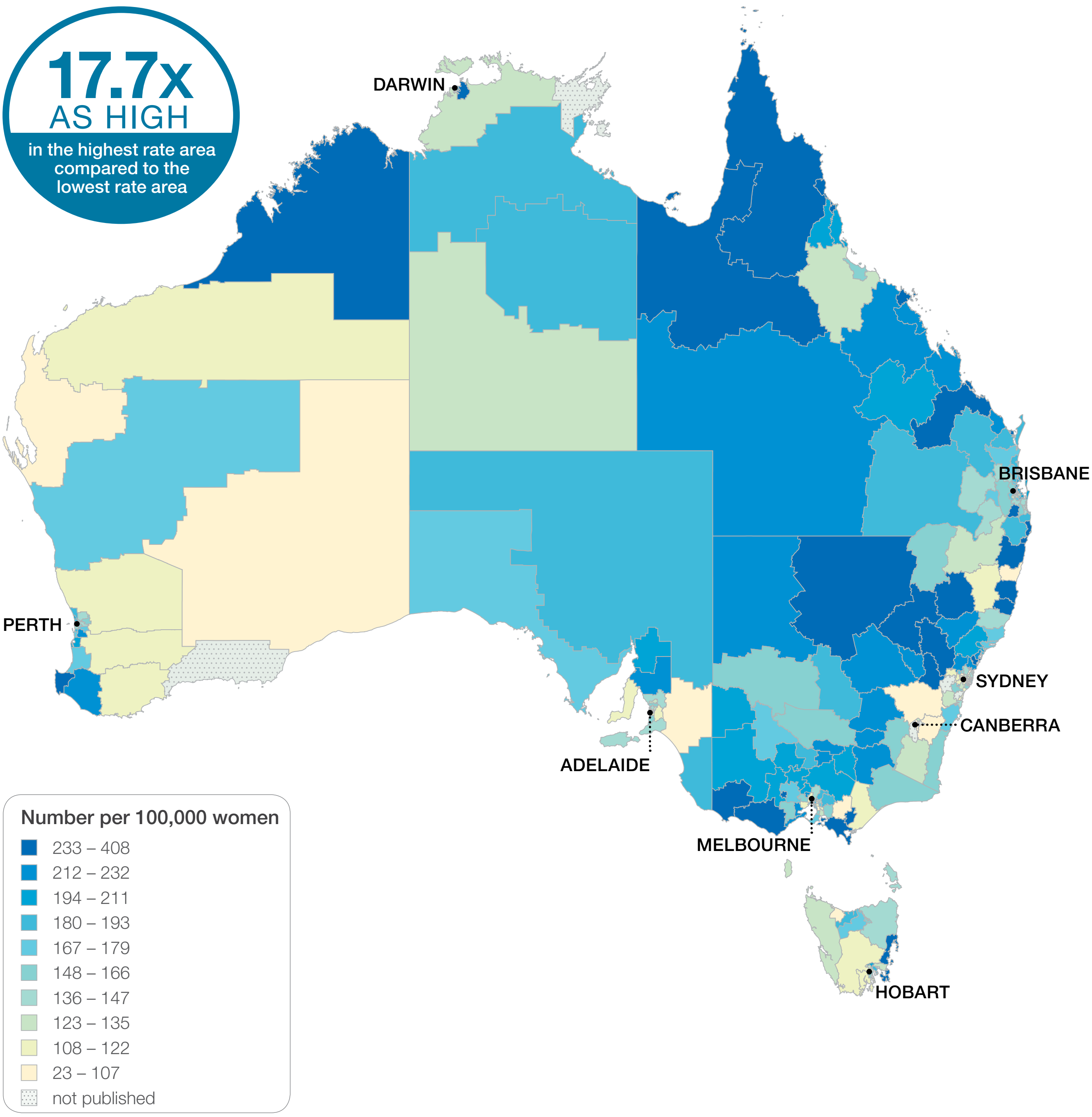
Highest rate areas

SA3	State	Rate	Hospitalisations
Lithgow - Mudgee	NSW	408	177
Bathurst	NSW	383	188
Outback - North	Qld	330	141
Port Macquarie	NSW	288	194
Palmerston	NT	287	123
Bourke - Cobar - Coonamble	NSW	287	78
Cairns - North	Qld	283	170
Far North	Qld	282	105

Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

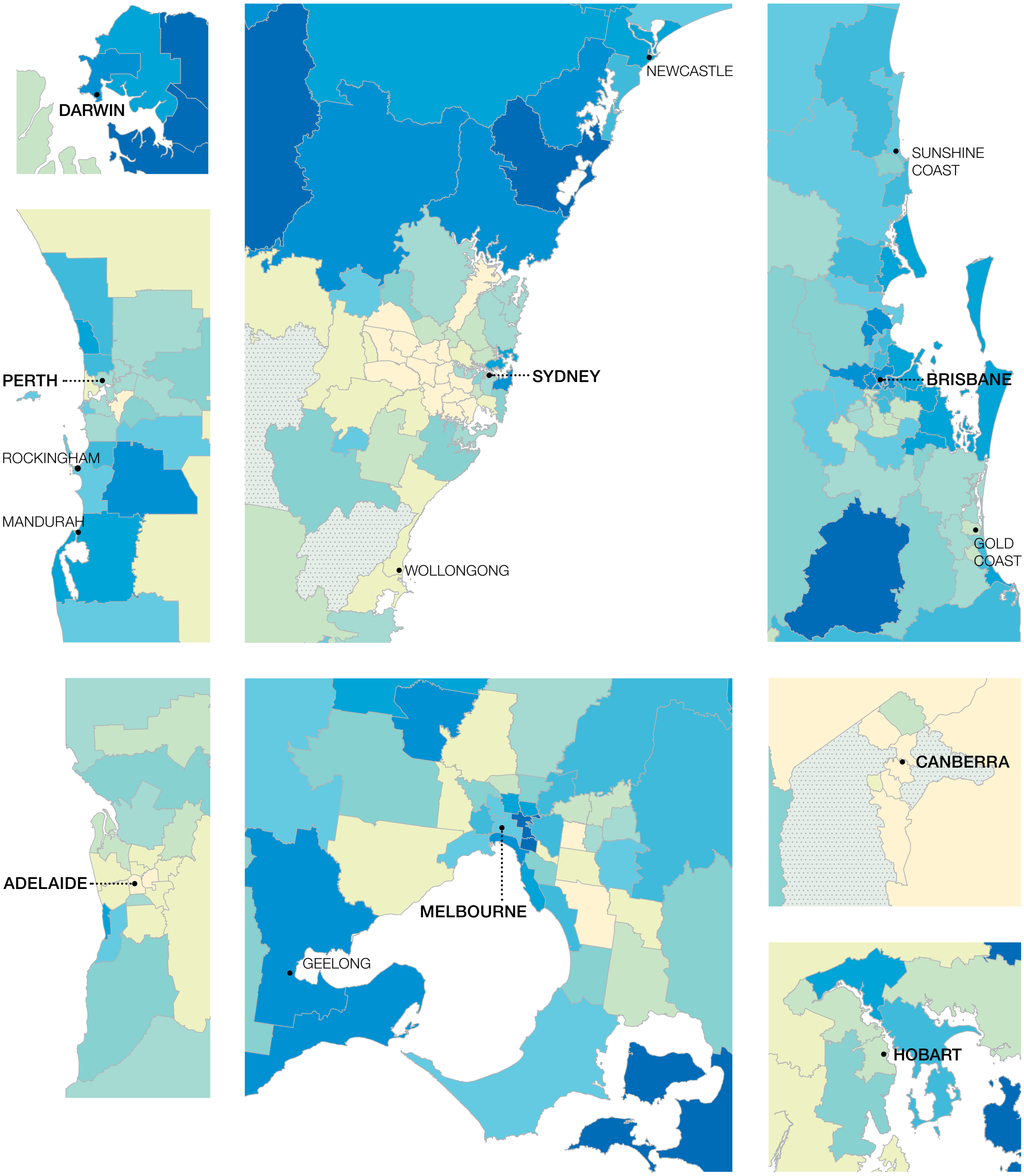
Cervical loop excision or laser ablation hospitalisations 15 years and over

Figure 3.18: Number of hospitalisations for cervical loop excision or laser ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15: Australia map



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Figure 3.19: Number of hospitalisations for cervical loop excision or laser ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15: capital city area maps

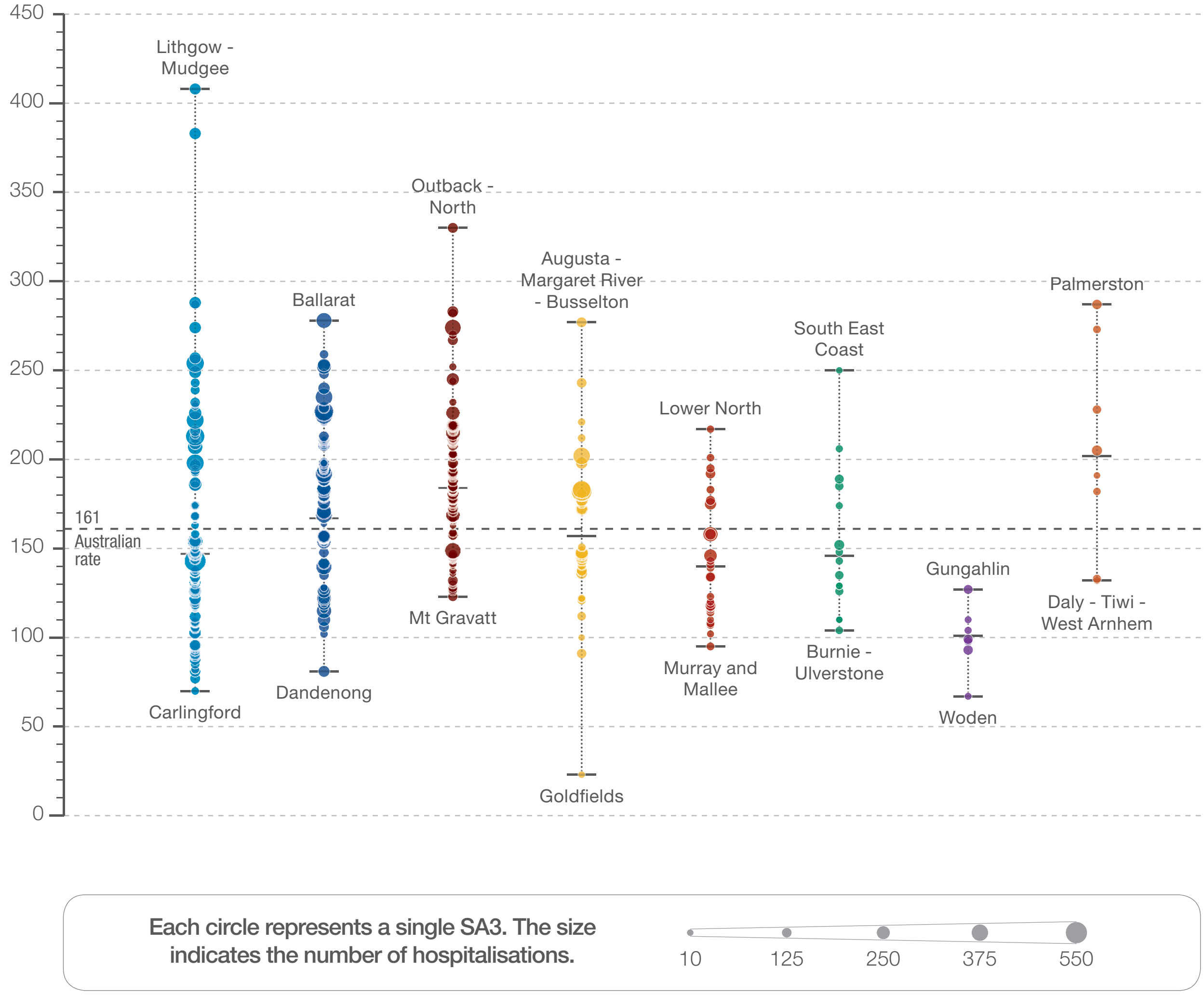


Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Cervical loop excision or laser ablation hospitalisations 15 years and over

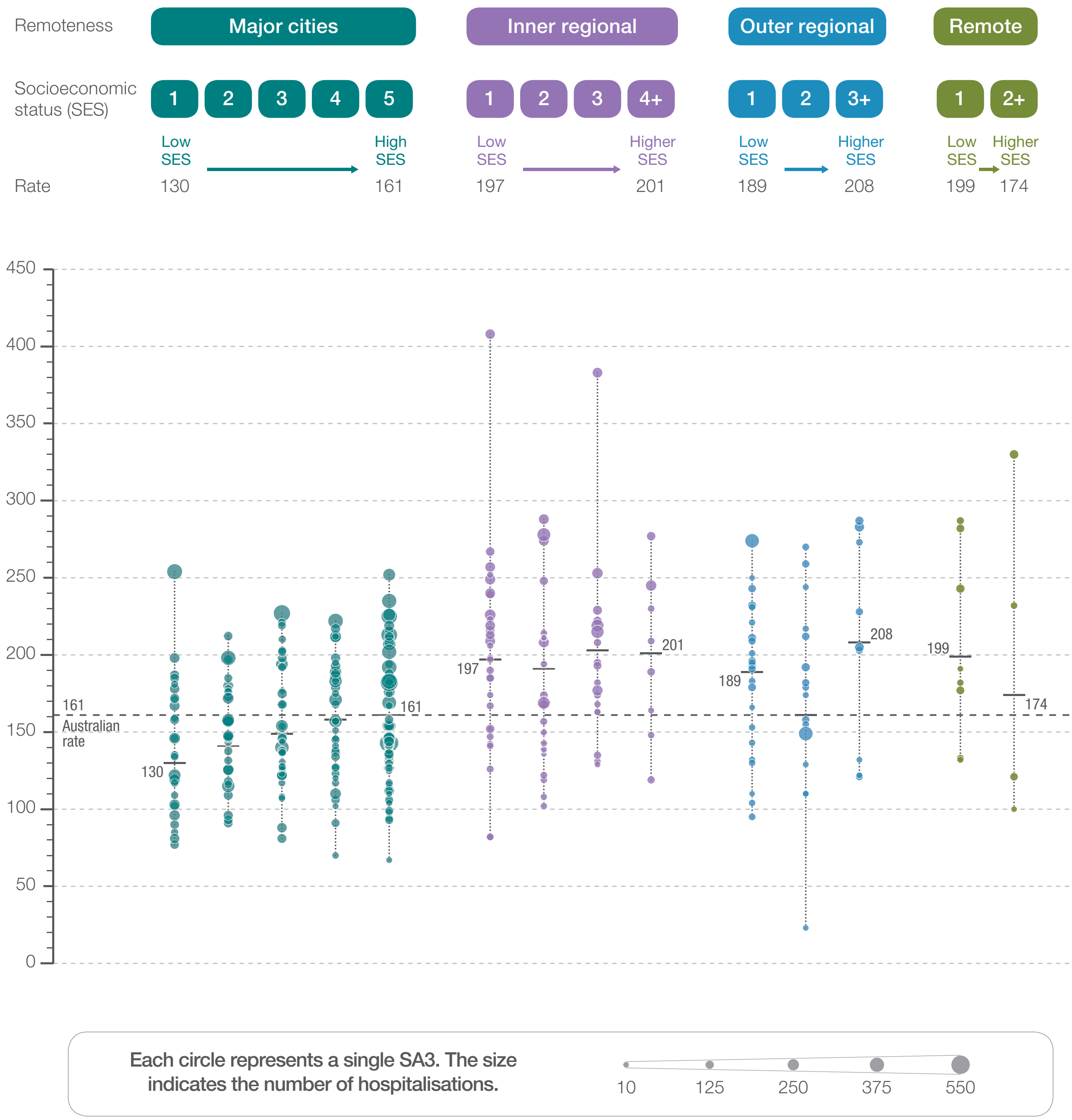
Figure 3.20: Number of hospitalisations for cervical loop excision or laser ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), state and territory, 2012–13 to 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	408	278	330	277	217	250	127	287
State/territory	147	167	184	157	140	146	101	202
Lowest rate	70	81	123	23	95	104	67	132
No. hospitalisations	12,772	11,630	10,064	4,780	2,605	774	504	623



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Figure 3.21: Number of hospitalisations for cervical loop excision or laser ablation per 100,000 women aged 15 years and over, age standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2012–13 to 2014–15



Notes:
Rates are age standardised to the Australian female population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and women in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Cervical loop excision or laser ablation hospitalisations 15 years and over

Resources

- National Health and Medical Research Council. Screening to prevent cervical cancer: guidelines for the management of asymptomatic women with screen-detected abnormalities. Canberra: NHMRC; 2005. (currently being updated)

Australian initiatives

The information in this chapter will complement work already under way to improve management of cervical precancerous abnormalities in Australia. At a national level, this work includes:

- The renewed National Cervical Screening Program, Australian Government. www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/future-changes-cervical
- Colposcopy Quality Improvement Program (C-QuIP), Royal Australian and New Zealand College of Obstetricians and Gynaecologists. www.cquip.edu.au
- Choosing Wisely Australia, which advises 'Do not perform ablative or excisional treatment of cervical low-grade squamous intraepithelial lesion (LSIL) in women during their reproductive years'. www.ranzcog.edu.au/RANZCOG_SITE/media/RANZCOG-MEDIA/News/CW_Recommendations_RANZCOG_v3-FINAL.PDF.

Some states and territory initiatives are also in place, including:

- The NSW Agency for Clinical Innovation Gynaecological Oncology Network – activities include the development of clinical practice guidelines, support for education, and support for improved services and equity of access for patients in rural, remote and regional New South Wales.

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3.4 Caesarean section 20–34 years

Context

This data item examines rates of caesarean section for selected women aged 20–34 years giving birth for the first time based on their place of residence. A caesarean section is an operation in which a baby is born through an incision in the mother's abdomen and uterus (womb).[1] Caesarean section can be lifesaving, but is associated with small risks of serious adverse effects for the mother and the baby, and for subsequent births.[2] The vast majority of women in Australia who have had a caesarean section have one for a subsequent birth.[3] This pattern has led to concern about the growing numbers of women at prime age for an uncomplicated vaginal birth (that is, 20–34 years) having their first baby by caesarean section for non-medical reasons.[4,5] These women have a lower risk of obstetric complications than older and younger women, and are more likely than older women to give birth again. Exploring variation in caesarean section for first births in a subset of these women who, along with their babies, are potentially at low risk from vaginal birth (as defined in Box 3.1) is a logical first step in investigating the appropriate use of the procedure, and supporting women to make informed choices about their maternity care.

Box 3.1

Selected women are those who met all of these criteria:

- Gave birth for the first time over the three-year period 2012–2014
- Aged 20–34 years
- Gestational age of baby at birth, 37–41 completed weeks
- Pregnant with one baby (singleton)
- Presentation of the baby is vertex (baby's head at the cervix).

A caesarean section may be performed if labour is not progressing, or serious complications are developing in the mother or the baby (emergency caesarean). Alternatively, it may be planned before the mother goes into labour (elective caesarean).[1] Most caesarean sections are done before labour onset (about 61% of all caesarean sections in Australia in 2014[3]*). Both emergency and planned caesarean sections are included in this data item.

* Based on the number of caesarean sections with no labour onset (62,562) and the total number of caesarean sections (101,896) in 2014.

Caesarean section 20–34 years

Caesarean section can be a lifesaving procedure in some circumstances.[2] Other advantages of a planned caesarean section compared with a spontaneous vaginal birth include reduced risk of labour-related morbidities for the baby and reduced risk of vaginal injuries for the mother.[2] It is also associated with a reduced long-term risk of pelvic floor disorders, such as stress incontinence and pelvic organ prolapse[6,7], although pregnancy itself is a risk factor for these and caesarean section may not protect against them.[8-11]

The most common reason for a caesarean section is a previous caesarean section.[3] In a study of more than 14,000 planned caesarean births (1998–2009) at a Queensland hospital, 53% were performed because of a previous caesarean section.[12] Planned caesarean sections are also performed because of risks from vaginal birth to the mother or the baby, or because the mother requests one (that is, for non-medical purposes).[1,12] These reasons made up about 28% and 15%, respectively, of all planned caesarean sections in the Queensland study.[12] Risks associated with vaginal birth include medical conditions of the mother (for example, pre-eclampsia, hypertension), medical conditions of the foetus, breech position of the baby, multiple pregnancy or placenta praevia (when the placenta covers the cervix).[1]

First-time mothers aged over 35 years – a population who more commonly require caesarean sections[3] – have been excluded from this data item, but mothers with health conditions (for example, hypertension, pre-eclampsia) and obstetric complications have not. As a result, some variation in caesarean rates from maternal medical factors is expected.

Implications of caesarean section

The decision to have a caesarean section has implications for both the mother and the baby. These need to be weighed up against the benefits, taking into account the circumstances and the preference of the woman. For the baby, compared with a planned vaginal birth, planned caesarean before 39 weeks gestation is associated with an increased risk of neonatal respiratory morbidity (breathing difficulties).[13-15] The most likely cause is a lack of lung surfactant and a failure to clear lung fluid – these processes are stimulated by labour.[13]

The likelihood of respiratory morbidity is greater for babies born close to term (37–38 weeks gestation) than for babies born at term (39–41 weeks).[12,16] Because the risk falls as gestational age increases, Australian and international guidelines recommend planned caesarean at approximately 39 weeks gestation or later in uncomplicated singleton (one-baby) pregnancies.[2,13,17]

Early planned birth (<39 weeks) has also been associated with increased risk of poor child development at school age, regardless of socioeconomic disadvantage and other demographic factors.[18] In a study of more than 150,000 births of ≥32 weeks gestation in New South Wales from 2002 to 2007, the likelihood of a child being developmentally high risk by the first year of full-time school increased for every week the child was born before 39–40 weeks.[18] Early-term birth has also been associated with increased odds of attention-deficit/hyperactivity disorder (ADHD) compared with infants born at 39–41 weeks.[19]

Babies born by caesarean section are less likely to be breastfed in the first few hours after birth or by the time they leave the hospital than babies born vaginally.[20] Birth by caesarean section has been associated with higher childhood rates of asthma[21] and obesity.[22]

For the mother, compared with a planned vaginal birth, a planned caesarean section may result in a longer hospital stay and may increase the risk of some rare but serious conditions.[2] These include haematoma, postpartum infections, anaesthetic complications, hysterectomy due to haemorrhage after birth and venous thromboembolism.[2,23]

Having a caesarean section also increases the risk of serious but rare complications in future pregnancies. These include uterine rupture, placenta praevia and placenta accreta (abnormal placental attachment that can result in massive haemorrhage and the need for hysterectomy).[24] The risk of these complications increases with each caesarean birth.[9]

Australian rate of caesarean section for all women

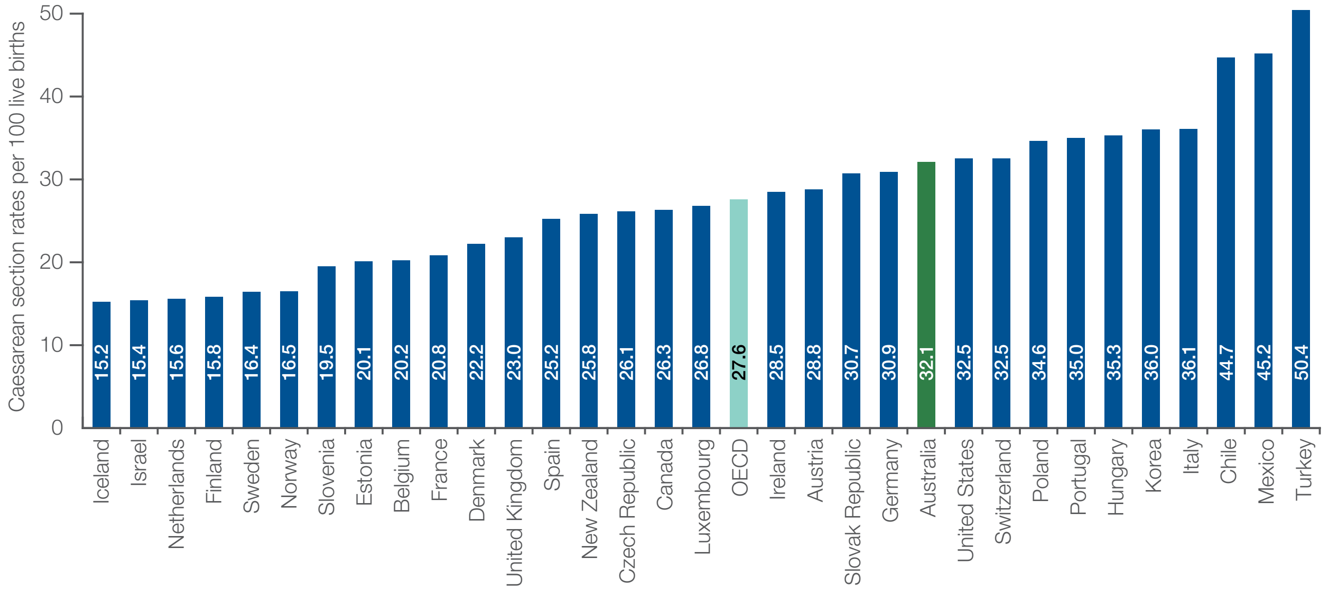
Australia has a higher rate of caesarean section than the average reported for the Organisation for Economic Co-operation and Development (OECD) (32% versus 28% of live births, respectively, in 2013)[25] (Figure 3.22). The rate has risen steadily since the early 1990s[26], a trend seen in nearly all comparable OECD countries.[25] Potential contributors to the rise include increasing maternal age, increasing numbers of maternal requests, increased maternal obesity, reduced vaginal birth after caesarean section, and multiple births resulting from assisted reproduction.[27-29]

Rates of both emergency and elective caesarean section have increased in Australia, but the rise in elective caesarean sections appears to be greater. In two Australian studies that adjusted rates for maternal age as well as for pregnancy and obstetric complications, both the odds of having an elective caesarean section and the odds of having an emergency caesarean section were found to have increased in the decades up to 2005 and 2008, respectively.[4,28] In unadjusted data from New South Wales, elective caesarean section accounted for most of the rise in caesarean section for selected women aged 20–34 years (the same criteria as this Atlas) over the period 2001–2015.[30] In these women, there was a 45% increase in elective caesarean compared with a 22% increase in emergency caesarean over this period.[30]

Caesarean section rates are higher in private hospitals (43% in 2011) than in public hospitals (30% in 2011).[26,31]

In 1985, the World Health Organization (WHO) stated that the ideal rate for caesarean sections is 10–15%, and that increasing the rate of caesarean section above this level is no longer associated with reduced mortality.[32] In 2015, WHO revised this statement to say that a specific population rate was no longer a useful target, and that examining rates and outcomes according to particular obstetric characteristics using the Robson classification would be more likely to lead to actions to improve care.[32]

Figure 3.22: Caesarean section rates per 100 live births, 2013 (or nearest year), OECD Health at a Glance 2015[25]



Caesarean section 20–34 years

About the data

Data are sourced from the Australian Institute of Health and Welfare National Perinatal Data Collection, and include both public and private hospitals. Rates are described as the number of selected women who had a caesarean section per 1,000 selected women aged 20–34 years. Selected women are women aged 20–34 years who met all of these criteria: gave birth for the first time, singleton pregnancy (carried one baby), baby's head positioned at the cervix, and baby of gestational age 37–41 completed weeks at birth.

Data are aggregated over three years to provide sufficient numbers to support reporting at the local level. The number of caesarean sections and the number of selected women over three years are used to provide an average rate. This is comparable to a rate based on data collected over one year.

The analysis and maps are based on the residential address of the mother and not the location of the birth. Rates are age standardised to allow comparison between populations with different age structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

Over the three-year period 2012–2014, 75,018 selected women aged 20–34 years had a caesarean section, representing an average rate of 268 caesarean sections per 1,000 selected women (the Australian rate).

The number of caesarean sections across 317† local areas (Statistical Area 3 – SA3) ranged from 147 to 438 per 1,000 selected women. The rate was **3.0 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of caesarean sections varied across states and territories, from 246 per 1,000 selected women in Tasmania to 300 in the Northern Territory (Figures 3.25–3.28).

After the highest and lowest 10% of results were excluded and 254 SA3s remained, the number of caesarean sections per 1,000 selected women was 1.5 times as high in the area with the highest rate compared to the area with the lowest rate.

Analysis by remoteness and socioeconomic status

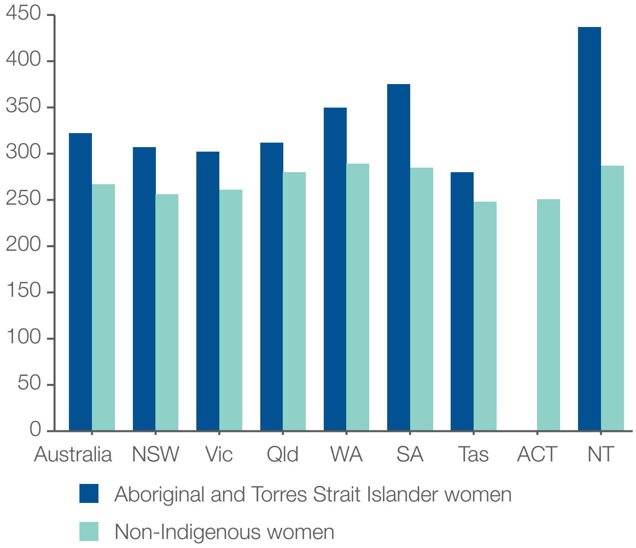
Rates in outer regional and remote areas tended to be higher than those in other areas. There was no clear pattern according to socioeconomic disadvantage in any remoteness category (Figure 3.29).

† There are 333 SA3s. For this item, data were suppressed for 16 SA3s due to a small number of caesarean section and/or selected women in an area.

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander women (322 per 1,000 selected women) was 1.2 times as high as the rate for non-Indigenous women (267 per 1,000 selected women). This difference was most pronounced in South Australia and the Northern Territory, where the rates for Aboriginal and Torres Strait Islander women were more than 1.3 times as high as the rates for non-Indigenous women (Figure 3.23).

Figure 3.23: Number of caesarean sections for selected women per 1,000 selected women, age standardised, by state and territory and Indigenous status, 2012–2014

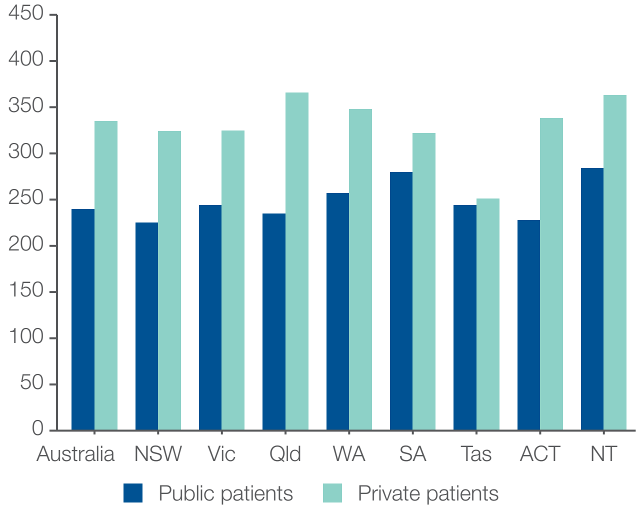


The data for Figure 3.23 are available at www.safetyandquality.gov.au/atlas.

Analysis by patient funding status

Overall, the rate of caesarean section for privately funded patients (335 per 1,000 selected women) was 1.4 times as high as the rate for publicly funded patients (240 per 1,000 selected women). The difference was most pronounced in Queensland, where privately funded patients were 1.6 times as likely to have a caesarean as publicly funded patients (Figure 3.24).

Figure 3.24: Number of caesarean sections for selected women per 1,000 selected women, age standardised, by state and territory and patient funding status, 2012–2014



The data for Figure 3.24 are available at www.safetyandquality.gov.au/atlas.

Notes:
Rates are age standardised to the Australian female population aged 20–34 years in 2001.
Rates are based on the number of caesarean section for selected women (numerator) and number of selected women living in the geographic area (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
Deliveries involving public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Deliveries involving private patients do incur a charge to the patient and/or a third-party payer.
Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Perinatal Data Collection 2012–2014.

Caesarean section 20–34 years

Interpretation

Potential reasons for the variation include differences in:

- Maternal comorbidities, such as obesity, diabetes, smoking and teenage pregnancy, particularly among Aboriginal and Torres Strait Islander women
- Maternal preference for elective caesarean
- Maternal awareness of risks and benefits of birth methods for current and subsequent births
- Obstetric complications
- The availability of midwives, obstetricians and operating theatres
- Clinicians' preferences
- Skills and skills development in instrument-assisted births (vacuum extraction or forceps)
- Access to maternity services in outer regional and remote areas
- The distance of maternity services from patient residence
- Models of care, including continuity of care models
- The level of antenatal care for Aboriginal and Torres Strait Islander women, and women who are socioeconomically disadvantaged
- Private health insurance coverage
- State and territory maternity health policies.

Because both emergency and planned caesarean sections were included in this data item, varying rates of these procedures within a local area may contribute to overall variation. Different factors may contribute to variation in emergency and elective caesarean sections. For example, variation in skills in instrument-assisted vaginal births are more likely to be associated with variation in emergency caesarean rates than planned caesarean rates.

The lack of a relationship between caesarean section rates and socioeconomic disadvantage may be related to different factors for women at most and least socioeconomic advantage. For women at most socioeconomic advantage, private health insurance coverage and maternal preference are likely to be important contributors. For women at least socioeconomic advantage, higher rates of medical and obstetric complications are likely to drive rates of caesarean section; for women living in small rural areas, lack of access to maternity services for supporting higher-risk vaginal births is likely to be a factor.

The higher rate of caesarean section for Aboriginal and Torres Strait Islander women compared with non-Indigenous women may be due to higher rates of maternal risk factors, such as obesity and diabetes[3], as well as a lack of culturally appropriate antenatal care. A recent study from the Northern Territory found that the likelihood of Aboriginal and Torres Strait Islander mothers having an emergency caesarean section for their first birth was 47% greater than for non-Indigenous mothers, regardless of demographic and obstetric risk factors. The authors hypothesised that this might reflect access to health services, health literacy and cultural preferences for midwifery-led care.[33]

The strong relationship between private health funding and caesarean section rate is expected.[26] In datasets of all women, higher rates of caesarean section for privately funded patients compared with publicly funded patients is commonly attributed to differences in the populations. Women having a caesarean section in a private hospital are more likely to be older and less disadvantaged.[31] The Atlas findings show that rates of caesarean section are also higher for younger women with privately funded care.

During the early 2000s, the rate of caesarean section for first births increased more in private hospitals than in public hospitals.[5,34] The difference was apparent among all women who gave birth[34], and also among selected women aged 20–34 years, adjusted for pre-existing pregnancy-related medical conditions (that is, women at low risk from vaginal birth).[5] The greater rate of caesarean section in private hospitals for women at low risk did not appear to be accompanied by a reduction in perinatal deaths (deaths of babies from 20 weeks gestation to the first 28 days of life).[35] Whether private funding status has a net benefit for the morbidity of babies born by caesarean section is unclear.[35,36]

Addressing variation

Focusing efforts on increasing the number of low-risk women aged 20–34 years who have a vaginal birth would be expected to help ensure the appropriate use of caesarean section. For the vast majority of women, having a caesarean section for the first birth sets the pattern for subsequent births.[3] In 2014, 85% of women who had a previous caesarean section had a repeat caesarean section.[3] Therefore, improving the appropriateness of caesarean section for first births in women at low risk from vaginal birth who may have subsequent births is likely to also reduce the rate of repeat caesarean section. Women at low risk may be defined as women who are pregnant with one baby, have an uncomplicated obstetric history, have no complications in the current pregnancy and have no medical conditions of concern for a vaginal birth.[37]

Collaboration between midwives, obstetricians and general practitioners is a key element of providing safe and high-quality maternity care.[38] In Australia, a range of models of care exist for low-risk pregnant women.[38] 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.[37] In case-load 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. These models work on the assumption that women will labour more effectively, need to stay in hospital for less time, and feel a stronger sense of satisfaction and personal control if they get to know their midwife.[39]

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 risk of caesarean section by 22% (19.4% versus 24.9%). The difference was primarily related to a fall in unplanned caesareans.[37] Case-load midwifery may not be as effective in reducing the risk of caesarean section in women of higher risk. In the M@NGO trial of more than 1,700 pregnant women of any risk, case-load care did not affect the caesarean rate compared with standard care, but the rate of both groups decreased over the duration of the study.[39]

Improving adherence to guidelines on planned caesarean sections before 39 weeks is likely to improve neonatal outcomes following a caesarean section. Planned caesarean sections before 39 weeks are common in Australia.[12,18,40] In New South Wales, 35% of low-risk repeat planned caesarean sections during 2008–2011 were performed before 39 weeks.[40] Ensuring that policies and procedures are in place in both the public and private sectors is important – privately funded women have much higher rates of caesarean section than publicly funded women.

Providing women who are pregnant with their first child written evidence-based information on the benefits and risks of birth methods (vaginal birth, instrument-assisted vaginal birth and caesarean section), including the optimal duration of pregnancy, may help address fears and concerns, and enable them to make informed decisions about childbirth.[2,9,18] Providing women who had a first birth by caesarean section with information on birth options if further children are planned may also help address their fears and concerns, and inform their decisions. Specific information should be included about the benefits and risks of vaginal birth after a caesarean section.[41]

Caesarean section 20–34 years

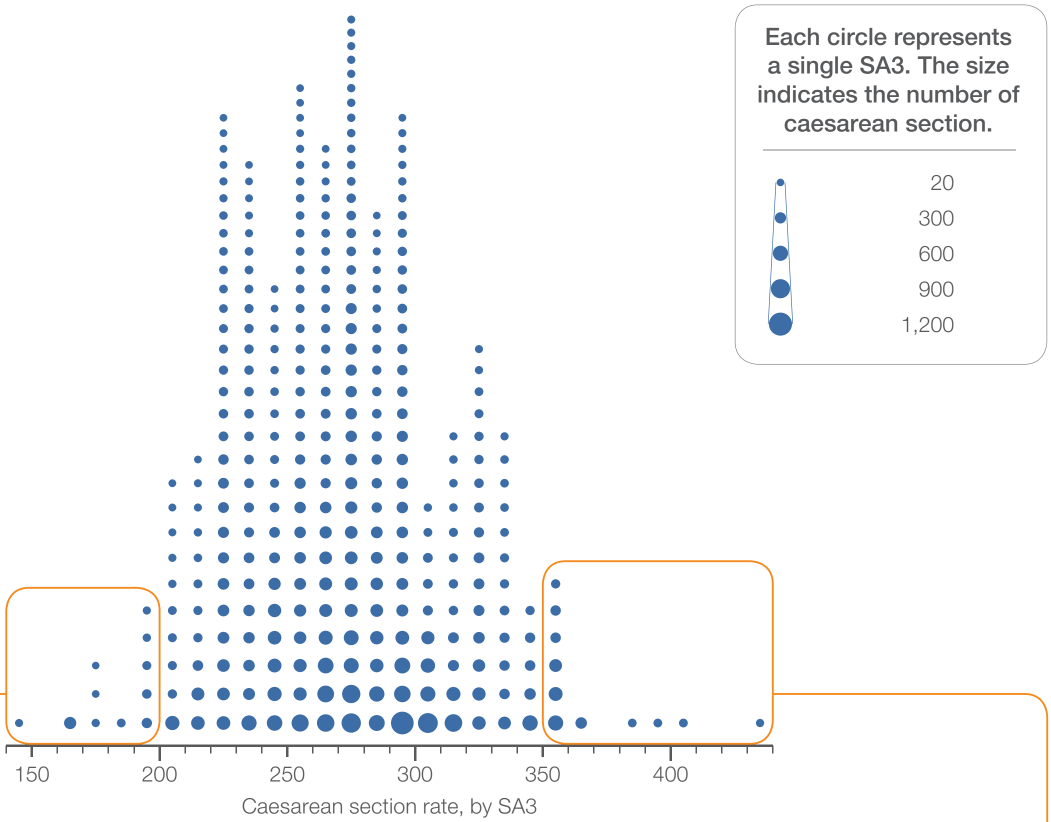
Improving clinician training in vaginal birth after a caesarean section, and providing the opportunity for more women to be offered it, if appropriate, may help improve the birth options for women who had a caesarean section for their first birth, but may not require it for future births.[41]

Of the women who give birth in Australia, 1 in 4 are overweight, and 1 in 5 are obese.[3] Providing women who are overweight or obese and are contemplating pregnancy with advice and interventions to reduce their weight is likely to reduce the increased morbidity and mortality associated with pregnancy for these women, and reduce their requirement for birth by caesarean section. In the absence of other obstetric or medical indications, obesity alone is not an indication for elective caesarean. There are added risks of obesity with both birth methods.[2]

Developing and expanding culturally competent and high-quality maternity care for Aboriginal and Torres Strait Islander women is important for improving access to regular antenatal care.[42] Aboriginal and Torres Strait Islander women were less likely to attend an antenatal visit in the first trimester (53%) than non-Indigenous women (60%) in Australia in 2014.[3]

Increasing the access of low-risk women living in remote areas to models of maternity care that support vaginal birth will help support these women. Twenty-four per cent of Aboriginal women who give birth each year live in remote and very remote Australia (versus 2% of non-Indigenous women), highlighting the importance of services in these areas.[43]

Figure 3.25: Number of caesarean sections for selected women per 1,000 selected women, age standardised, by Statistical Area Level 3 (SA3), 2012–2014



Lowest rate areas

SA3	State	Rate	Caesarean section
Baw Baw	Vic	**147**	62
Fairfield	NSW	**168**	376
Port Douglas - Daintree	Qld	**170**	20
Stonnington - East	Vic	**173**	78
Great Lakes	NSW	**177**	33
Goldfields	WA	**188**	114
Yarra	Vic	**190**	233
Richmond Valley - Coastal	NSW	**192**	131
Norwood - Payneham - St Peters	SA	**192**	83
Marrickville - Sydenham - Petersham	NSW	**193**	170
Taree - Gloucester	NSW	**198**	69

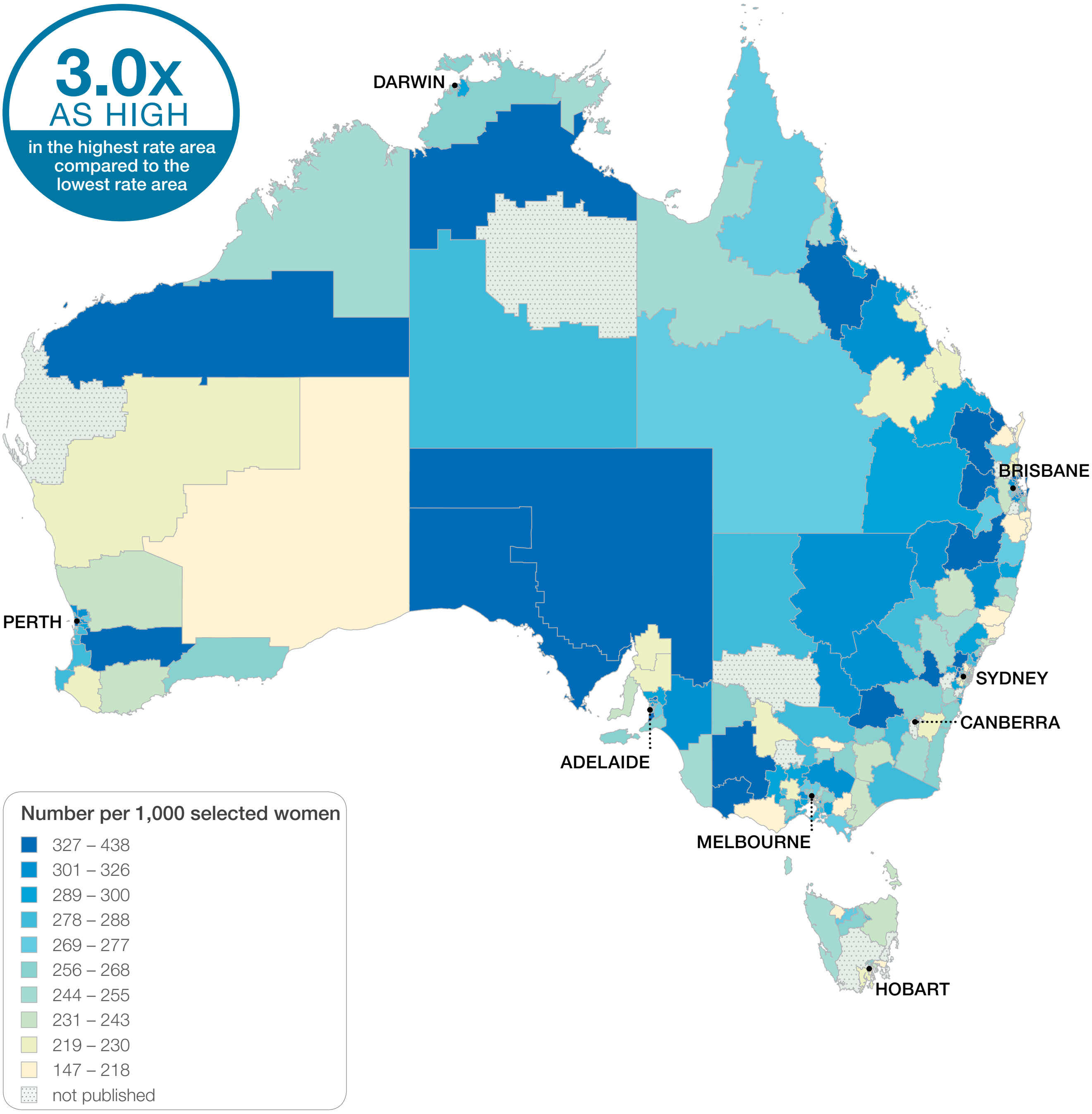
Highest rate areas

SA3	State	Rate	Caesarean section
Bribie - Beachmere	Qld	**438**	73
Outback - North and East	SA	**400**	116
Glenelg - Southern Grampians	Vic	**393**	112
Inverell - Tenterfield	NSW	**389**	109
Wagga Wagga	NSW	**364**	322
Marion	SA	**358**	423
Cleveland - Stradbroke	Qld	**358**	242
Richmond - Windsor	NSW	**357**	152
Cockburn	WA	**356**	506
St Marys	NSW	**351**	239
Penrith	NSW	**350**	599

Notes:
Rates are age standardised to the Australian female population aged 20–34 years in 2001.
Rates are based on the number of caesarean section for selected women (numerator) and number of selected women living in the geographic area (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Perinatal Data Collection 2012–2014.

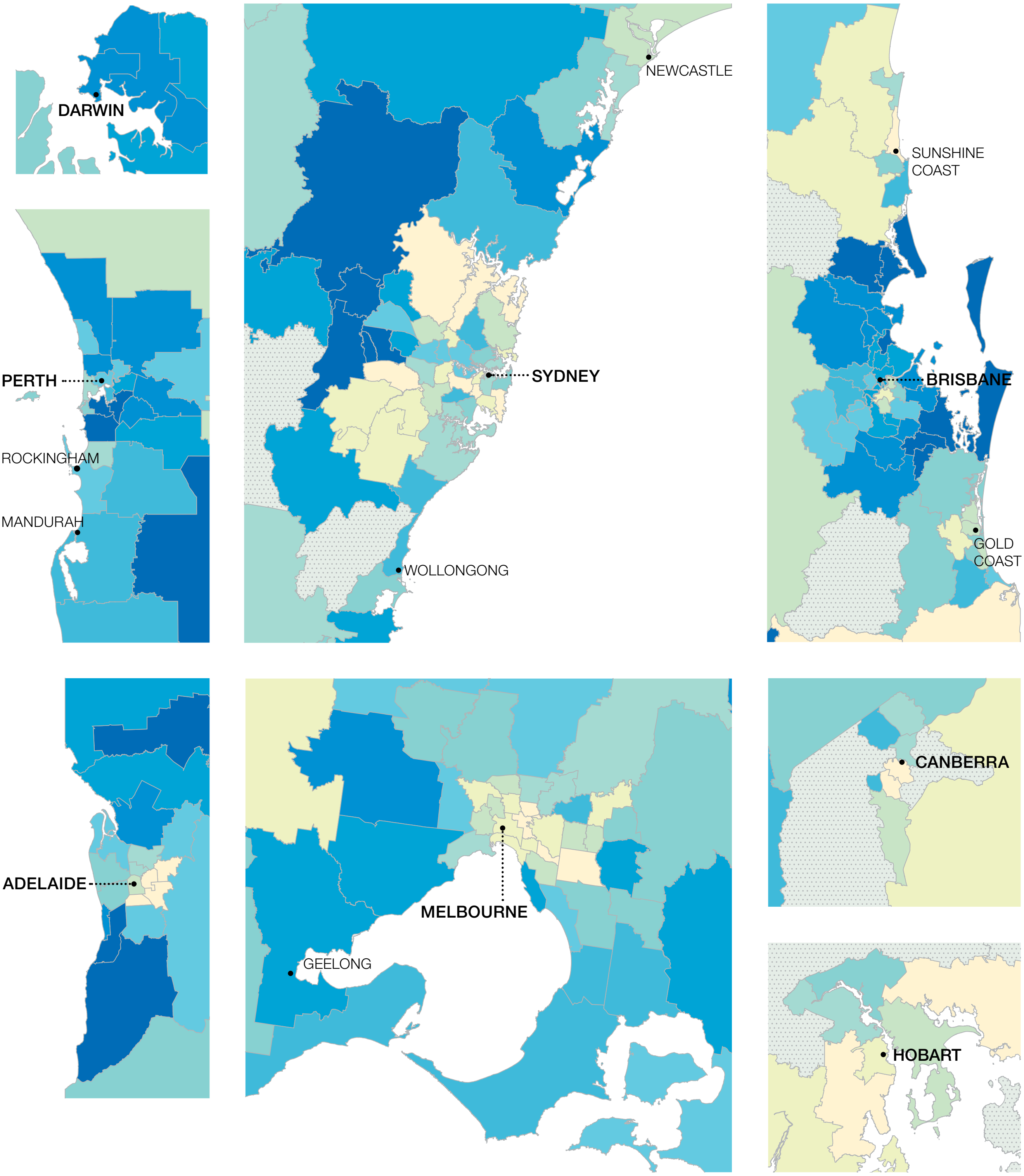
Caesarean section 20–34 years

Figure 3.26: Number of caesarean sections for selected women per 1,000 selected women, age standardised, by Statistical Area Level 3 (SA3), 2012–2014: Australia map



Notes:
Rates are age standardised to the Australian female population aged 20–34 years in 2001.
Rates are based on the number of caesarean section for selected women (numerator) and number of selected women living in the geographic area (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Perinatal Data Collection 2012–2014.

Figure 3.27: **Number of caesarean sections for selected women per 1,000 selected women, age standardised, by Statistical Area Level 3 (SA3), 2012–2014: capital city area maps**

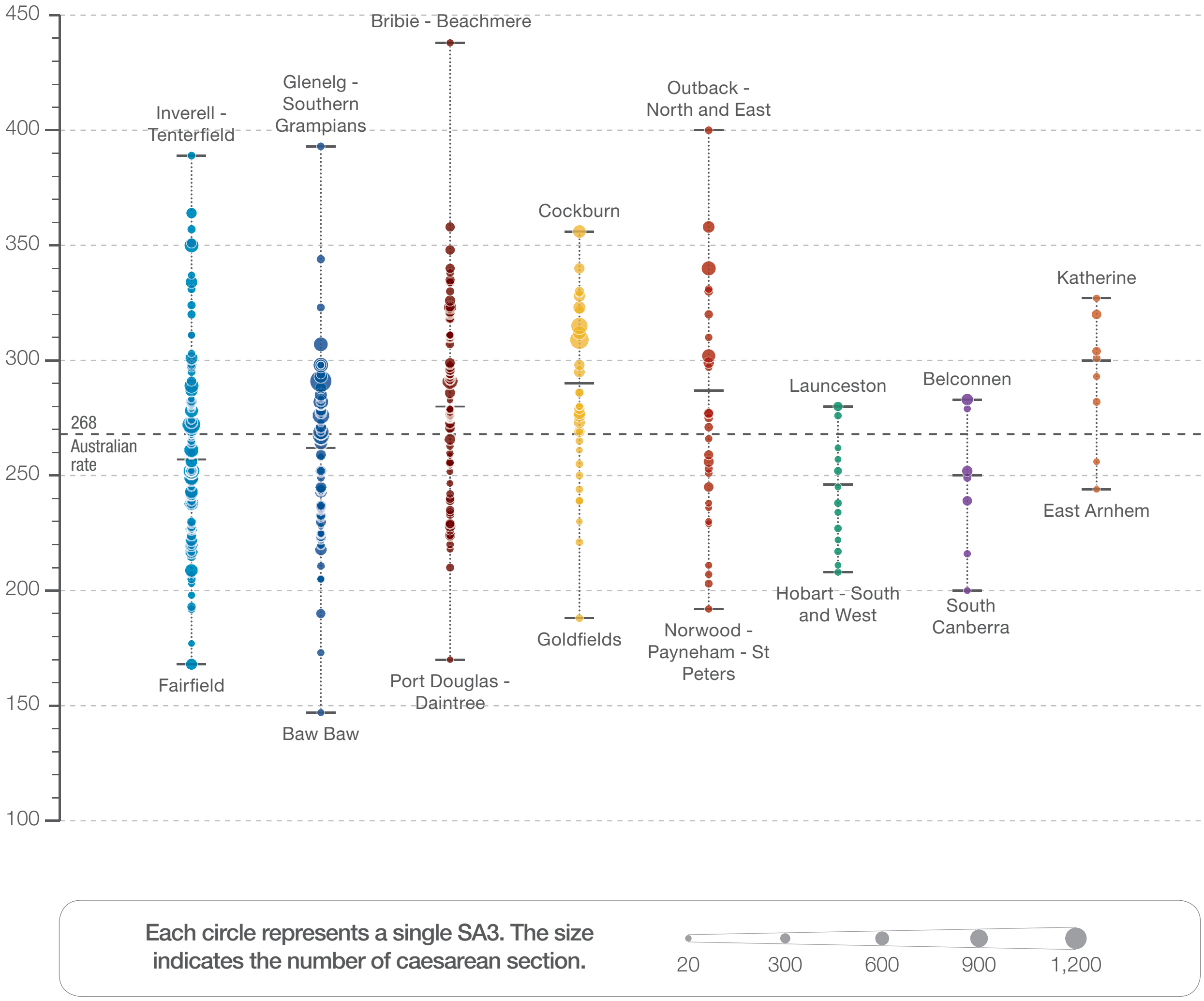


Notes:
Rates are age standardised to the Australian female population aged 20–34 years in 2001.
Rates are based on the number of caesarean section for selected women (numerator) and number of selected women living in the geographic area (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Perinatal Data Collection 2012–2014.

Caesarean section 20–34 years

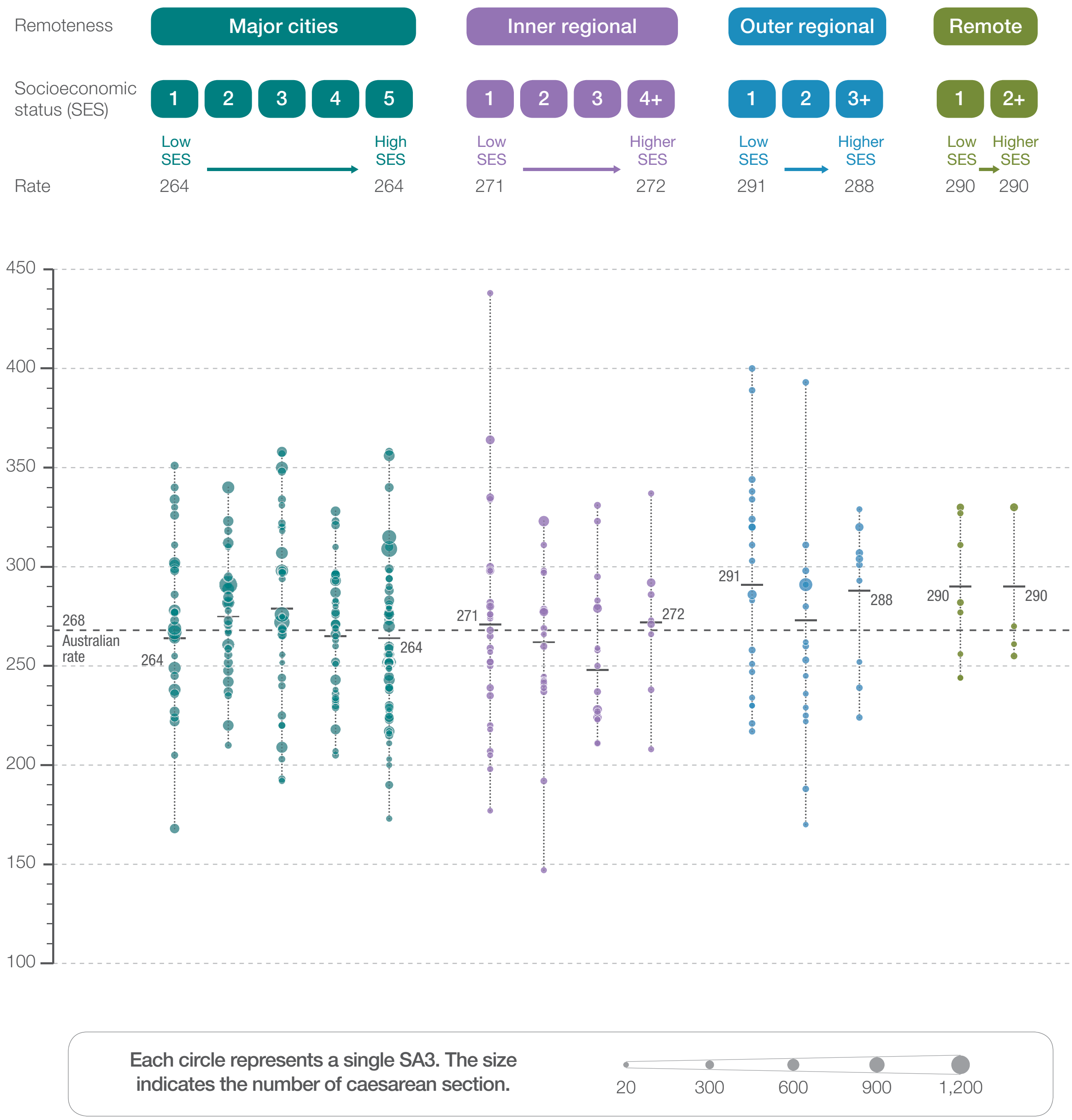
Figure 3.28: Number of caesarean sections for selected women per 1,000 selected women, age standardised, by Statistical Area Level 3 (SA3), state and territory, 2012–2014

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	389	393	438	356	400	280	283	327
State/territory	257	262	280	290	287	246	250	300
Lowest rate	168	147	170	188	192	208	200	244
Caesarean section	23,645	18,837	14,828	8,922	5,177	1,111	1,379	927



Notes:
Rates are age standardised to the Australian female population aged 20–34 years in 2001.
Rates are based on the number of caesarean section for selected women (numerator) and number of selected women living in the geographic area (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Perinatal Data Collection 2012–2014.

Figure 3.29: Number of caesarean sections for selected women per 1,000 selected women, age standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2012–2014



Notes:
Rates are age standardised to the Australian female population aged 20–34 years in 2001.
Rates are based on the number of caesarean section for selected women (numerator) and number of selected women living in the geographic area (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Perinatal Data Collection 2012–2014.

Caesarean section 20–34 years

Resources

- Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Timing of elective caesarean section at term. East Melbourne: RANZCOG; 2014.
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Caesarean delivery on maternal request. East Melbourne: RANZCOG; 2010.
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Caesarean section. Patient information pamphlet. East Melbourne: RANZCOG; 2016.
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Birth after previous caesarean section. East Melbourne: RANZCOG; 2015.

Australian initiatives

The information in this chapter will complement work already under way to help ensure appropriate use of caesarean section in Australia. At a national level, this work includes:

- National Core Maternity Indicator of caesarean section for selected women giving birth for the first time; the full list of indicators and results from 2010–2013 are available at www.aihw.gov.au/publication-detail/?id=60129555634
- National framework for maternity services (in development as an enduring framework). www.health.gov.au/internet/main/publishing.nsf/Content/maternity-pubs
- *Guiding Principles for Developing a Birthing on Country Service Model and Evaluation Framework, Phase 1*. www.coaghealthcouncil.gov.au/Portals/0/Birthing%20on%20country%20Framework.pdf

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

- *Maternity: Towards Normal Birth in NSW*, New South Wales Department of Health
- *Maternity: Timing of Planned or Pre-labour Caesarean Section at Term*, New South Wales Department of Health
- Type of birth (vaginal, caesarean, forceps, etc.), NSW Health Statistics
- *South Australian Perinatal Practice Guidelines: Caesarean Section*
- *South Australian Perinatal Practice Guidelines: Birth Options after Caesarean Section*
- The Continuity at Centenary Hospital (CatCH) program, Australian Capital Territory, which provides continuity of midwifery care during pregnancy, birth and postnatal care
- Caesarean sections, HealthStats ACT
- *Queensland Maternity and Neonatal Clinical Guideline: Normal Birth*
- *Queensland Maternity and Neonatal Clinical Guideline: Vaginal Birth after Caesarean Section*
- *Queensland Maternity and Neonatal Clinical Guideline: Obesity in Pregnancy*
- Queensland perinatal statistics
- 3 Centres Collaboration, Victoria
- Maternity and Newborn Clinical Network, Victoria
- Koori Maternity Services Program, Victoria
- Project Primip, Royal Women's Hospital Melbourne
- Rural Generalist program, Royal Australian College of General Practitioners, and Australian College of Rural and Remote Medicine
- Western Australian Preterm Birth Prevention Initiative.

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Caesarean section 20–34 years

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3.5 Third- and fourth-degree perineal tears

Context

This data item examines the rate of third- and fourth-degree perineal tears per 1,000 women giving birth vaginally based on their place of residence. Perineal tears are tears of the skin and other tissues (the perineum) that separate the vagina from the anus. They occur mainly during childbirth as the baby stretches the vagina.[1,2]

Most women who give birth vaginally do not sustain any significant damage to their perineum or anus.[3] Of all women who gave birth vaginally in Australia in 2014, one-quarter had an intact perineum after the birth, and about half had either a first-degree tear (skin-deep tear) or a second-degree tear (involving the perineal muscle).[3] A small proportion (3%) of women had a third- or fourth-degree tear.[3]

A third-degree tear is an injury to the perineum involving the anal sphincter (muscle controlling the anus), and a fourth-degree tear involves the anal sphincter and the anal mucosa (the lining of the anus or rectum).[1,2] These injuries, if not recognised and repaired at the time, can have serious long-term consequences for women's lives, including continued perineal pain, faecal incontinence, painful sexual intercourse, reduced quality of life and depression.[2] Accurate detection and appropriate repair of these tears is important to minimise the risk of infection, blood loss, pain and incontinence, as well as long-term complications.[2,4] Repair surgery is effective in eliminating symptoms for about 60–80% of affected women one year after surgery, but some women have permanent incontinence despite appropriate treatment.[2,5]

Australian rate

The Australian rate of third- and fourth-degree perineal tears is above the reported average for comparable countries in the Organisation for Economic Co-operation and Development (OECD).[6] Differences in clinical practice and in reporting are likely to contribute to variation between countries.[6,7] Rates are higher with instrument-assisted birth. For unassisted vaginal births, the Australian rate and OECD reported average were 2.4 and 1.6 per 100 births, respectively, in 2013.[6] For instrument-assisted vaginal births, the Australian rate and OECD reported average were 7.3 and 6.0 per 100 births, respectively.[6]

Third- and fourth-degree perineal tears

Analysis of data from the National Perinatal Data Collection in 2013 found that Aboriginal and Torres Strait Islander women who gave birth vaginally were less likely to have a third- or fourth-degree perineal tear than non-Indigenous women (1.8% compared with 3.0%).[8] Living in remote areas was associated with lower rates of third- and fourth-degree tears than living in major cities (2.1% in remote areas compared with 3.2% in major cities).[8]

There are limited published Australian data on the effect of socioeconomic disadvantage on rates of third- or fourth-degree perineal tear. Socioeconomic advantage was associated with higher rates of severe perineal tear in an analysis of first births in England during the period 2000–2012.[9]

Risk factors for third- or fourth-degree perineal tear

The risk in a first vaginal birth is approximately three times as high as the rate in subsequent vaginal births.[10,11] The risk is approximately doubled in an instrument-assisted birth (forceps or vacuum extraction)[11], or if the baby's birth weight is 4 kg or more.[10,11] Other risk factors include Asian ethnicity, large infant head circumference, prolonged second stage of labour, shoulder dystocia of the baby (shoulder stuck behind mother's pubic bone), having a previous severe perineal tear, and occipito-posterior position of the baby (back of baby's head against mother's spine).[2,10-12] Having a male baby and gestational diabetes have also been identified as risk factors in some Australian studies.[13,14]

Evidence is conflicting on whether an episiotomy increases or decreases the risk of third- or fourth-degree perineal tears during a vaginal birth.[15] Episiotomy is a surgical cut made through the vaginal wall and perineum to provide more space for the baby to be delivered.[1] The effectiveness of the procedure in preventing severe perineal tears appears to depend on the type of cut and the indications for its use.[16]

Women aged 25–34 years appear to be more likely to have third- or fourth-degree perineal tears after vaginal birth compared with younger and older women, according to Australian data.[16,17] The lower risk of severe perineal tears for women aged 35 years and over compared with women aged 25–34 years does not appear to be related to the proportion of first births.[14,16] More caesarean sections in this age group may mean that those who give birth vaginally have fewer risk factors than younger women.

Trends since 2000

The reported incidence of severe perineal trauma has increased over the past two decades in Australia and in comparable countries.[9,18-20] A study of births in New South Wales reported an increase in the overall rate of severe perineal trauma from 1.4% to 1.9% between 2000 and 2008.[13] Rates increased three-fold in England between 2000 and 2012, from 1.8% to 5.9%.[9]

The trend towards increasing rates of third- and fourth-degree perineal tears does not necessarily indicate poor-quality care. Some of the rise may be due to better recognition and reporting.[8,12] Other suggested explanations are increased rates of forceps-assisted births, and changes in episiotomy rates and practices.[9,21] Changes to other practices during the second stage of labour may also contribute, such as the woman's position during birth, support of the perineum as the baby's head is delivered and the speed of delivery of the baby's head.[16,18,19] Changes in risk factors, such as the rise of maternal age at first birth and maternal weight, may contribute[9], but evidence is lacking to confirm this.[16,18] The increased proportion of women of Asian ethnicity in Australia may be a contributor to the rate rise.[16]

About the data

Data are sourced from the Australian Institute of Health and Welfare National Perinatal Data Collection, and include births that occurred in hospitals, birth centres and the community (such as home births), for both public and private patients. Rates are described as the number of third- and fourth-degree perineal tears per 1,000 women who gave birth vaginally over the three-year period 2012–2014. Data include instrument-assisted births, non–instrument assisted births and episiotomies.

Data are aggregated over three years to provide sufficient numbers to support reporting at a local level. The number of third-and fourth-degree perineal tears and the number of women who gave birth vaginally over three years are used to provide an average rate. This is comparable to a rate based on data collected over one year.

The analysis and maps are based on the residential address of the mother and not the location of the birth. Rates are age standardised to allow comparison between populations with different age structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

Over the three-year period 2012–2014, 18,463 women of all ages who gave birth vaginally had a third- or fourth-degree perineal tear, representing an average rate of 27 per 1,000 vaginal births (the Australian rate).

The number of women who had a third- or fourth-degree perineal tear across 301† local areas (Statistical Area 3 – SA3) ranged from 6 to 71 per 1,000 vaginal births. The rate was **11.8 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of women who had a third- or fourth-degree perineal tear varied across states and territories, from 22 per 1,000 vaginal births in Western Australia to 45 in the Australian Capital Territory (Figures 3.32–3.35).

After the highest and lowest 10% of results were excluded and 245 SA3s remained, the number of women who had a third- or fourth-degree perineal tear per 1,000 vaginal births was 2.9 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 of third- and fourth-degree perineal tear tended to be higher in major cities and remote areas than in inner and outer regional areas. There was a trend towards a decreasing rate of perineal tears with socioeconomic disadvantage in major cities. However, there was no clear pattern according to socioeconomic disadvantage in other categories of remoteness (Figure 3.36).

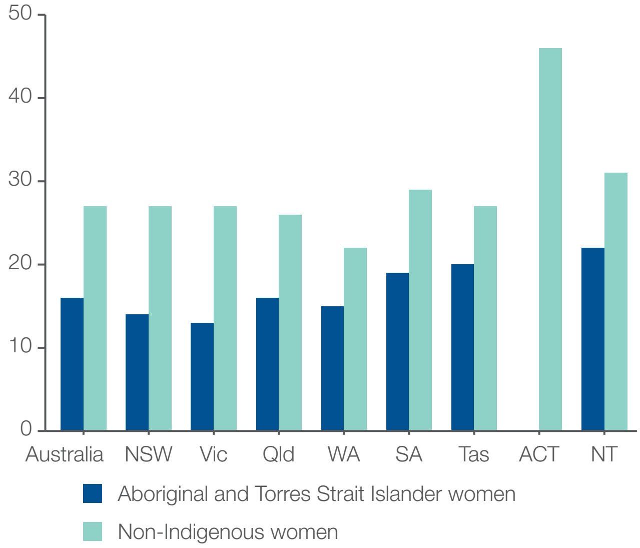
† There are 333 SA3s. For this item, data were suppressed for 32 SA3s due to a small number of third- and fourth-degree perineal tears and/or women living in an area who gave birth vaginally.
Some of the published SA3 rates were considered more volatile than others. These rates are excluded from the 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.

Third- and fourth-degree perineal tears

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander women (16 per 1,000 vaginal births) was 41% lower than the rate for non-Indigenous women (27 per 1,000 vaginal births) (Figure 3.30).

Figure 3.30: Number of third- and fourth-degree perineal tears per 1,000 vaginal births, age standardised, by state and territory and Indigenous status, 2012–2014

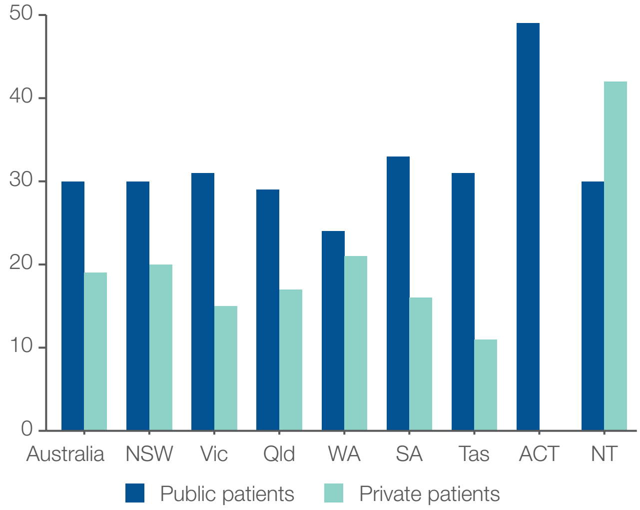


The data for Figure 3.30 are available at www.safetyandquality.gov.au/atlas.

Analysis by patient funding status

Overall, the rate of third- or fourth-degree perineal tear for privately funded patients (19 per 1,000 vaginal births) was 37% lower than for publicly funded patients (30 per 1,000 vaginal births). This differential varied by state and territory, and was greatest in Tasmania. The Northern Territory was an exception to this pattern, with a higher rate for privately funded patients (42 per 1,000 vaginal births) than for publicly funded patients (30 per 1,000 vaginal births) (Figure 3.31).

Figure 3.31: Number of third- and fourth-degree perineal tears per 1,000 vaginal births, age standardised, by state and territory and patient funding status, 2012–2014



The data for Figure 3.31 are available at www.safetyandquality.gov.au/atlas.

Notes:
Rates are age standardised to the Australian female population aged 15–44 years in 2001.
Rates are based on the number of third- and fourth-degree perineal tears (numerator) and number of women living in the geographic area who gave birth vaginally (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
Deliveries involving public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Deliveries involving private patients do incur a charge to the patient and/or a third-party payer.
Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
Data for ACT (private patients) have been suppressed.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Perinatal Data Collection 2012–2014.

Interpretation

Potential reasons for the variation include differences in:

- Maternal risk factors, such as gestational diabetes and obesity
- Clinician adherence to policies and guidelines on perineal care and obstetric practice
- Clinician skills and competency levels in instrument-assisted births
- Baby risk factors, such as weight and head circumference
- The proportion of mothers of Asian ethnicity
- The parity status of mothers (number of previous births)
- Obstetric risk factors, such as prolonged second stage of labour, baby's position in the birth canal and mother's position during birth
- The rate and type of instrument-assisted births (vacuum extraction or forceps)
- The rate and type of episiotomy
- Reporting and coding practices across states and territories
- Health service policies and guidelines on perineal care and clinical practice, including the recognition and detection of perineal tears.

The reduced likelihood of third- and fourth-degree perineal tears for Aboriginal and Torres Strait Islander women compared with other Australian women may be partly explained by higher rates of preterm babies, low birth-weight babies and babies who are small for gestational age (each at least 1.5 times as high for Aboriginal and Torres Strait Islander women as for non-Indigenous women).[3] Aboriginal and Torres Strait Islander women are also less likely to have an instrument-assisted vaginal birth than non-Indigenous women (6% versus 12%).[3] These factors may outweigh some potential risk factors for perineal tear among Aboriginal and Torres Strait Islander women, such as higher rates of obesity and gestational diabetes than non-Indigenous women.[3]

The reason for lower rates of severe perineal tears in privately funded ('private') patients compared with publicly funded ('public') patients is unclear. Differences in detection and reporting between public and private hospitals may contribute. As well, an Australian study of more than 700,000 singleton births found that women in private hospitals had lower rates of third- and fourth-degree tears than those in public hospitals, regardless of maternal age, and the proportion of first births and vaginal births.[22] Private patients may have fewer risk factors for perineal tear than public patients. For example, more elective caesarean sections in the private health sector may reduce the proportion of women at risk of perineal tear giving birth vaginally. Differences in models of care, such as midwifery-led compared with obstetric-led care, may also influence perineal tear rates; these include differences in detection and reporting. Differences in the use and indications for instruments and episiotomy, as well as in rates of emergency caesarean section, may also contribute.

The lower rate of third- and fourth-degree perineal tear in regional areas compared with major cities may reflect less systematic detection and reporting in smaller hospitals, differences in models of care for low-risk births in regional areas and the lower proportion of women of Asian ethnicity living in regional areas.

Addressing variation

Although severe tears cannot be prevented in all cases, a number of clinical practices are associated with a reduced risk.[2] Initiatives that combine these practices with education and training can be effective in reducing incidence.[23-25]

Supportive care

Warm compresses on the perineum in the second stage of labour approximately halve the risk of third- and fourth-degree perineal tears.[26] There is also some evidence to suggest that perineal massage during this stage may reduce the risk of third-degree tears.[26]

Third- and fourth-degree perineal tears

Antenatal perineal massage undertaken by the woman or her partner from 35 weeks (once or twice a week) reduces the risk of episiotomies for first vaginal births.[27] Although this practice does not affect rates of third- or fourth-degree perineal tears, it reduces the incidence of perineal trauma that requires stitches.[27]

Supporting a slow and gentle birth of the baby's head and shoulders during the second stage of labour is widely regarded as important for minimising the risk of third- and fourth-degree perineal tears.[23,25] Ways of doing this include maintaining good communication with the woman throughout the second stage of labour, such as continuous support from the same midwife[28], and having good visualisation of the perineum during the last minutes of labour.[23] There is conflicting evidence for other measures, such as manually pressing on the baby's head on crowning, and for the level of encouragement or coaching that women should be given to push.[4] However, recent international programs that have successfully lowered rates of anal sphincter tears have described 'hands on' techniques (guarding the perineum and flexing the baby's head) and verbal encouragement to slow pushing at crowning.[2,23,26]

Birth position may influence the risk of tears involving the anal sphincter.[10,29] In the United Kingdom, guidelines discourage lying down (supine) or semi-supine positions during the second stage of labour and encourage women to adopt any other position that they are comfortable with.[4] Lithotomy (lying on the back with the trunk slightly raised and the legs in stirrups) has been associated with the highest rates of obstetric anal sphincter injury[10,29], while a standing position may be protective.[29] Further, keeping mobile and staying upright during the first stage of labour reduces the duration of the second stage of labour, and the risk of caesarean section and epidural analgesia.[30]

Use of episiotomy and instruments

Routine use of episiotomy for unassisted vaginal births (that is, births without use of instruments) does not protect against third- or fourth-degree perineal tears.[4,31] United Kingdom guidelines recommend episiotomy if there is a clinical need, such as an instrumental birth or suspected foetal compromise.[2,4] If instruments are used, a mediolateral episiotomy (a cut that turns away from the anal sphincter at an angle of 60 degrees) is recommended.[2,15] Midline episiotomy (a cut towards the anus) in an instrumental vaginal birth appears to increase the risk of injury to the anal sphincter and should be avoided.[15,32]

In Australia, 18% of women who had their first baby as an unassisted vaginal birth had an episiotomy in 2013 compared with 16% in 2004.[8] Episiotomy is more common in instrument-assisted vaginal births. In these first births, the rate of episiotomy increased from 61% to 70% between 2004 and 2013.[8]

Improvements in training in instrument-assisted vaginal births, including initiatives to ensure skills maintenance, are likely to help reduce the risk of tears due to instruments.[33,34] Use of mediolateral episiotomy if instruments are used may be protective.[2,34] Instruments such as vacuum extraction (also known as ventouse) or forceps are used to expedite birth if a baby is showing signs of distress.[4] Both are associated with higher rates of third- or fourth-degree perineal tear than unassisted births.[2,6] Vacuum extraction is associated with lower rates than forceps, but is less effective than forceps in achieving a vaginal birth.[35]

In Australia, 25% of women aged 20–34 years who gave birth for the first time to a singleton, full-term baby with head at the cervix had an instrument-assisted birth in 2013.[8] This proportion has increased by 2.5% since 2004.[8]

Risk factor awareness

Clinician awareness of risk factors for third- and fourth-degree tear (as described on page 222) is important. Although risk factors cannot reliably predict an anal sphincter injury[2], awareness of risks can influence management.[36]

Detection and management

Since all women giving birth vaginally are at risk of sustaining a third- or fourth-degree perineal tear, guidelines recommend systematic examination of the perineum after birth.[2] If genital trauma is identified, a closer rectal examination should be done, with the mother's consent, to ensure accurate diagnosis and selection of treatment appropriate for the severity of the tear.[2] These steps will also support the consistent reporting of perineal tears. Only clinicians with expertise and skills in repair of third- and fourth-degree tears should undertake these repairs, and repairs should be done according to latest guidelines.[2]

Examples of effective initiatives

Quality improvement initiatives that focus on three to five key clinical practices, and include a comprehensive education and training component have been effective in reducing rates of severe perineal tears.[23-25]

A United Kingdom initiative based on techniques to slow down the second stage of labour reported a significant decrease in third- and fourth-degree tears after the intervention (4.7% versus 2.2%; n = 3,902 vaginal births).[24] The intervention was based on three principles:

- Avoiding the semi-recumbent position
- Verbal encouragement for the mother to slow down pushing at crowning of the head
- Slowing down delivery of the head with one hand.

Case study: Quality improvement project on detection and management of third- and fourth-degree perineal tears

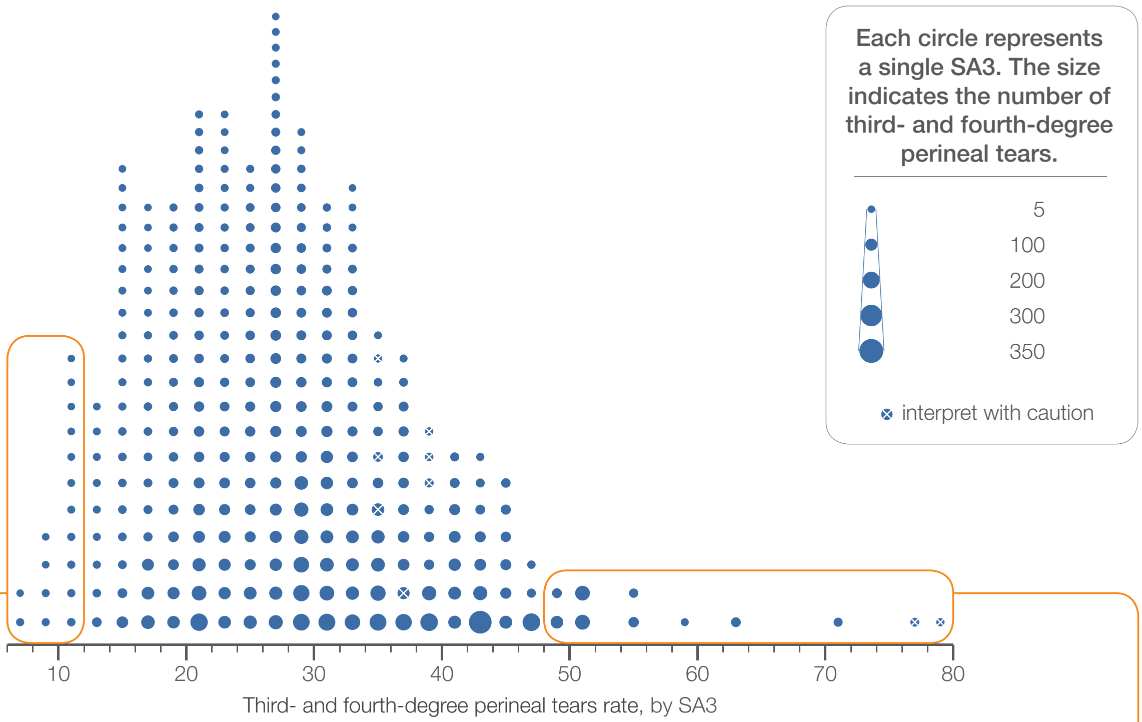
In 2016, the Canberra Hospital and Health Services undertook a quality improvement project to address higher than expected numbers of third- and fourth-degree perineal tears in the Australian Capital Territory in 2015. A combination of review of clinical practices, and staff and patient education was associated with a reduction in the rate (average of 3.0% in 2016 compared with 5.2% in 2015).

The plan of action was multifaceted and included:

- Development of a reflective practice tool for maternity staff to reflect on factors that may have contributed to cases of severe perineal trauma
- Revision of an information brochure for women on antenatal perineal massage
- Development of a process to support application of warm compresses to the perineum in the second stage of labour
- Multidisciplinary workshops for midwifery, nursing and medical staff, covering prevention and management of third- and fourth-degree perineal tears, antenatal massage, warm compresses in the second stage, birth positions and instrument-assisted births.

Third- and fourth-degree perineal tears

Figure 3.32: Number of third- and fourth-degree perineal tears per 1,000 vaginal births, age standardised, by Statistical Area Level 3 (SA3), 2012–2014



Lowest rate areas

SA3	State	Rate	Perineal tears
Mandurah	WA	6	19
Inverell - Tenterfield	NSW	6	5
Coolangatta	Qld	8	8
Wheat Belt - South	WA	8	7
Central Highlands	Qld	9	18
Outback - North	Qld	9	16
Dubbo	NSW	10	25
Darling Downs (West) - Maranoa	Qld	10	15
Upper Murray exc. Albury	NSW	10	12
Sorell - Dodges Ferry	Tas	10	6
Mid North	SA	10	5
Wheat Belt - North	WA	11	20
Taree - Gloucester	NSW	11	19
Bowen Basin - North	Qld	11	18
Wollondilly	NSW	11	11
Maryborough	Qld	11	9
Maryborough - Pyrenees	Vic	11	6

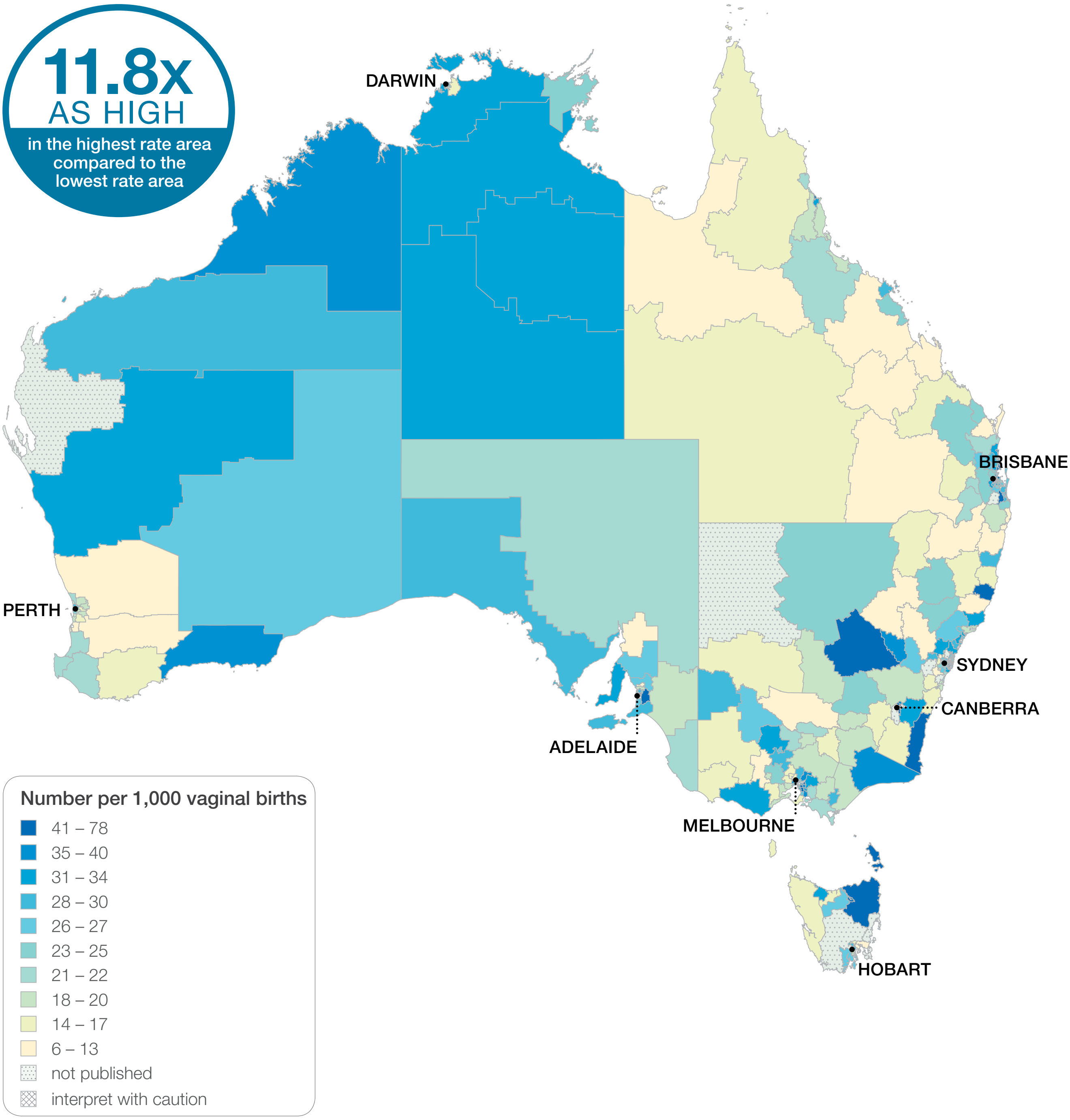
Highest rate areas

SA3	State	Rate	Perineal tears
Adelaide City	SA	78*	22
Weston Creek	ACT	76*	34
Surfers Paradise	Qld	71	38
Woden	ACT	62	53
Gold Coast Hinterland	Qld	59	15
Cairns - North	Qld	55	66
North East	Tas	54	42
Hurstville	NSW	51	159
Monash	Vic	51	157
Tuggeranong	ACT	49	113
Adelaide Hills	SA	49	54

Notes:
Rates are age standardised to the Australian female population aged 15–44 years in 2001.
Rates are based on the number of third- and fourth-degree perineal tears (numerator) and number of women living in the geographic area who gave birth vaginally (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
Crosses and asterisks 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 National Perinatal Data Collection 2012–2014.

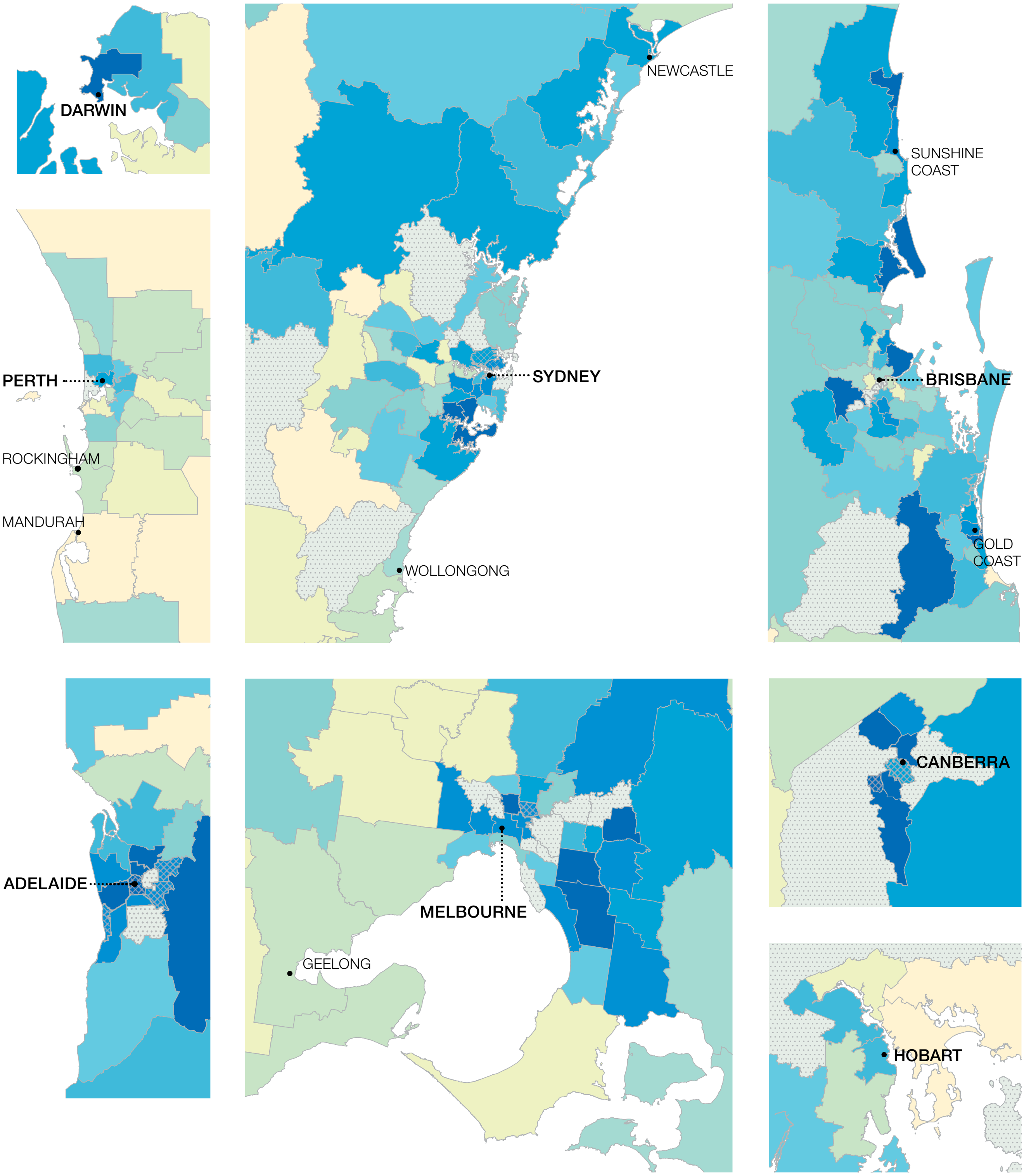
Third- and fourth-degree perineal tears

Figure 3.33: Number of third- and fourth-degree perineal tears per 1,000 vaginal births, age standardised, by Statistical Area Level 3 (SA3), 2012–2014: Australia map



Notes:
Rates are age standardised to the Australian female population aged 15–44 years in 2001.
Rates are based on the number of third- and fourth-degree perineal tears (numerator) and number of women living in the geographic area who gave birth vaginally (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
Hatching indicates a rate that is 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 National Perinatal Data Collection 2012–2014.

Figure 3.34: **Number of third- and fourth-degree perineal tears per 1,000 vaginal births, age standardised, by Statistical Area Level 3 (SA3), 2012–2014: capital city area maps**

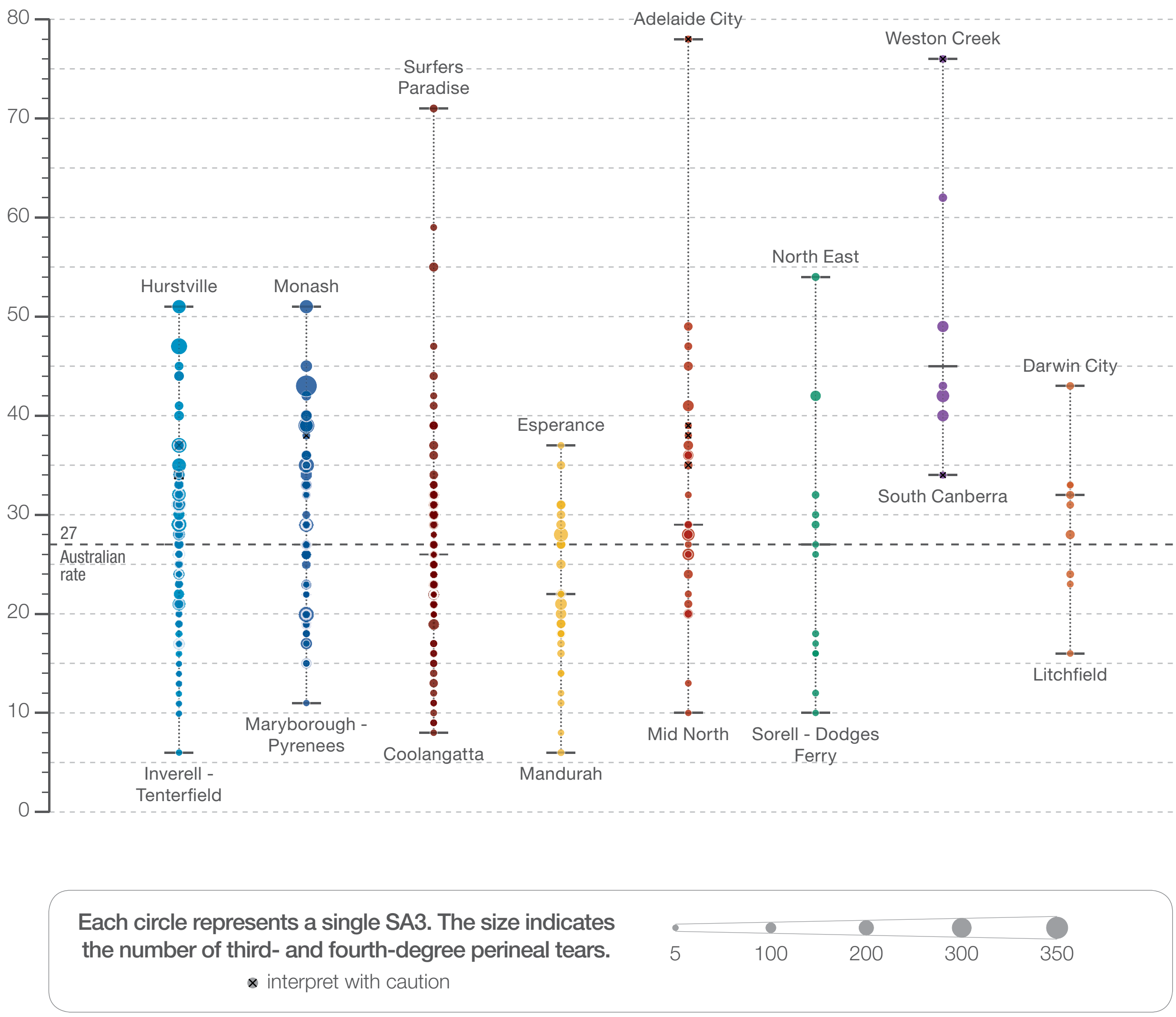


Notes:
Rates are age standardised to the Australian female population aged 15–44 years in 2001.
Rates are based on the number of third- and fourth-degree perineal tears (numerator) and number of women living in the geographic area who gave birth vaginally (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
Hatching indicates a rate that is 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 National Perinatal Data Collection 2012–2014.

Third- and fourth-degree perineal tears

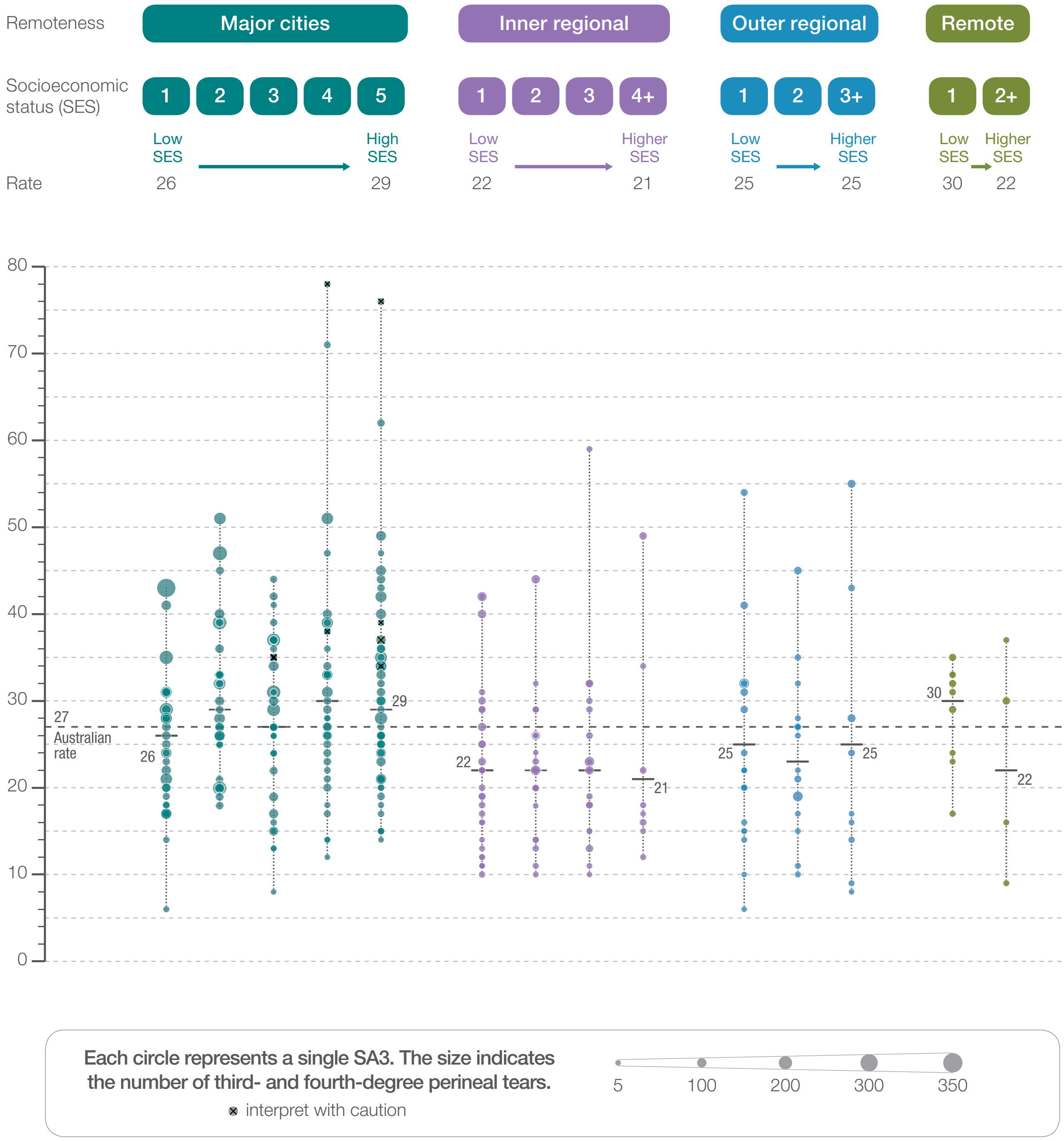
Figure 3.35: Number of third- and fourth-degree perineal tears per 1,000 vaginal births, age standardised, by Statistical Area Level 3 (SA3), state and territory, 2012–2014

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	51	51	71	37	78*	54	76*	43
State/territory	27	27	26	22	29	27	45	32
Lowest rate	6	11	8	6	10	10	34*	16
Perineal tears	5,978	4,657	3,567	1,669	1,353	344	544	284



Notes:
Rates are age standardised to the Australian female population aged 15–44 years in 2001.
Rates are based on the number of third- and fourth-degree perineal tears (numerator) and number of women living in the geographic area who gave birth vaginally (denominator).
Analysis is based on the woman's area of usual residence, not the place of birth.
Refer to the case study (page 227), Canberra Hospital and Health Services quality improvement project, for 2015-2016 ACT rates.
Crosses and asterisks 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 National Perinatal Data Collection 2012–2014.

Figure 3.36: Number of third- and fourth-degree perineal tears per 1,000 vaginal births, age standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2012–2014



Notes:

Rates are age standardised to the Australian female population aged 15–44 years in 2001.

Rates are based on the number of third- and fourth-degree perineal tears (numerator) and number of women living in the geographic area who gave birth vaginally (denominator).

Analysis is based on the woman's area of usual residence, not the place of birth.

Crosses 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 National Perinatal Data Collection 2012–2014.

Third- and fourth-degree perineal tears

Resources

- Royal College of Obstetricians and Gynaecologists. The management of third-and fourth-degree perineal tears. Green-top guideline No. 29. London: RCOG; 2015. Available from: www.rcog.org.uk/globalassets/documents/guidelines/gtg-29.pdf
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Australian initiatives

The information in this chapter will complement work already under way to address the rate of third- and fourth-degree perineal tears in Australia. At a national level, this work includes:

- A Breakthrough Collaborative on perineal trauma, led by Women's Healthcare Australasia, based on methods developed by the Institute for Healthcare Improvement in the United States – a Breakthrough Collaborative is a resource-intensive tool that focuses on spread and adaptation of existing knowledge about best-practice care to multiple settings. www.women.wcha.asn.au/wha-collaborative-improvement-perineal-trauma
- National Core Maternity Indicators of third- and fourth-degree perineal tears for all vaginal births, and third- and fourth-degree perineal tears for all vaginal first births; the full list of indicators and results from 2010 to 2013 are available at www.aihw.gov.au/publication-detail/?id=60129555634.

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Chapter 4
Surgical interventions

At a glance

This Atlas examined variation in six surgical interventions by Statistical Area Level 3 (SA3). Lumbar spinal fusion showed the largest variation between areas, with a seven-fold difference between the highest and lowest rates. Rates of spinal decompression showed a five-fold difference. A four-fold difference was found for rates of knee replacement, laparoscopic cholecystectomy, appendicectomy and cataract surgery.

For some of these procedures, 'indication creep' and differing clinician views of the value of the operation in new patient populations are likely to have contributed to the variation. For example, spinal fusion surgery was initially used primarily to treat fractures and deformities of the spine, but its use has now broadened to include treatment of degenerative spine disorders.[1] In the case of cholecystectomy, introduction of the laparoscopic technique was followed by a sharp rise in its use.[2] This may have been partly due to a lowering of the threshold for the procedure.[2]

Wide variation in use of a surgical procedure may reflect a lack of agreement on its indications. For procedures with uncertain benefits outside a small patient population, substantial variation raises the likelihood that rates are too high in some areas. For the interventions in this chapter where the evidence is unclear, determining whether there are subgroups of patients who are more likely to benefit from the procedure should be a priority. Identification of patients who are likely to benefit would be aided by routine collection and analysis of the severity and nature of patients' presenting symptoms, and patient-reported outcomes after surgery. Limiting spinal fusion procedures undertaken because of low back pain has been recommended in the United Kingdom.[3]

Ensuring that patients understand the evidence about the likelihood of risks and benefits is particularly important if the degree of benefit from surgical treatment is not clear. Accessible information, improved health literacy and high-quality tools for shared decision-making would support patients to make better informed choices about care.[4]

The variation in rates of cataract surgery highlights inequity of access. The rate of cataract surgery hospitalisations for Aboriginal and Torres Strait Islander Australians was 80% of the rate for other Australians.

Surgical interventions

Recommendations

Knee replacement

4a. The Medicare Benefits Schedule (MBS) Review Taskforce to ensure that MBS descriptors reflect the care described in the Osteoarthritis of the Knee Clinical Care Standard.

4b. State and territory health departments to use the Osteoarthritis of the Knee Clinical Care Standard to promote appropriate care for the management of people with knee pain, including conservative non-surgical management using a combination of non-pharmacological and pharmacological treatments.

4c. State and territory health departments to promote timely access to joint replacement or joint-conserving surgery when conservative management no longer provides adequate pain relief or maintenance of function.

Lumbar spinal decompression and fusion

4d The Commission to lead work with relevant professional colleges and societies to develop an Australian guideline for management of low back pain and sciatica, to promote appropriate care for people with these conditions.
This should be based on a modification of the 2016 National Institute for Health and Care Excellence guideline *Low Back Pain and Sciatica in Over 16s: Assessment and Management*, and any other relevant high-quality Australian and international evidence.

4e. State and territory health departments, and relevant colleges and specialist societies to implement the Australian guideline on low back pain and sciatica to promote appropriate care for people with low back pain and sciatica.

4f. The Commission to work with relevant specialists and experts to identify the next steps needed to define and deliver appropriate care for low back pain and sciatica.

4g. The Spine Society of Australia to publish the outcome of the pilot trial of the Australian Spine Registry. The Commission to work with the Spine Society of Australia to develop a business case for the development of a clinical quality registry for all patients undergoing spinal fusion and decompression surgery in Australia. All patients who have spinal fusion and decompression operations in Australia would be entered on this registry unless they opt out. The registry is to be established and operated according to the Framework for Australian Clinical Quality Registries.

Laparoscopic cholecystectomy and appendicectomy

4h. State and territory health departments to lead work with relevant professional colleges and societies to develop clinical guidance on timing, imaging and thresholds for surgery for appendicectomy and laparoscopic cholecystectomy.

4i. State and territory health departments, and relevant colleges and specialist societies to promote, disseminate and implement guidance on surgery thresholds for biliary disease and abdominal pain. To maximise implementation, the guidance should be incorporated within care pathways.

4j. The Commission to work with relevant professional colleges and specialist societies and HealthPACT to develop a technology brief to examine the evidence for the use of intraoperative cholangiography to delineate the biliary anatomy and to detect stones in the common bile duct.

Cataract surgery

4k. The Commission to develop a clinical care standard for cataract surgery, and the MBS Review Taskforce to ensure that MBS descriptors reflect the care described in the clinical care standard.

4l. State and territory health departments to work with the Aboriginal Community Controlled Health Service sector to ensure culturally appropriate, ongoing and consistent services for cataract assessment and cataract surgery in areas where these are needed.

Background

This chapter examines variation in hospitalisations for:

- Knee replacement
- Lumbar spinal decompression
- Lumbar spinal fusion
- Laparoscopic cholecystectomy
- Appendicectomy
- Cataract surgery.

Landmark accomplishments in surgical practice have revolutionised surgical care, saved countless lives, and significantly improved longevity and the quality of life. However, when new techniques are developed, it is important to define how they should best be used so that the likely benefits justify the risks and the use of resources. 'Indication creep' can contribute to variation in the use of surgical procedures as they start to be used beyond the conditions for which they were initially trialled and found to be of benefit.[5] Whereas a new technique may have been introduced for very valid reasons and brought clear benefits to the original patient group, questions about appropriateness can arise when its use is extended to a new group of patients in which the value is less clear.[5] Variation may follow when clinicians have different opinions on which patients are likely to benefit.[5] Some of the surgical interventions examined in this chapter fall into this category.

In the past, spinal fusion surgery was primarily used to treat fractures and deformities of the spine, such as severe scoliosis.[1] Over time, the conditions for which the procedure is used have broadened. Studies in the United States have shown that degenerative spine disorders are now the most common reason for spinal fusion.[6,7] Views differ in the clinical community about the value of lumbar spinal fusion operations (both with and without accompanying decompression) for low back pain resulting from degenerative disease. Some systematic reviews have highlighted the lack of high-quality evidence to allow firm conclusions to be drawn about outcomes from these surgeries.[8-11]

Surgical interventions

Cholecystectomy (removal of the gall bladder) is another example where the indication may have broadened; in this case, the introduction of the laparoscopic technique appears to have prompted an increase in use of the procedure. Rates of cholecystectomy in many countries in the Organisation for Economic Co-operation and Development rose sharply after the introduction of the laparoscopic procedure in the 1990s. Rates of cholecystectomy had been steady for some years before this, but, within two years of introduction of the new procedure, rates had increased by 24% in Australia.[2] Offering laparoscopic cholecystectomy to patients who would not have been fit to undergo the open procedure contributed to the increase, but the threshold for cholecystectomy may also have become lower.[2,12]

In both of these examples, and some other interventions examined in this chapter, determining whether there are subgroups of patients who are more likely to benefit from the procedure should be a priority. Identification of patients who are likely to benefit would be aided by routine collection and analysis of the severity and nature of patients' presenting symptoms, and patient-reported outcomes after surgery.

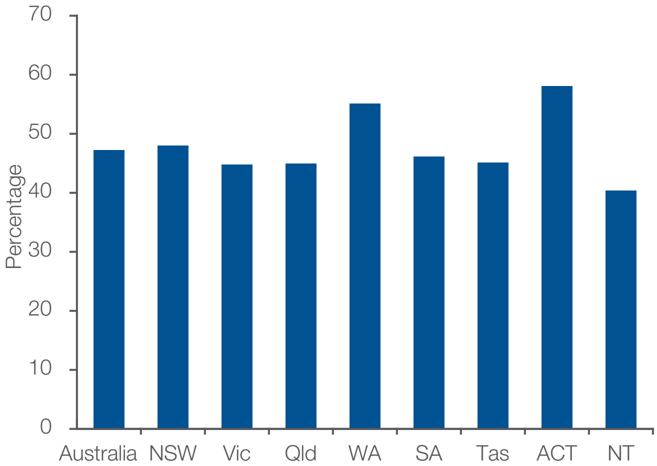
Greater use of conservative options, including self-management, could reduce the need for some surgical interventions. For example, even a 5% weight loss can improve symptoms for overweight people with symptomatic osteoarthritis of the knee.[13] Cognitive interventions and exercises have been shown in some studies to result in the same improvement as lumbar fusion in patients with chronic low back pain and disc degeneration (measured on a disability index that is considered the 'gold standard' of low back functional outcome tools).[14,15]

To make well-informed decisions, patients need to understand how the risks and benefits compare between surgical and non-surgical options. More data presented in an understandable way, accessible information, improved health literacy and high-quality tools for shared decision-making would support them to do this.[4] The Commission has a number of resources to support shared decision-making and risk communication (available at www.safetyandquality.gov.au). A clinical care standard and patient information on treatment options for knee pain have also recently been released by the Commission.

The influence of private health insurance

Differences in rates of private health insurance are likely to contribute to variation in hospitalisation rates for surgical interventions. The percentage of people with private hospital insurance in 2015, by state and territory, is shown in Figure 4.1. Rates of private hospital insurance varied from 40.4% in the Northern Territory to 58.1% in the Australian Capital Territory.[16]

Figure 4.1: Percentage of people with private hospital insurance, by state and territory, 2015



Source: Australian Prudential Regulation Authority[17]

About the data

Hospital admission data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations per 100,000 people. Because a record is included for each hospitalisation when a procedure occurs, rather than for each patient, patients hospitalised for a particular procedure 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 recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen. For some indicators, data are aggregated over three years to provide sufficient numbers to support reporting at the local level.

Factors influencing population-based hospitalisation rates include incidence and prevalence of risk factors and disease, hospital admission practices, bed availability, and patient social factors such as the availability of carers, the availability of other treatment options, treatment compliance and travel distance.

Surgical interventions

Australian initiatives

The information in this chapter will complement work already under way to improve surgical care in Australia. At a national level, this work includes:

- Australian Safety and Efficacy Register of New Interventional Procedures – Surgical (ASERNIP-S), The Research, Audit and Academic Surgery Division of the Royal Australasian College of Surgeons.[18] The ASERNIP-S program uses a range of methods to assess the safety and effectiveness of new and emerging surgical procedures, including full and rapid systematic reviews, technology overviews, and horizon scanning summaries and reports. The division also establishes and manages both clinical and research audits of surgical procedures.

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4.1 Knee replacement hospitalisations 18 years and over

Context

This data item examines hospitalisations for knee replacement surgery, including total, partial and revision procedures, in people aged 18 years and over by their place of residence. Knee replacement (also known as knee arthroplasty) is a surgical procedure that removes diseased parts of the bones forming the knee joint and replaces them with an artificial joint. Total knee replacements undertaken for the first time account for 88% of procedures. The remaining procedures are partial knee replacements (5%) and revisions of previous procedures (7%).[1]

Between 2003 and 2014, the number of knee replacement procedures undertaken in Australia per year increased by 88% – by 97% in the private sector and by 71% in the public sector.[1] The increase is partly due to population ageing but also to the growing use of this intervention for people at earlier ages, as a result of rising levels of obesity, which have increased the need for knee replacements. In 2011, Australia had the highest rate of knee replacement among selected countries in the Organisation for Economic Co-operation and Development (OECD).[2] Previous studies have shown geographical variation in rates of knee replacement within Australia, with higher rates in some regional areas.[3,4]

Pain or mobility problems caused by osteoarthritis are the reason for 98% of knee replacements in Australia.[1] Osteoarthritis is a common disease, affecting one in 12 Australians[5], and is the sixth most common condition managed by general practitioners, accounting for 2.8% of encounters.[6] The risk of osteoarthritis of the knee in overweight people is double that in people of normal weight; in obese people, it is four times as high.[7] An estimated 43% of knee osteoarthritis and 53% of total knee replacements in Australia are due to obesity.[7] Other risk factors for osteoarthritis of the knee include previous knee injury, female gender, older age and occupations that are physically demanding on the knee.[8]

Knee replacement hospitalisations 18 years and over

For people with knee osteoarthritis, guidelines recommend use of a range of pharmacological and non-pharmacological approaches before surgery, including weight loss, physiotherapy, and use of medicines to relieve pain and inflammation.[9,10] These strategies are effective for some people. For example, even a 5% weight loss can improve symptoms for overweight people with symptomatic osteoarthritis of the knee.[11] However, guidelines relating to osteoarthritis have not been fully implemented in Australia, and non-pharmacological treatments remain underused.[12] It has been estimated that only 43% of people with osteoarthritis receive care that is concordant with guidelines.[13]

Knee replacement surgery can be very effective in relieving pain and improving mobility for many patients with severe symptoms in whom conservative, non-surgical treatments have been unsuccessful.[10] Knee replacement surgery has some risks, related to the operation itself and to the risk of failure of the prosthetic joint. The 10-year revision rate ranges from 2.9% to 10.9%.[1] Although patient expectations about the likely outcomes of surgery are high, the operation is not successful for some people – approximately 15% of patients continue to experience pain and/or functional deficits after knee replacement surgery.[14-16] Patients therefore need to be well informed about the range of treatment options, the likelihood of risks and benefits associated with each, and the range of possible outcomes.

Waiting times for knee replacement surgery are among the longest for any type of elective surgery in Australia. In 2014–15, the waiting time was more than 191 days for half of the patients admitted for total knee replacement surgery in public hospitals.[17] Waiting times for total knee replacement surgery vary by Aboriginal and Torres Strait Islander status, remoteness and socioeconomic disadvantage. In 2014–15, the median waiting time for total knee replacement was 263 days for Aboriginal and Torres Strait Islander Australians and 190 days for other Australians.[17] It was 173 days in major cities, 234 days in inner regional areas, 262 days in outer regional areas and 202 days in remote areas.[18] The median waiting time was 218 days for the most socioeconomically disadvantaged and 148 days for the least socioeconomically disadvantaged.[18] Nationally, 6.6% of people admitted for total knee replacements undertaken in 2014–15 had waited more than 365 days.

In 2013, the rate of knee replacement surgery varied widely among OECD countries, from 3 per 100,000 in Mexico to 226 per 100,000 in the United States.[19] Knee replacement rates vary within countries as well as between countries. A study published in 2014 showed that there was a two- to three-fold difference within most participating OECD countries, including Australia.[2] Australia's knee replacement rates were considerably higher than the OECD average (180 compared with 121).[20]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for knee replacement per 100,000 people aged 18 years or over in 2014–15. Because a record is included for each hospitalisation for knee replacement surgery, rather than for each patient, patients hospitalised for this procedure 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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 52,039 hospitalisations for knee replacement, representing 257 hospitalisations per 100,000 people aged 18 years and over (the Australian rate).

The number of hospitalisations for knee replacement across 319† local areas (Statistical Area 3 – SA3) ranged from 128 to 507 per 100,000 people aged 18 years and over. The rate was **4.0 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 155 per 100,000 people aged 18 years and over in the Northern Territory to 284 in Western Australia (Figures 4.4–4.7).

After the highest and lowest 10% of results were excluded and 255 SA3s remained, the number of hospitalisations per 100,000 people aged 18 years and over was 1.9 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

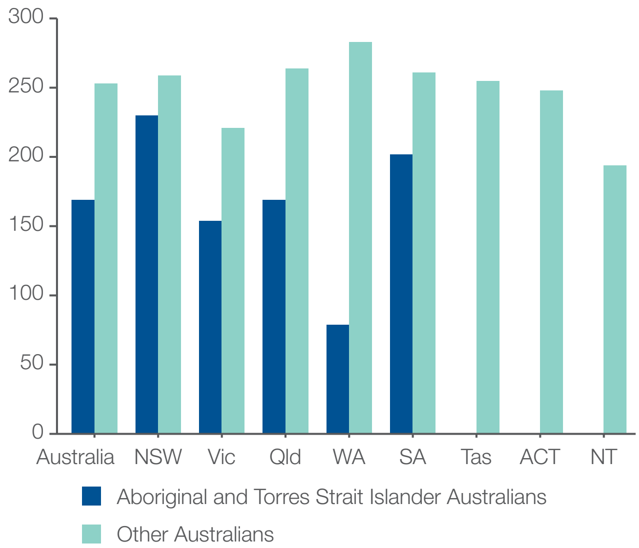
Analysis by remoteness and socioeconomic status

Rates of knee replacement surgery were higher in inner and outer regional areas than in major cities or remote areas. There was no clear pattern according to socioeconomic disadvantage (Figure 4.8).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (169 per 100,000 people) was 33% lower than the rate for other Australians (253 per 100,000 people) (Figure 4.2).

Figure 4.2: **Number of hospitalisations for knee replacement per 100,000 people aged 18 years and over, age and sex standardised, by state and territory and Indigenous status, 2014–15**



The data for Figure 4.2 are available at www.safetyandquality.gov.au/atlas.

† There are 333 SA3s. For this item, data were suppressed for 14 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Data for Tas, ACT and NT (Aboriginal and Torres Strait Islander Australians) have been suppressed.

Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.

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

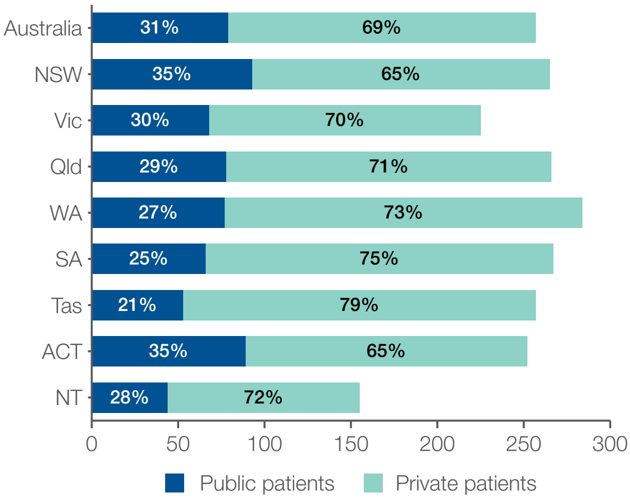
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Knee replacement hospitalisations 18 years and over

Analysis by patient funding status

Overall, 69% of hospitalisations for knee replacement surgery were for privately funded patients. This proportion varied from 65% in New South Wales and the Australian Capital Territory to 79% in Tasmania. The median age of patients at the time of operation was 69 years for publicly funded patients and 68 years for privately funded patients (Figure 4.3).

Figure 4.3: Number of hospitalisations for knee replacement per 100,000 people aged 18 years and over, age and sex standardised, by state and territory and patient funding status, 2014–15



The data for Figure 4.3 are available at www.safetyandquality.gov.au/atlas.

Interpretation

Potential reasons for the variation include differences in:

- Burden of disease, particularly osteoarthritis
- Risk factors for knee problems, such as obesity
- Decision-making criteria of clinicians and thresholds for surgical intervention
- Patients' perceptions of the likely benefits and risks of different care options
- Access to models of care that provide a coordinated approach to alternatives to surgery, such as physiotherapy
- Access to public elective surgery
- Levels of private health insurance and access to private hospitals.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in the area. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, 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.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Addressing variation

Following earlier work highlighting variation in knee surgery rates within Australia[19], the Commission has worked with clinical experts and consumers to investigate and recommend national action to reduce unwarranted variation and improve care. This work produced a number of approaches to identify and address unwarranted variation in knee surgery, with clinician, consumer and system-level strategies. A clinical care standard, identifying and defining the care that people should be offered, will be available from the Commission in 2017. Patient information on treatment options for knee osteoarthritis, and risks and benefits associated with each will also be available from the Commission in 2017.

International and Australian observational research suggests that orthopaedic wait-list triage systems led by advanced-scope physiotherapists or nurse practitioners can efficiently and appropriately stream patients for non-surgical and surgical interventions.[21-23] Arthritis Australia recommends establishment of multidisciplinary clinics for people with advanced osteoarthritis that include triage and conservative management, to improve management and reduce demand for elective joint replacement.[10]

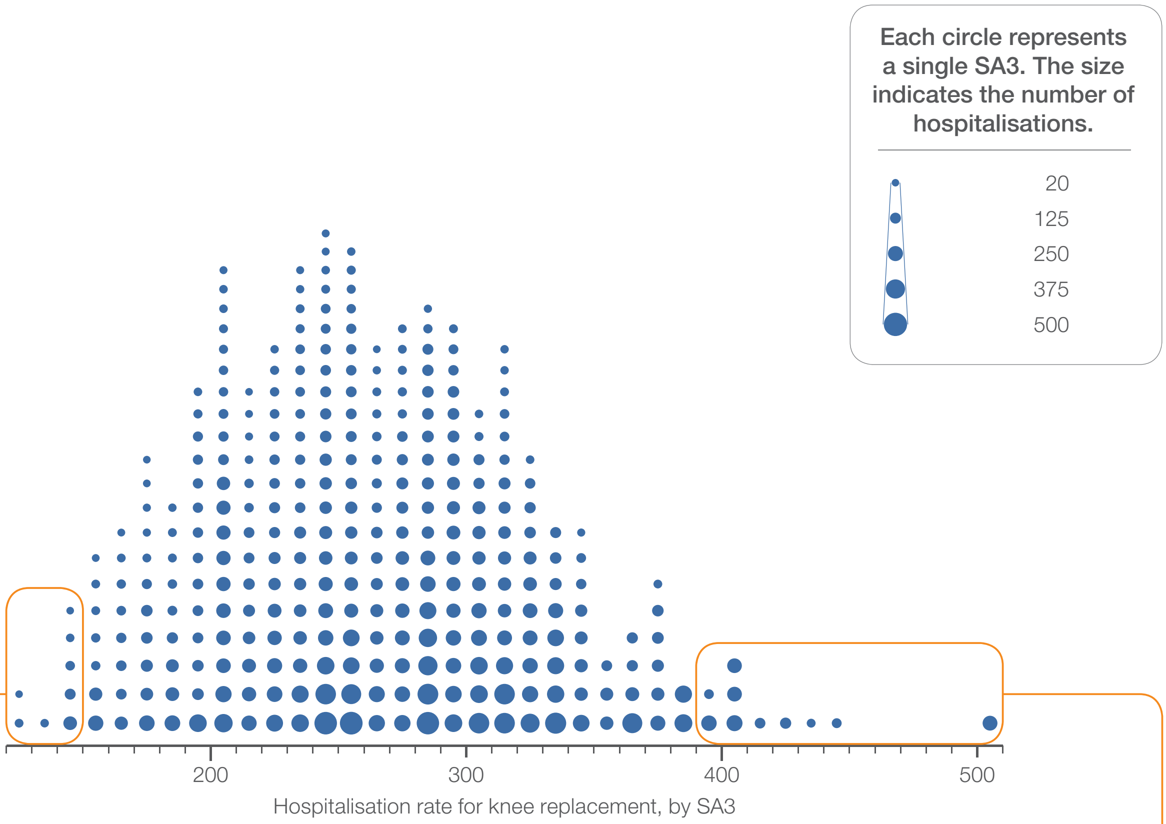
Programs based on this model of care have shown improvements in uptake of conservative management, improved clinical outcomes, and shorter waiting times for those triaged to surgery.[10] For example, the New South Wales Osteoarthritis Chronic Care Program reported that more than 1 in 10 (10.7%) of patients on the waiting list for knee replacement were removed because they no longer required surgery.[24] The Osteoarthritis Hip and Knee Service at the Royal Melbourne Hospital reported shorter waiting times to the initial appointment after general practitioner referral compared with usual care (81 days versus 105 days) and shorter time to surgery after consenting to surgery compared with usual care (median 141 days versus 218 days).[25] Most state and territory health departments are implementing multidisciplinary programs to improve the management of people with osteoarthritis; however, these are often still not coordinated between health services. Funding models that promote community-based multidisciplinary care and conservative management options should be explored. Given that obesity is a key risk factor for knee osteoarthritis, evidence-based obesity management programs should also be promoted.[26,27]

Routine measurement of treatment outcomes and patient preferences helps identify the groups of people who will benefit most from surgery, as well as those who are unlikely to benefit. This can help identify appropriate rates for knee replacement. Ensuring that patients have a clear understanding of potential outcomes of surgery and the effect that surgery might have on daily functioning is essential. Patient-reported outcome measures (PROMs) for knee replacement surgery measure the outcomes of treatment from a patient's perspective. This involves patients completing preoperative and postoperative surveys about their health and level of disability. In the United Kingdom, information about PROMs for knee replacement surgery is gathered nationally, and differences in thresholds for undertaking surgery and in health outcomes following surgery can be tracked.[28,29] In Australia, PROMs are used in some orthopaedic services, but there is no national system for gathering information about functional outcomes of knee replacement surgery. The Arthroplasty Clinical Outcomes Registry collects information on clinical and patient-reported outcomes of knee replacement surgery from a small number of sites around Australia and provides publicly available annual reports on findings.[30]

Knee replacement hospitalisations 18 years and over

The National Joint Replacement Registry collects data from hospitals on all knee joint replacements in Australia. This includes information on the physical condition of people undergoing surgery, the types of prosthesis used, and the time to first revision surgery for people who require reoperation. Currently, the registry does not have direct contact with patients and so does not gather PROMs. Collecting this information nationally and matching it with demographic and other data, such as therapies trialled before surgery, could help identify the types of patients who are unlikely to have a good outcome and the types of patients who would benefit from better access to knee replacement surgery. The Commission is currently evaluating the future use of PROMs in Australia, and has recently published a review examining the benefits and challenges of using PROMs to guide policymakers.[31]

Figure 4.4: Number of hospitalisations for knee replacement per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Maribyrnong	Vic	**128**	60
Darwin City	NT	**128**	22
Darebin - South	Vic	**133**	52
Brimbank	Vic	**141**	207
Brunswick - Coburg	Vic	**142**	84
Chatswood - Lane Cove	NSW	**146**	125
Palmerston	NT	**146**	24
Sherwood - Indooroopilly	Qld	**147**	52

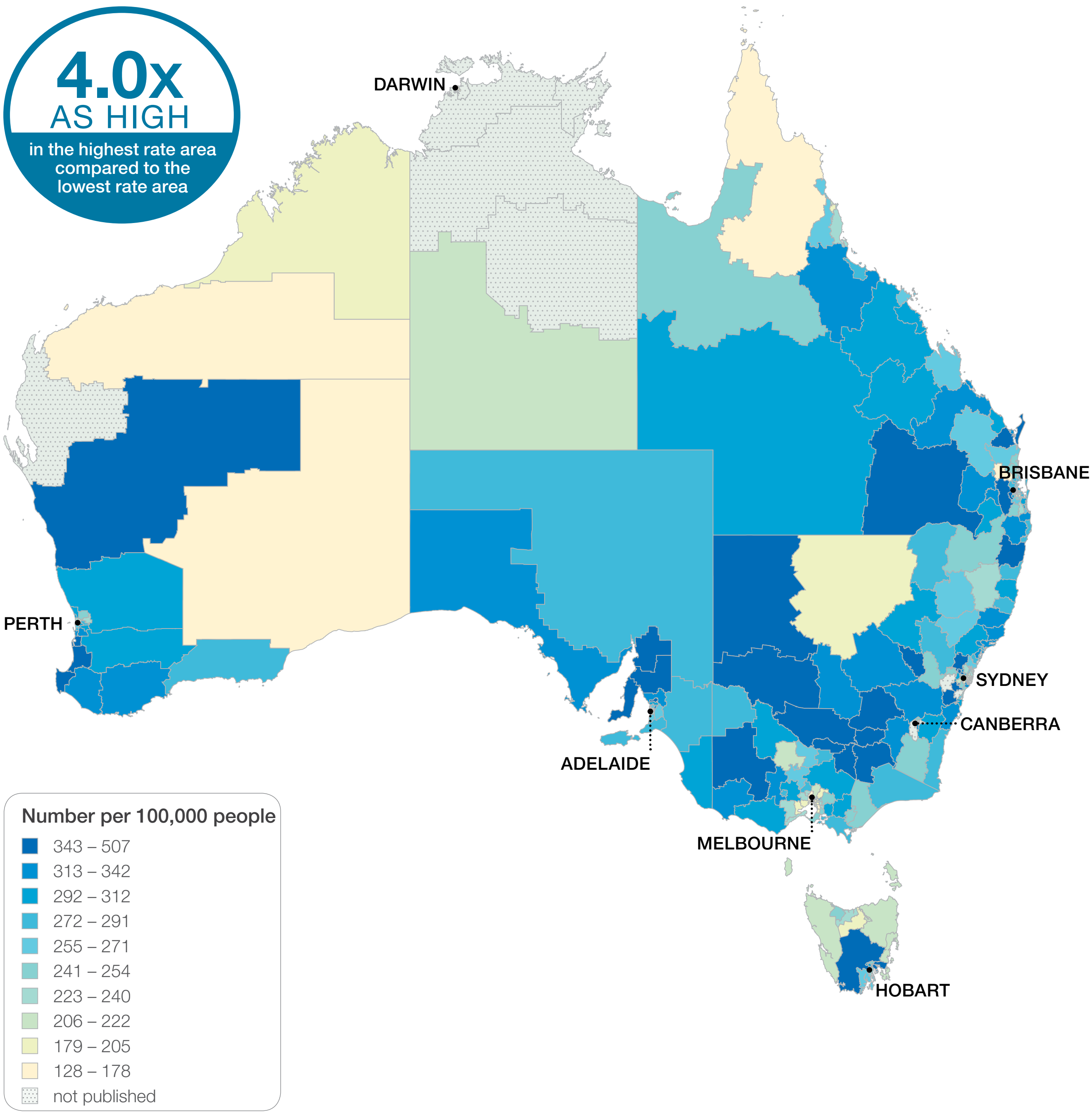
Highest rate areas

SA3	State	Rate	Hospitalisations
Mid West	WA	**507**	243
Hawkesbury	NSW	**443**	92
Lower Murray	NSW	**438**	62
Mid North	SA	**420**	133
Richmond - Windsor	NSW	**419**	117
Grampians	Vic	**400**	278
Ipswich Hinterland	Qld	**400**	240
Albury	NSW	**400**	238
Wodonga - Alpine	Vic	**391**	262
Broken Hill and Far West	NSW	**390**	89

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

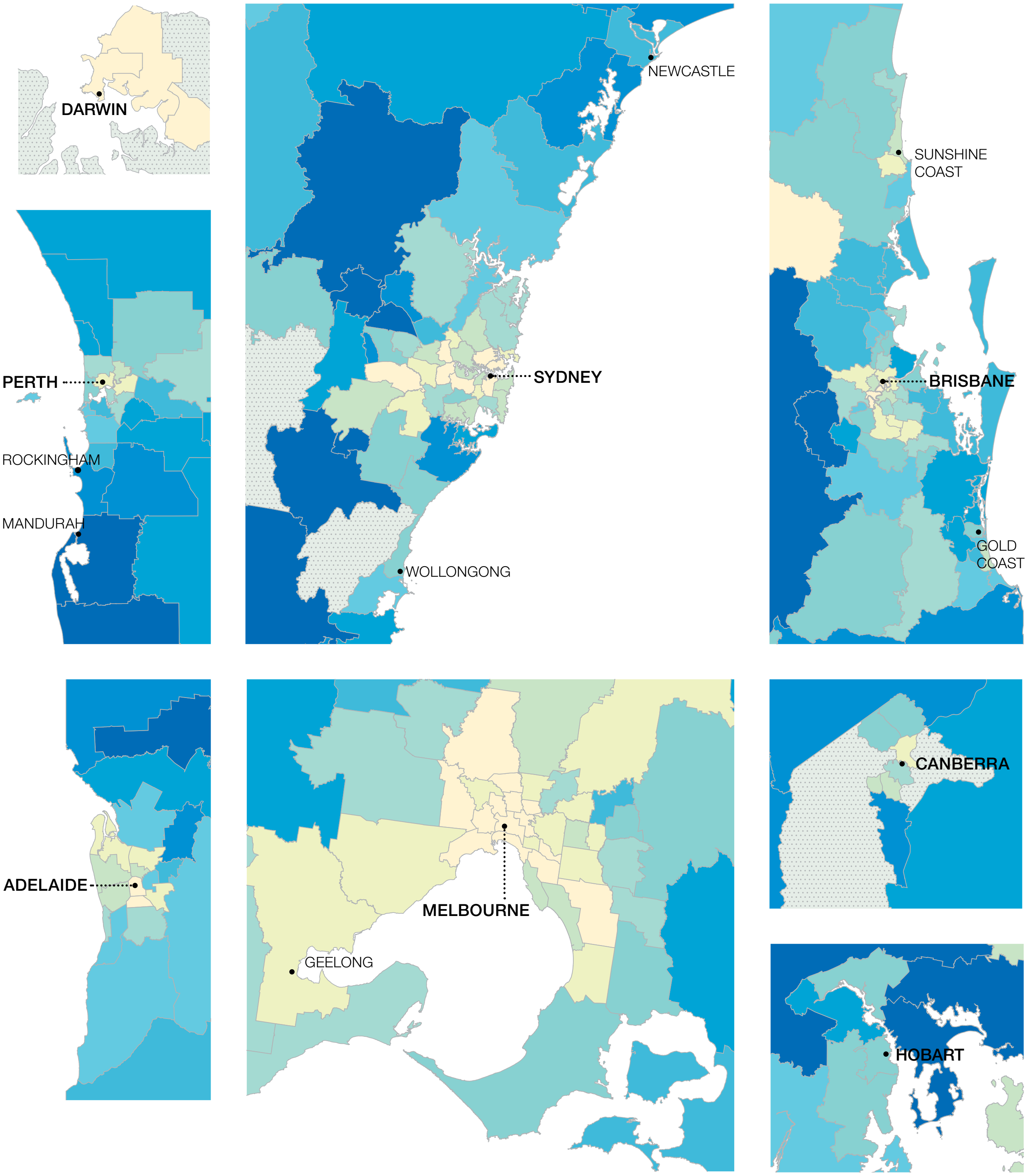
Knee replacement hospitalisations 18 years and over

Figure 4.5: Number of hospitalisations for knee replacement per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 4.6: Number of hospitalisations for knee replacement per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps

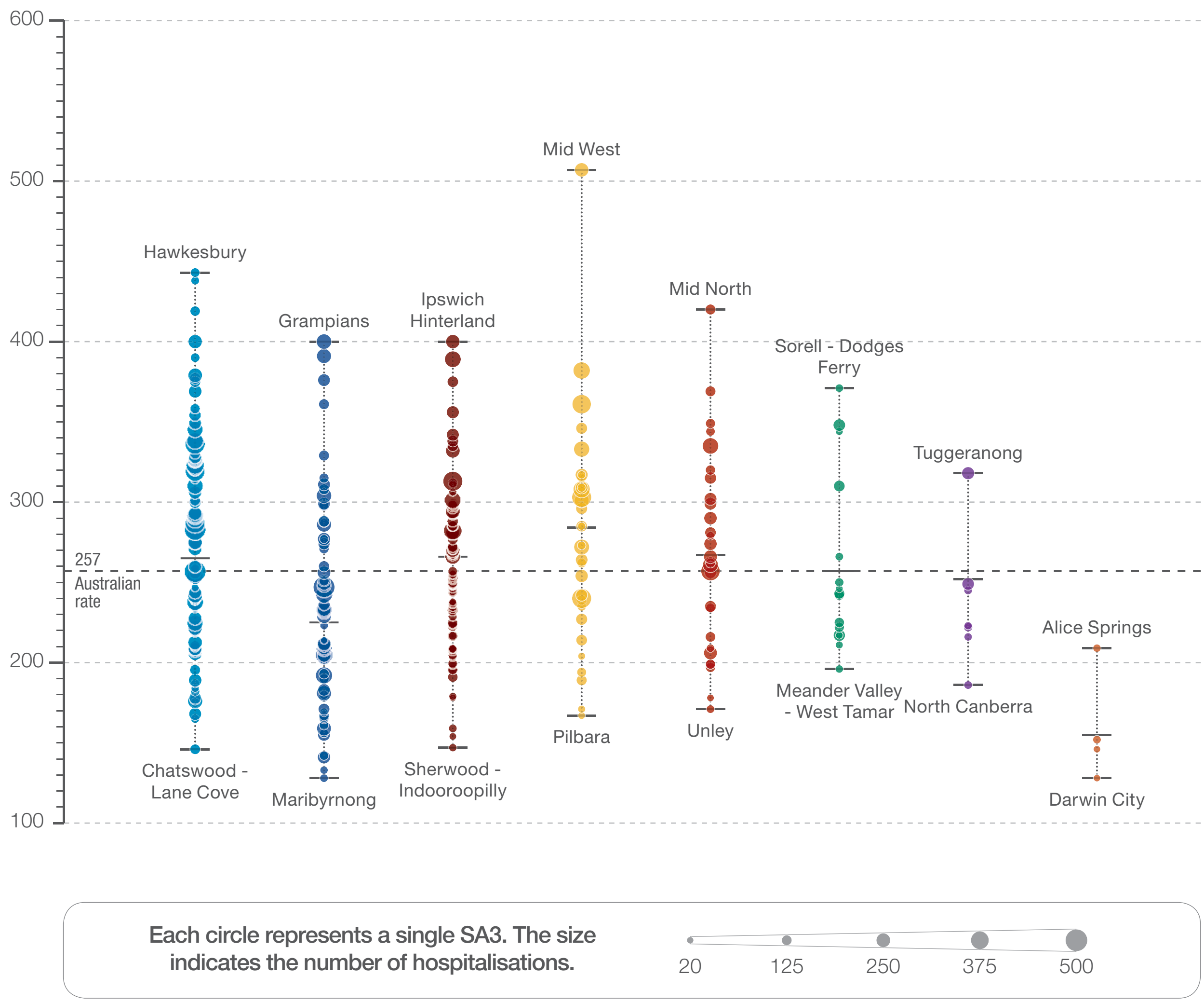


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Knee replacement hospitalisations 18 years and over

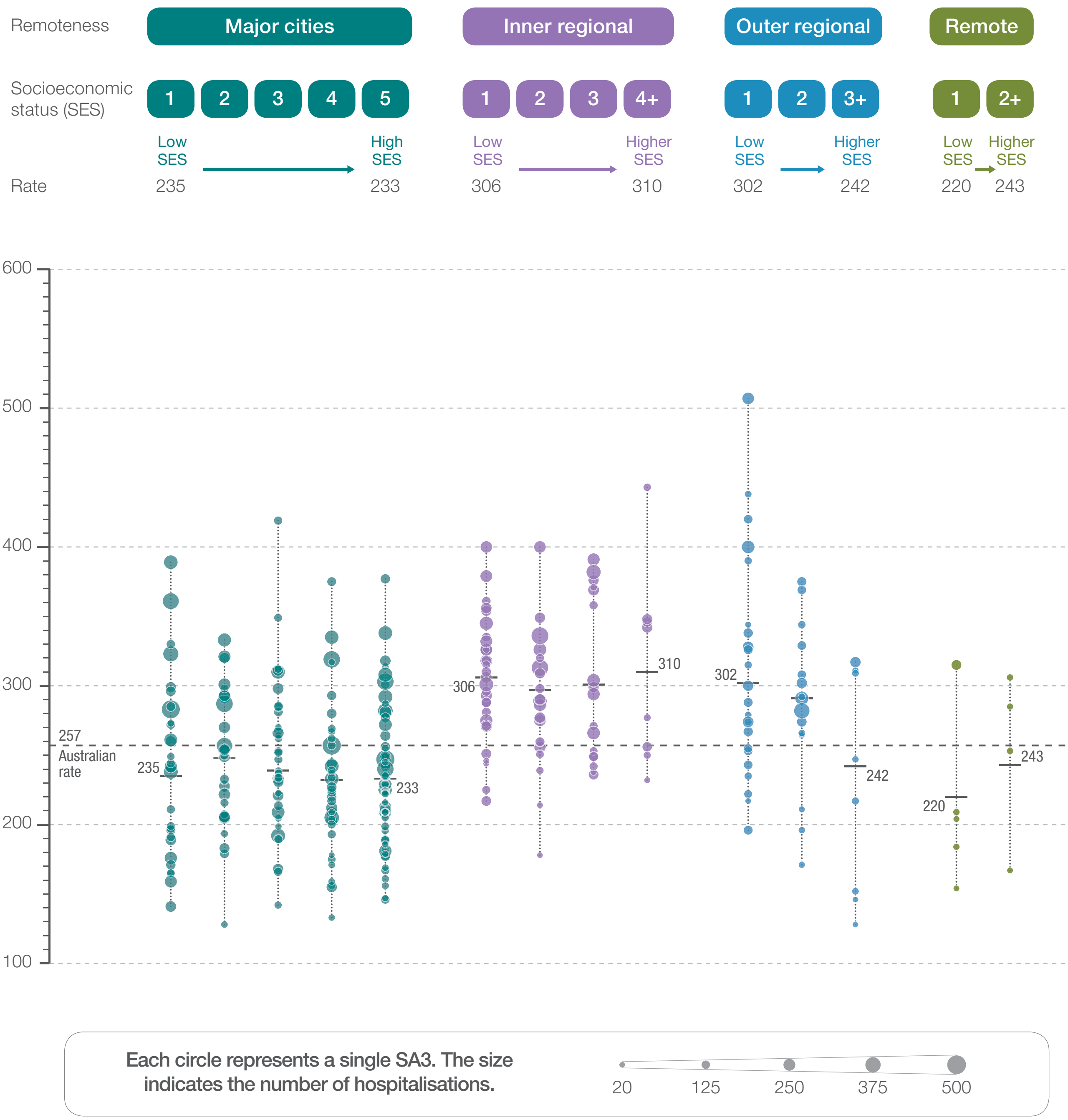
Figure 4.7: Number of hospitalisations for knee replacement per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	443	400	400	507	420	371	318	209
State/territory	265	225	266	284	267	257	252	155
Lowest rate	146	128	147	167	171	196	186	128
No. hospitalisations	17,786	11,329	10,540	5,694	4,331	1,374	708	219



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 4.8: Number of hospitalisations for knee replacement per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Knee replacement hospitalisations 18 years and over

Resources

- Australian Commission on Safety and Quality in Health Care. Osteoarthritis of the knee clinical care standard. Sydney: ACSQHC; 2017.
- Tonic documentary on knee pain, available from www.tonicondemand.com.au/?s=knee.
- Australian Commission on Safety and Quality in Health Care. *Decision Support Tool for Osteoarthritis of the Knee*. (available 2017)
- Royal Australian College of General Practitioners. Guideline for the non-surgical management of hip and knee osteoarthritis. South Melbourne: RACGP; 2009.
- Australian Orthopaedic Association. National Joint Replacement Registry annual report 2015. Adelaide: AOA; 2015.

Australian initiatives

Australian initiatives to improve care for patients with knee osteoarthritis include:

- National Action Plan for Osteoarthritis, Rheumatoid Arthritis and Osteoporosis
- National Joint Replacement Registry (Australian Orthopaedic Association)
- Osteoarthritis Hip and Knee Service, Victoria
- Orthopaedic Physiotherapy Screening Clinic and Multidisciplinary Service, Queensland
- Osteoarthritis Chronic Care Program, New South Wales
- Waiting list management and model of care initiatives, Western Australia and South Australia
- A publication produced by the Royal Australasian College of Surgeons in partnership with Medibank, exploring variation in orthopaedic procedures, including knee replacement (www.surgeons.org/media/24529112/mpl-racs_orthopaedic_procedures.pdf).

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4.2 Lumbar spinal decompression hospitalisations 18 years and over

Context

This data item examines hospitalisations for lumbar spinal decompressions in people aged 18 years and over based on their place of residence.

The first *Australian Atlas of Healthcare Variation* examined variation in lumbar spinal decompression and lumbar spinal fusion combined, and found that the rate was 4.8 times as high in the area with the highest rate as in the area with the lowest rate. Further analysis to separately explore variation in lumbar spinal decompression (without fusion) and lumbar spinal procedures involving fusion was recommended. This analysis excludes any cases where lumbar spinal fusion procedures have been undertaken because of an injury, either a recent injury or where the underlying problem relates to a previous injury.

Lumbar spinal decompression surgery is often used to treat spinal stenosis – the narrowing of a section of the spinal column, usually associated with degeneration. Degeneration of the lumbar spinal joints and intervertebral discs commonly occurs with ageing; although it does not cause symptoms in most people, it can cause severe low back and leg pain and reduced mobility in some people.[1]

Lumbar spinal decompression surgery aims to relieve these symptoms by increasing the amount of space in the spinal canal, to decrease pressure on affected nerves and blood vessels. It may also be used to treat a prolapsed or herniated disc, spinal injuries such as fractures, and spinal cord compression due to metastatic cancer.[2]

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.

Lumbar spinal decompression hospitalisations 18 years and over

Non-surgical treatments for spinal stenosis vary, depending on the location of the stenosis and the severity of the symptoms. They include medication, physiotherapy, steroid injections, cognitive behavioural therapy and educational interventions of a multidisciplinary nature.[3] Some systematic reviews of the research on management of spinal stenosis have suggested that surgery is more effective than conservative treatment when the latter has failed for more than six months.[4-6] However, more recent reviews have noted a lack of high-quality research in this area and that better studies with comprehensive outcome measurement are needed.[3]

The 2016 United Kingdom National Institute for Health and Care Excellence (NICE) guidelines note that one of the greatest challenges with non-specific low back pain (that is not associated with serious or potentially serious causes) is identifying risk factors that may predict when a single back pain episode will become a long-term, persistent pain condition. The guidelines recommend use of risk stratification at first point of contact with a healthcare professional for each new episode of non-specific low back pain. This approach helps to identify people at risk of poor outcome so that they can be offered more intensive support and management. The NICE guidelines review a range of non-invasive treatments to improve functioning and decrease pain. They state that spinal decompression should be considered for people with sciatica when non-surgical treatment has not improved pain or function, and their radiological findings are consistent with sciatic symptoms.[7]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for lumbar spinal decompression (without fusion) per 100,000 people aged 18 years and over in 2012–13 to 2014–15. Hospitalisations resulting from trauma (either a recent injury or an old 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 this procedure more than once in the financial year will be counted more than once.

Data are aggregated over three years to provide sufficient numbers to support reporting at the local level. The number of hospitalisations and the summed population over three years are used to provide an average rate. This is comparable to a rate based on data collected over one year.

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

Over the three-year period 2012–13 to 2014–15, there were 44,169 hospitalisations for lumbar spinal decompression, representing an average rate of 81 hospitalisations per 100,000 people aged 18 years and over (the Australian rate).

The number of hospitalisations for lumbar spinal decompression across 322† local areas (Statistical Area 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 to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 53 per 100,000 people aged 18 years and over in the Australian Capital Territory and the Northern Territory to 103 in Western Australia (Figures 4.11–4.14).

After the highest and lowest 10% of results were excluded and 258 SA3s remained, the number of hospitalisations per 100,000 people aged 18 years and over was 2.0 times as high in the area with the highest rate compared to the area with the lowest rate.

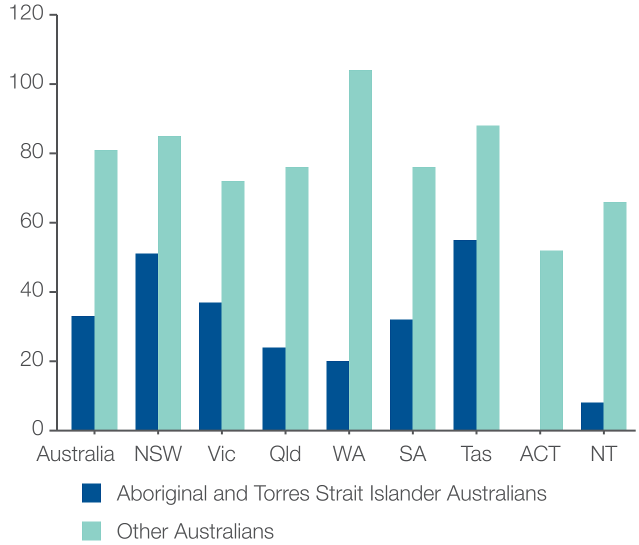
Analysis by remoteness and socioeconomic status

Rates 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 (Figure 4.15).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (33 per 100,000 people) was 59% lower than the rate for other Australians (81 per 100,000 people) (Figure 4.9).

Figure 4.9: Number of hospitalisations for lumbar spinal decompression per 100,000 people aged 18 years and over, age and sex standardised, by state and territory and Indigenous status, 2012–13 to 2014–15



The data for Figure 4.9 are available at www.safetyandquality.gov.au/atlas.

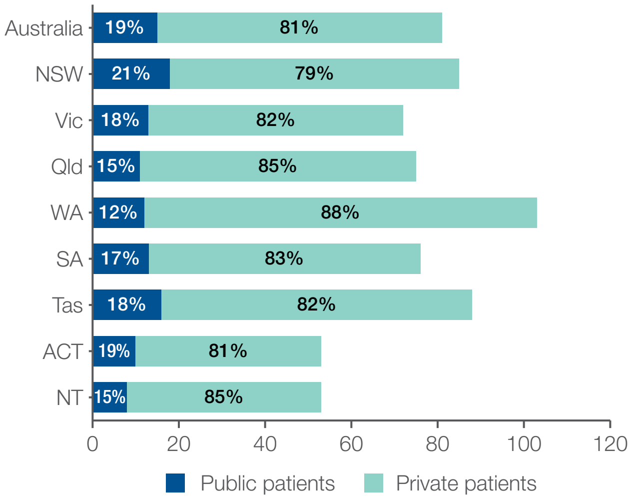
† There are 333 SA3s. For this item, data were suppressed for 11 SA3s due to a small number of hospitalisations and/or population in an area.
Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Lumbar spinal decompression hospitalisations 18 years and over

Analysis by patient funding status

Overall, 81% of hospitalisations for lumbar spinal decompression were for private patients. This proportion varied from 79% in New South Wales to 88% in Western Australia. The median age of patients at the time of operation was 55 years for publicly funded patients and 57 years for privately funded patients (Figure 4.10).

Figure 4.10: Number of hospitalisations for lumbar spinal decompression per 100,000 people aged 18 years and over, age and sex standardised, by state and territory and patient funding status, 2012–13 to 2014–15



The data for Figure 4.10 are available at www.safetyandquality.gov.au/atlas.

Interpretation

Potential reasons for the variation include differences in:

- Risk factors for back pain, including the patient characteristics of obesity[8], physical inactivity, medical comorbidity[9] and occupation[10]
- Factors associated with prolonged symptoms, such as workplace factors, psychosocial factors and functional capacity[3]
- Access to models of care that encourage self-management and provide a multidisciplinary approach to alternatives to surgery, such as physiotherapy, rheumatology services, pain clinics, cognitive behavioural therapy, exercise, weight loss initiatives and patient education
- Patient preferences, and understanding of likely benefits and risks of different care options[11]
- Decision-making criteria of clinicians and thresholds for surgical intervention
- Rates of surgery for stenosis where lumbar spinal fusion accompanies decompression
- The history of previous lumbar spinal decompression surgery, including repeat surgery[9]
- The availability of a surgical workforce
- Access to public elective surgery
- Levels of private health insurance and access to private hospitals.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in the area. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, variations between areas may not directly reflect the practices of the clinicians who are based in these areas. The analysis is based upon where people live rather than where they obtain their health care. Patients may travel outside their local area to receive care.

Addressing variation

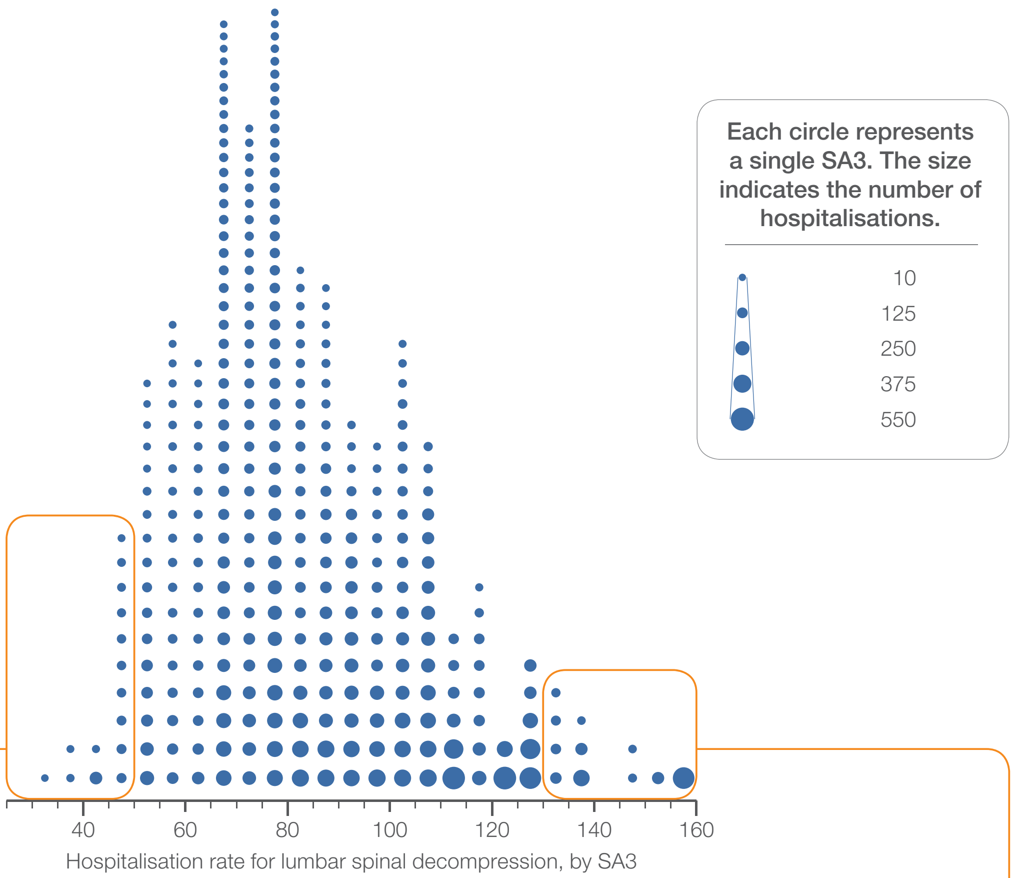
It is not possible to state how much of the observed variation in lumbar decompression surgery is unwarranted. The pattern of higher rates of operation with higher socioeconomic status, and the differences in rates between publicly and privately funded patients suggest that patients' ability to pay is a significant factor. Routine information on outcomes of care is not collected. Comprehensive information about uses of alternative conservative treatments is unavailable. Research to map the availability and patterns of non-surgical care, as well as comprehensive data on the availability and practice patterns of the surgical workforce, would give a more comprehensive view of the treatments available in local regions.

Measuring outcomes of the different treatment options would help identify when, and for which patients, surgery would be of most benefit. This information should be used to prioritise access to public surgery. Development of comprehensive evidence-based guidance on management of low back pain and sciatica in Australia, accompanied by high-quality decision support materials for patients, would help ensure that patients are well informed about the range of management options, and the likelihood of benefit from both invasive and non-invasive therapies. Australian researchers are undertaking a multi-centre randomised trial of surgical decompression for lumbar spinal stenosis funded by the National Health and Medical Research Council.

Funding models that enable patients to make well-informed choices about care options, including community-based multidisciplinary care and conservative management options, should be explored.

Lumbar spinal decompression hospitalisations 18 years and over

Figure 4.11: Number of hospitalisations for lumbar spinal decompression per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Far North	Qld	**30**	19
Kimberley	WA	**36**	30
North Canberra	ACT	**38**	44
Dandenong	Vic	**44**	192
Alice Springs	NT	**44**	37
Richmond Valley - Hinterland	NSW	**45**	83
Queanbeyan	NSW	**45**	61
Cairns - South	Qld	**47**	103
Belconnen	ACT	**47**	102
Maribyrnong	Vic	**47**	84
Auburn	NSW	**47**	81
Bourke - Cobar - Coonamble	NSW	**47**	30
Richmond Valley - Coastal	NSW	**48**	96
Forest Lake - Oxley	Qld	**49**	72
Gympie - Cooloola	Qld	**49**	63

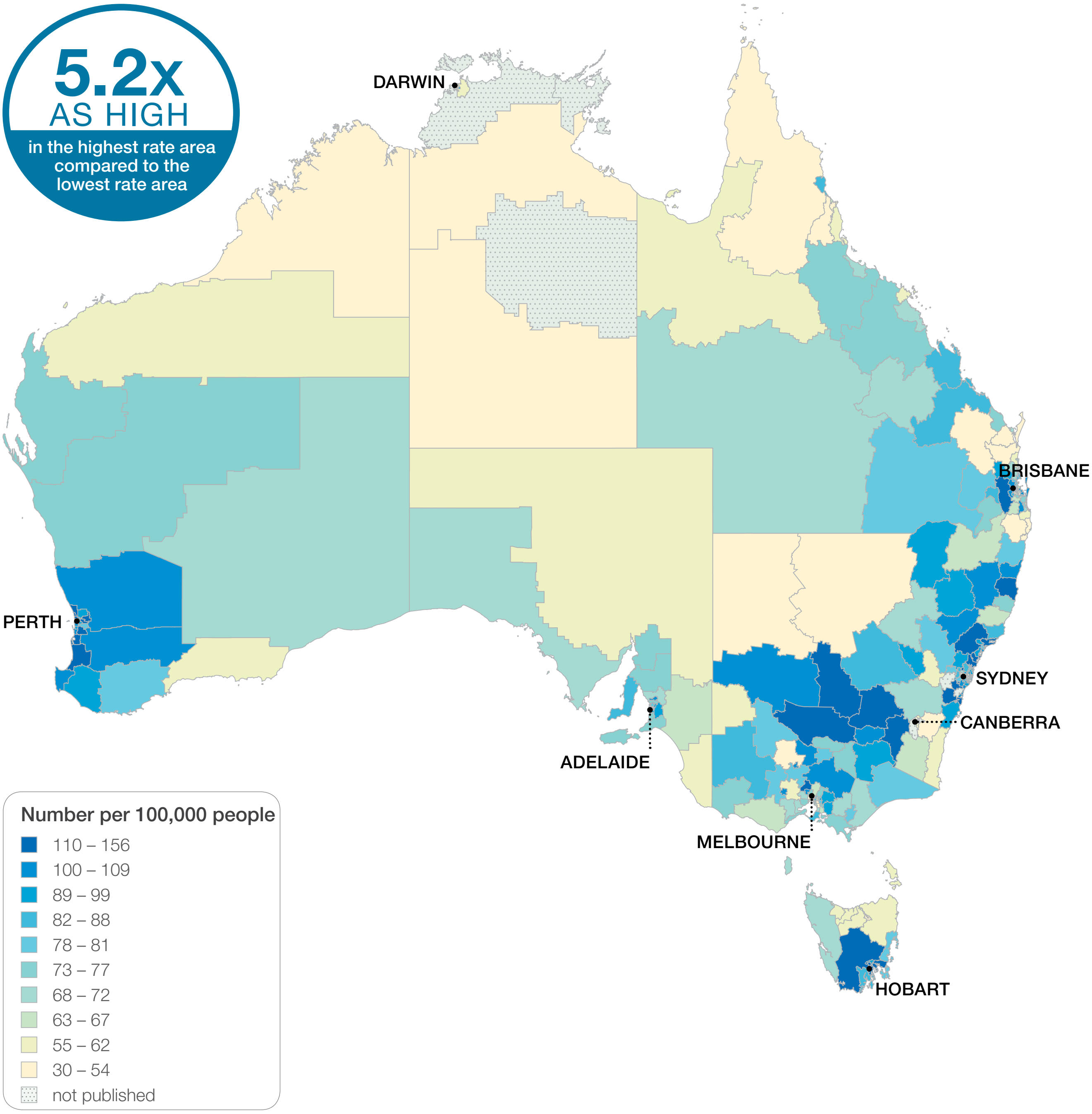
Highest rate areas

SA3	State	Rate	Hospitalisations
Eastern Suburbs - North	NSW	**156**	500
Camden	NSW	**152**	178
Serpentine - Jarrahdale	WA	**149**	68
Sorell - Dodges Ferry	Tas	**147**	53
Hobart - North East	Tas	**138**	179
Bunbury	WA	**137**	323
Tumut - Tumbarumba	NSW	**137**	54
Hobart - South and West	Tas	**133**	102
Rouse Hill - McGraths Hill	NSW	**133**	77
Wollondilly	NSW	**132**	119
Griffith - Murrumbidgee (West)	NSW	**130**	153

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

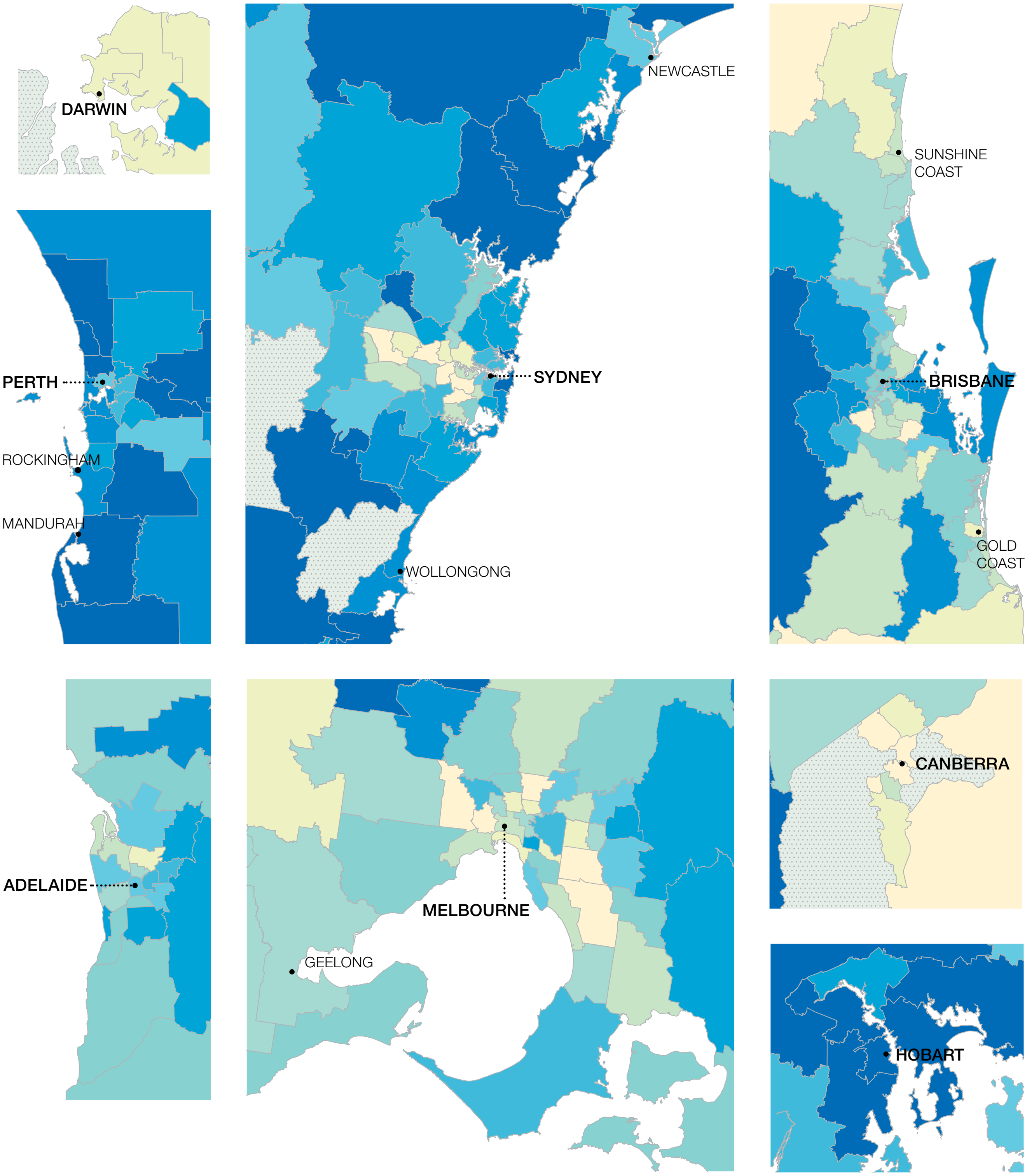
Lumbar spinal decompression hospitalisations 18 years and over

Figure 4.12: Number of hospitalisations for lumbar spinal decompression per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Figure 4.13: **Number of hospitalisations for lumbar spinal decompression per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15: capital city area maps**

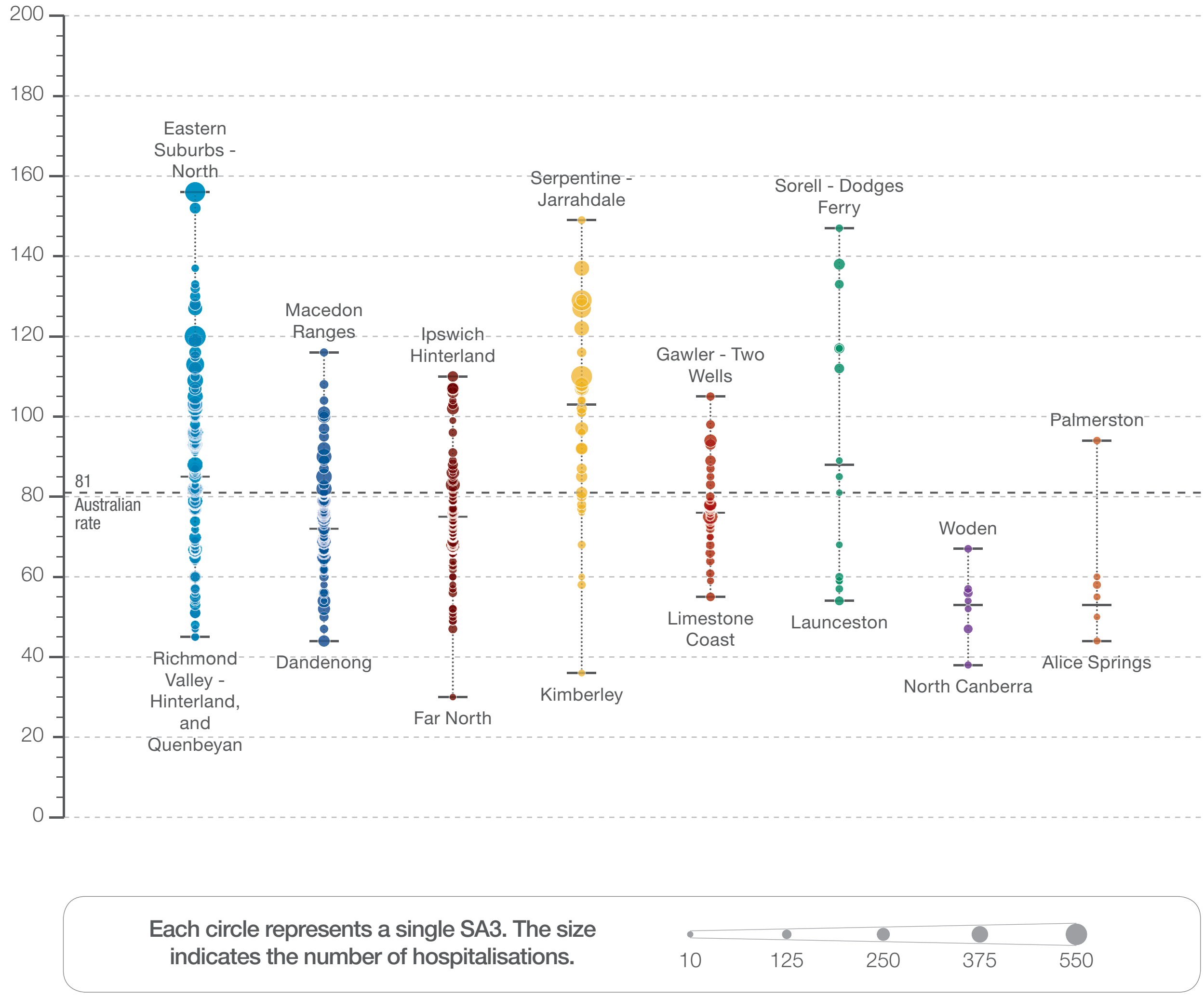


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Lumbar spinal decompression hospitalisations 18 years and over

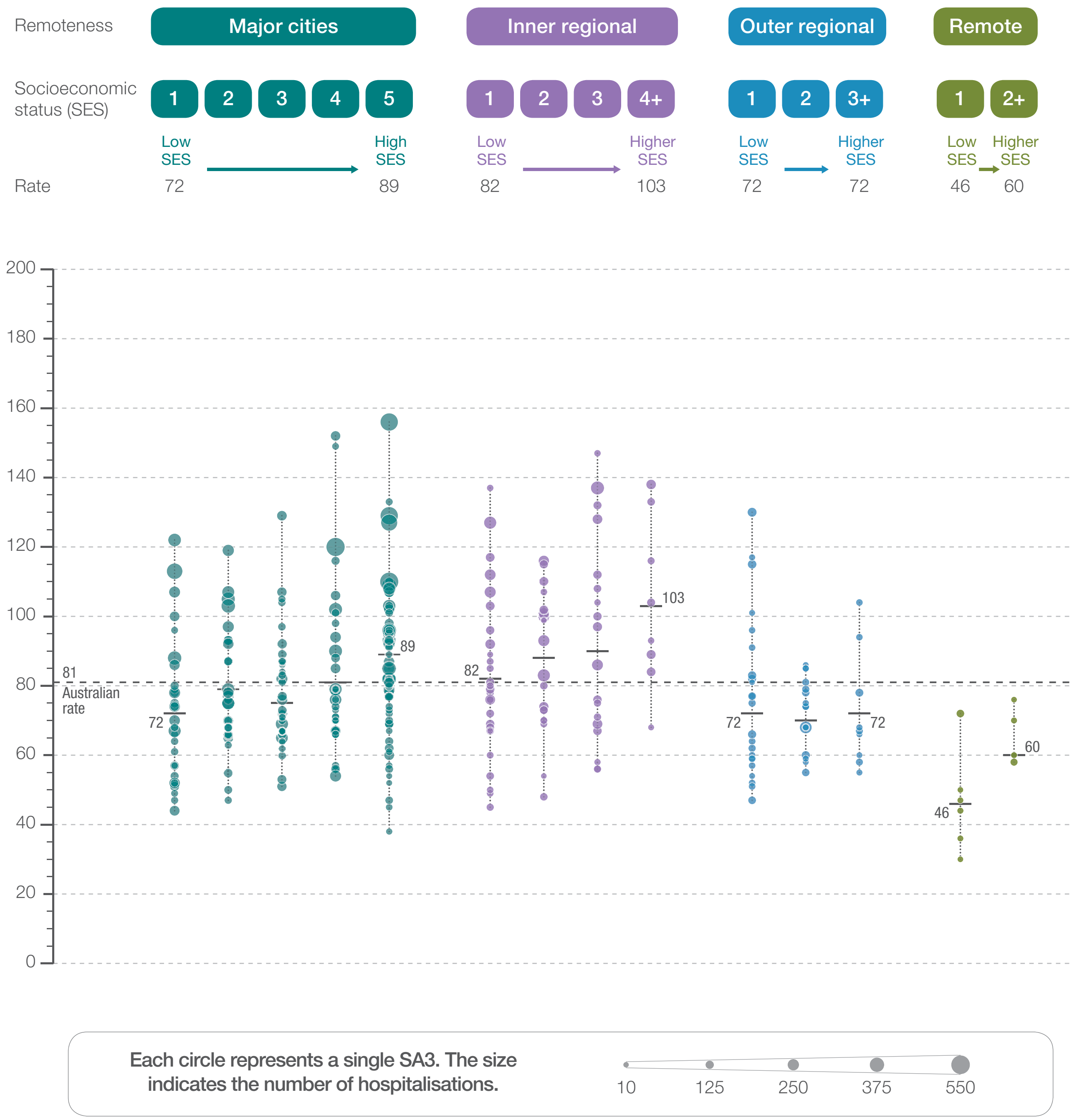
Figure 4.14: Number of hospitalisations for lumbar spinal decompression per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2012–13 to 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	156	116	110	149	105	147	67	94
State/territory	85	72	75	103	76	88	53	53
Lowest rate	45	44	30	36	55	54	38	44
No. hospitalisations	15,216	9,892	8,039	5,906	3,230	1,098	442	270



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Figure 4.15: Number of hospitalisations for lumbar spinal decompression per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2012–13 to 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Lumbar spinal decompression hospitalisations 18 years and over

Resources

- National Institute for Health and Care Excellence. Low back pain and sciatica in over 16s: assessment and management. Invasive treatments. NICE guideline NG59. Methods, evidence and recommendations. London: NICE; 2016.

Australian initiatives

The information in this chapter will complement work already under way to address management of back pain in Australia. At a national level, this work includes:

- Physiotherapy-led triage clinics for low back pain[12,13]
- Establishment of the Australia & New Zealand Musculoskeletal Clinical Trials Network to support priority areas in musculoskeletal research[14]
- A pilot trial of a multi-site Australian Spine Registry, being undertaken by the Spine Society of Australia and Monash University, that will provide an online database of patient-reported and clinical outcomes.

Many state and territory initiatives are also in place including:

- *A model of care for spinal pain*, Western Australia[15]
- *A model of care for the management of people with acute low back pain*, NSW Agency for Clinical Innovation.[16]

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14. Australia and New Zealand Musculoskeletal Clinical Trials Network. Available from: http://anzmusc.org
15. Department of Health, Western Australia. Spinal pain model of care. Perth: Department of Health; 2009.
16. NSW Agency for Clinical Innovation. Management of people with acute low back pain: model of care. Sydney: ACI; 2016.

4.3 Lumbar spinal fusion hospitalisations 18 years and over

Context

This data item examines hospitalisations for lumbar spinal fusion in people aged 18 years and over based on their place of residence. The first *Australian Atlas of Healthcare Variation* examined variation in lumbar spinal decompression and lumbar spinal fusion combined, and found that the rate was 4.8 times as high in the area with the highest rate as in the area with the lowest rate. Further analysis to separately explore variation in lumbar spinal decompression (without fusion) and lumbar spinal procedures involving fusion was recommended. This analysis excludes any cases where lumbar spinal fusion procedures have been undertaken because of an injury, either a recent injury or where the underlying problem relates to a previous injury.

Lumbar spinal fusion permanently connects two or more vertebrae using bone grafts and, often, internal fixation such as metal rods.[1] In the past, spinal fusion surgery was primarily used to treat fractures and deformities of the spine, such as severe scoliosis.[2] Over time, the conditions for which the procedure is used have broadened. Studies in the United States have shown that degenerative spine disorders are now the most common reason for spinal fusion.[3,4]

Degeneration of the lumbar spinal joints and intervertebral discs commonly occurs with ageing; although it does not cause symptoms in most people, it can cause severe low back pain and reduced mobility in some people. Low back pain affects approximately 16% of the Australian population, and rates are highest among people aged 65–74 years.[5] Most back problems are managed non-surgically. Spinal surgery is considered for patients with severe chronic low back pain after more conservative treatment options have failed for three or more months.[6] Spinal fusion surgery aims to reduce symptoms by stabilising the spine. It can be performed on its own or together with spinal decompression.

There are differing views in the clinical community about the value of lumbar spinal fusion operations (both with and without accompanying decompression) for low back pain resulting from degenerative disease. Some systematic reviews have highlighted the lack of high-quality evidence to allow firm conclusions to be made about outcomes from these surgeries.[7-10]

Lumbar spinal fusion hospitalisations 18 years and over

The most recent comprehensive review of interventions for low back pain and sciatica in people aged over 16 years, undertaken by the United Kingdom National Institute for Health and Care Excellence (NICE) as part of its guideline development process, identifies the need for high-quality evidence. The 2016 NICE guideline on management and assessment of low back pain and sciatica[11] notes that some studies report that approximately 20% of patients who undergo spinal fusion experience short- to medium-term complications. The NICE guideline recommends against treating patients with low back pain using spinal fusion except within the context of a clinical trial that could help clarify whether, and for whom, this procedure is of benefit.[11]

Cognitive interventions and exercises are strongly recommended because they have been shown to result in equal improvement to lumbar fusion in patients with chronic low back pain and disc degeneration (measured on a disability index considered the 'gold standard' of low back functional outcome tools).[12,13]

The rate of lumbar spinal fusion surgery in Australia has been increasing, with most of the increase occurring in the private sector. Between 1997 and 2006, the rate of lumbar spinal fusion surgery performed privately in Australia increased by 175%.[2] Comparable national data for publicly funded patients have not been published. New South Wales data for the same period showed that the rate of publicly performed spinal fusion procedures increased by 2%, compared with an increase of 167% for privately performed procedures.[2] Rates of spinal fusion surgery have also increased in other countries – for example, the rate among Medicare recipients in the United States tripled between 1992 and 2003.[14]

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for lumbar spinal fusion (with and without decompression) per 100,000 people aged 18 years and over from 2012–13 to 2014–15. Hospitalisations resulting from trauma (either a recent injury or an old injury) are excluded from this analysis. Because a record is included for each hospitalisation for lumbar spinal fusion surgery, rather than for each patient, patients hospitalised for this procedure more than once in the financial year will be counted more than once.

Data are aggregated over three years to provide sufficient numbers to support reporting at the local level. The number of hospitalisations and the summed population over three years are used to provide an average rate. This is comparable to a rate based on data collected over one year.

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

Over the three-year period 2012–13 to 2014–15, there were 14,746 hospitalisations for lumbar spinal fusion, representing an average rate of 26 hospitalisations per 100,000 people aged 18 years and over (the Australian rate).

There were 2,235 spinal fusion operations performed without an accompanying decompression for people aged 18 years and over during this three-year period. For lumbar fusion only, the national annual rate standardised for age and sex was four hospitalisations per 100,000 people aged 18 years and over.

The number of hospitalisations for lumbar spinal fusion across 305† local areas (Statistical Area 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 to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 12 per 100,000 people aged 18 years and over in the Northern Territory to 41 in Tasmania (Figures 4.18–4.21).

After the highest and lowest 10% of results were excluded and 249 SA3s remained, the number of hospitalisations per 100,000 people aged 18 years and over was 2.5 times as high in the area with the highest rate compared to the area with the lowest rate.

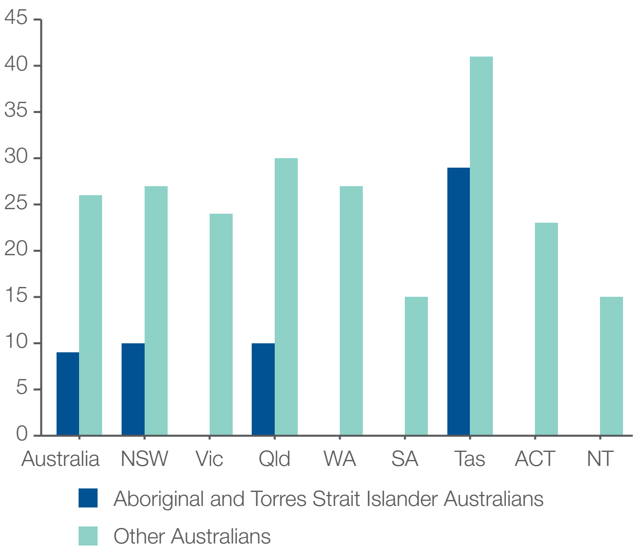
Analysis by remoteness and socioeconomic status

Rates of surgery were higher in inner regional areas than in major cities or outer regional areas, and were lowest in remote areas. In major cities, rates of surgery decreased with socioeconomic disadvantage, but this pattern was not evident in other categories of remoteness (Figure 4.22).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (9 per 100,000 people) was 65.4% lower than the rate for other Australians (26 per 100,000 people) (Figure 4.16).

Figure 4.16: Number of hospitalisations for lumbar spinal fusion per 100,000 people aged 18 years and over, age and sex standardised, by state and territory and Indigenous status, 2012–13 to 2014–15



The data for Figure 4.16 are available at www.safetyandquality.gov.au/atlas.

† There are 333 SA3s. For this item, data were suppressed for 28 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Data for Vic, WA, SA, ACT and NT (Aboriginal and Torres Strait Islander Australians) have been suppressed.

Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.

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

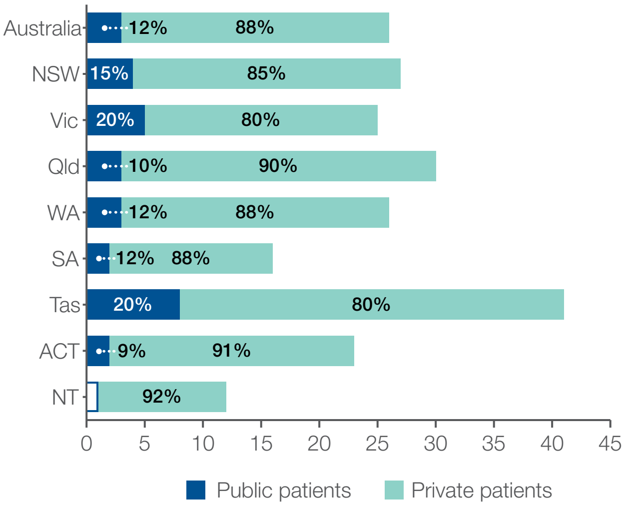
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Lumbar spinal fusion hospitalisations 18 years and over

Analysis by patient funding status

Overall, 88% of hospitalisations for lumbar spinal fusion were for privately funded patients. This proportion varied from 80% in Victoria and Tasmania to 92% in the Northern Territory. The median age of patients at the time of operation was 61 years for publicly funded patients and 63 years for privately funded patients (Figure 4.17).

Figure 4.17: Number of hospitalisations for lumbar spinal fusion per 100,000 people aged 18 years and over, age and sex standardised, by state and territory and patient funding status, 2012–13 to 2014–15



The data for Figure 4.17 are available at www.safetyandquality.gov.au/atlas.

Interpretation

Potential reasons for the variation include differences in:

- Use of the procedure in management of low back pain and degenerative disease of the spine
- Risk factors for back pain, including the patient characteristics of obesity[15], physical inactivity, medical comorbidity[16] and occupation[17]
- Factors associated with prolonged symptoms, such as workplace factors, psychosocial factors and functional capacity[18]
- Access to models of care that provide a multidisciplinary approach to alternatives to surgery, such as physiotherapy, rheumatology services, pain clinics, cognitive behavioural therapy, exercise, weight loss initiatives and patient education
- Patient understanding of likely benefits and risks of different care options, and preferences for types of care
- Decision-making criteria of clinicians and thresholds for surgical intervention
- The availability and distribution of a surgical workforce
- Levels of private health insurance and access to private hospitals
- Access to public elective surgery.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
Unshaded data (NT public patients) is based on a small number of hospitalisations.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in the area. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, 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.

The discrepancy between private and public rates of spinal fusion is marked. This may reflect a lack of agreement on the value of this operation, and the influence of patient and surgeon preferences.[2]

Addressing variation

Lumbar spinal fusion surgery can be performed for a variety of reasons – spinal deformity, nerve and spinal cord compression caused by vertebral malalignment, and low back pain. This analysis does not explore stated reasons for having the surgery. The increase in the rate of lumbar spinal fusion surgery that has occurred in Australia suggests that the indications for use of this surgery have broadened or that the thresholds for intervention have changed. These changes should be further examined. The marked discrepancy between the percentages of lumbar spinal fusion surgery performed in public and private settings also requires further investigation. Use and availability of other treatment options, such as multidisciplinary clinics and specialist chronic pain clinics, for people with low back pain should be explored.

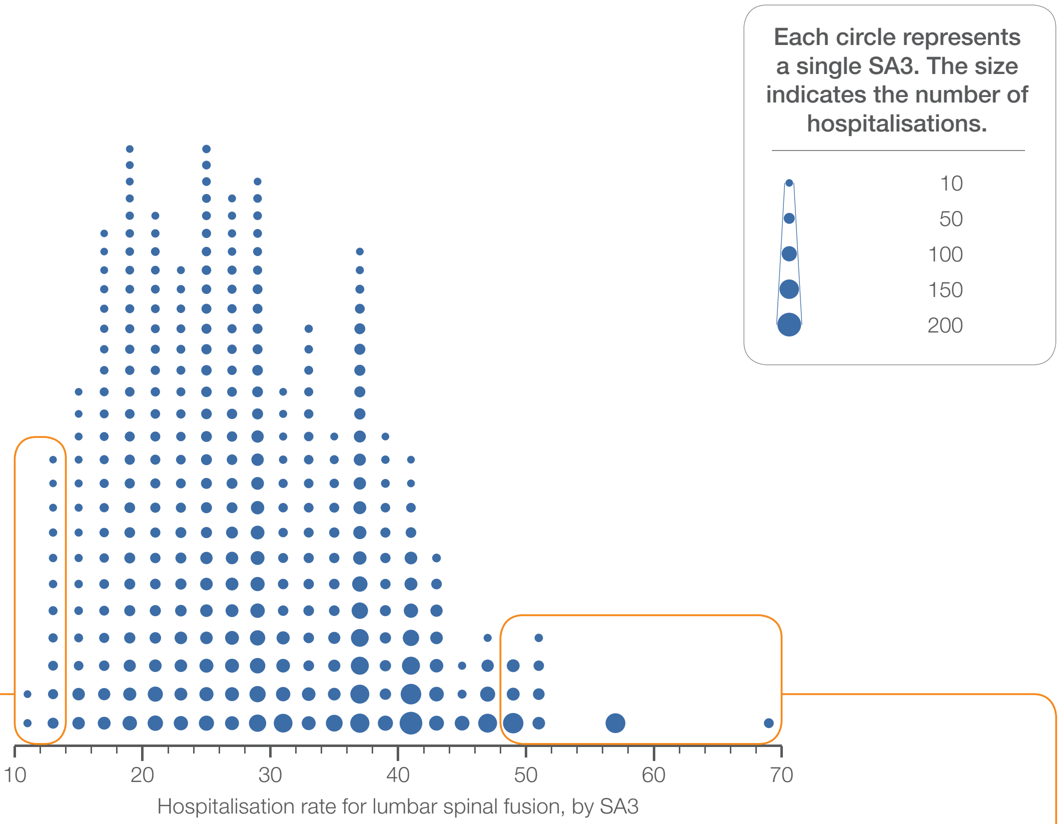
Determining whether there are subgroups of patients with low back pain who are more likely to benefit from spinal fusion procedures should be a research priority. Identification of patients who are likely to benefit would be aided by a national treatment registry, and by routine collection and analysis of patient-reported outcomes for all patients undergoing lumbar spinal fusion operations.

Limiting spinal fusion procedures undertaken because of low back pain to the context of clinical trials, as has been suggested in the United Kingdom, should be considered. This approach would require a nationally agreed system.[11]

Ensuring that patients with low back pain understand the evidence about risks and benefits of lumbar spinal fusion is particularly important, because the degree of benefit from surgical treatment is not clear for many patients, and there are risks associated with surgery.

Lumbar spinal fusion hospitalisations 18 years and over

Figure 4.18: **Number of hospitalisations for lumbar spinal fusion per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15**



Lowest rate areas

SA3	State	Rate	Hospitalisations
Campbelltown	SA	**10**	12
Port Adelaide - East	SA	**11**	17
Strathfield - Burwood - Ashfield	NSW	**12**	40
Canterbury	NSW	**12**	37
Auburn	NSW	**12**	20
Eyre Peninsula and South West	SA	**12**	20
Maitland	NSW	**12**	19
South Perth	WA	**12**	14
Maryborough - Pyrenees	Vic	**12**	10
Newcastle	NSW	**13**	50
Port Phillip	Vic	**13**	30
Cairns - South	Qld	**13**	27
Upper Hunter	NSW	**13**	10

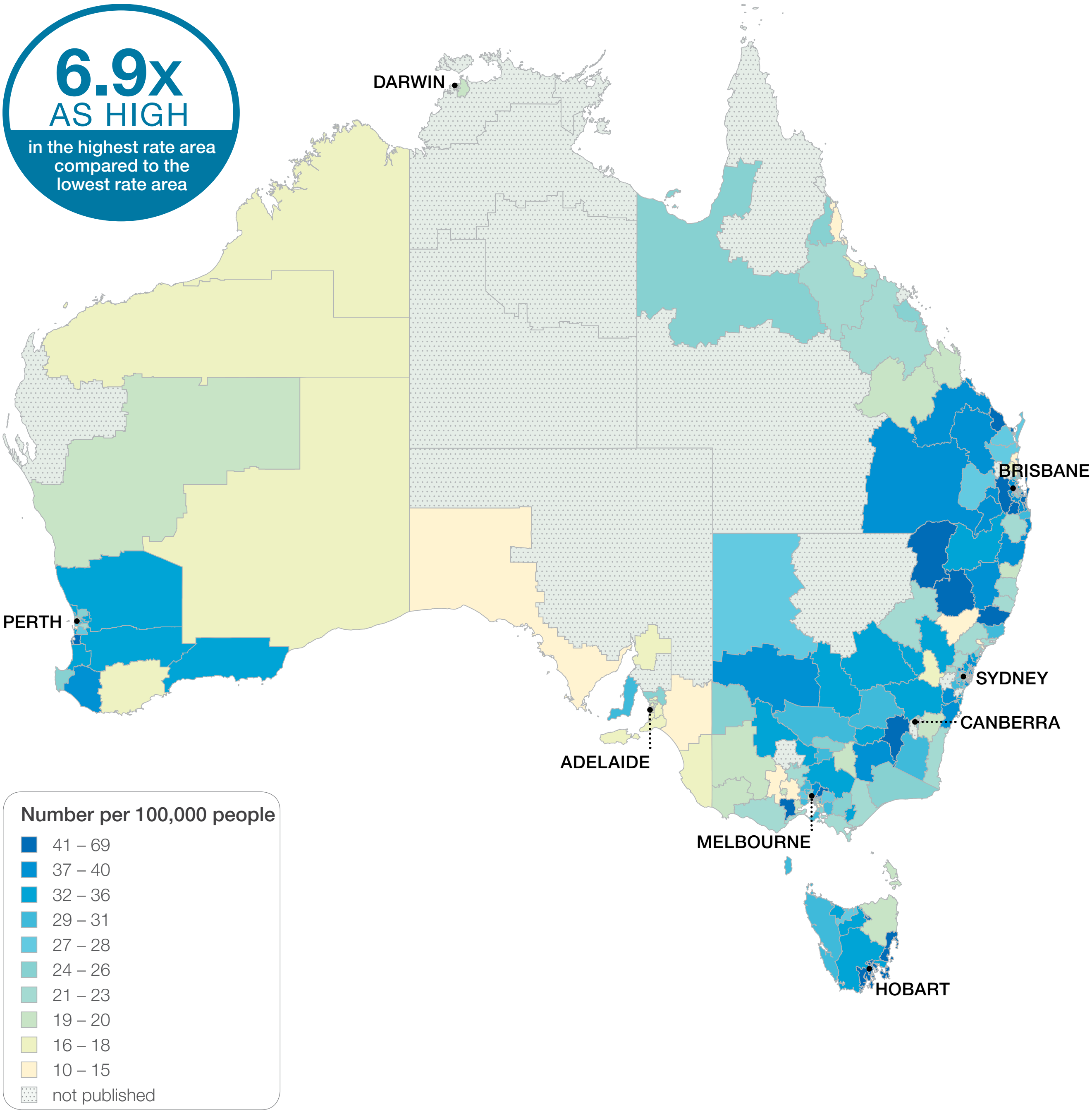
Highest rate areas

SA3	State	Rate	Hospitalisations
Huon - Bruny Island	Tas	**69**	37
Bundaberg	Qld	**57**	154
Hobart - North West	Tas	**51**	69
Barwon - West	Vic	**51**	20
Kenmore - Brookfield - Moggill	Qld	**50**	58
Hobart - South and West	Tas	**50**	44
Nillumbik - Kinglake	Vic	**49**	72
Banyule	Vic	**48**	161
Nerang	Qld	**48**	73

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

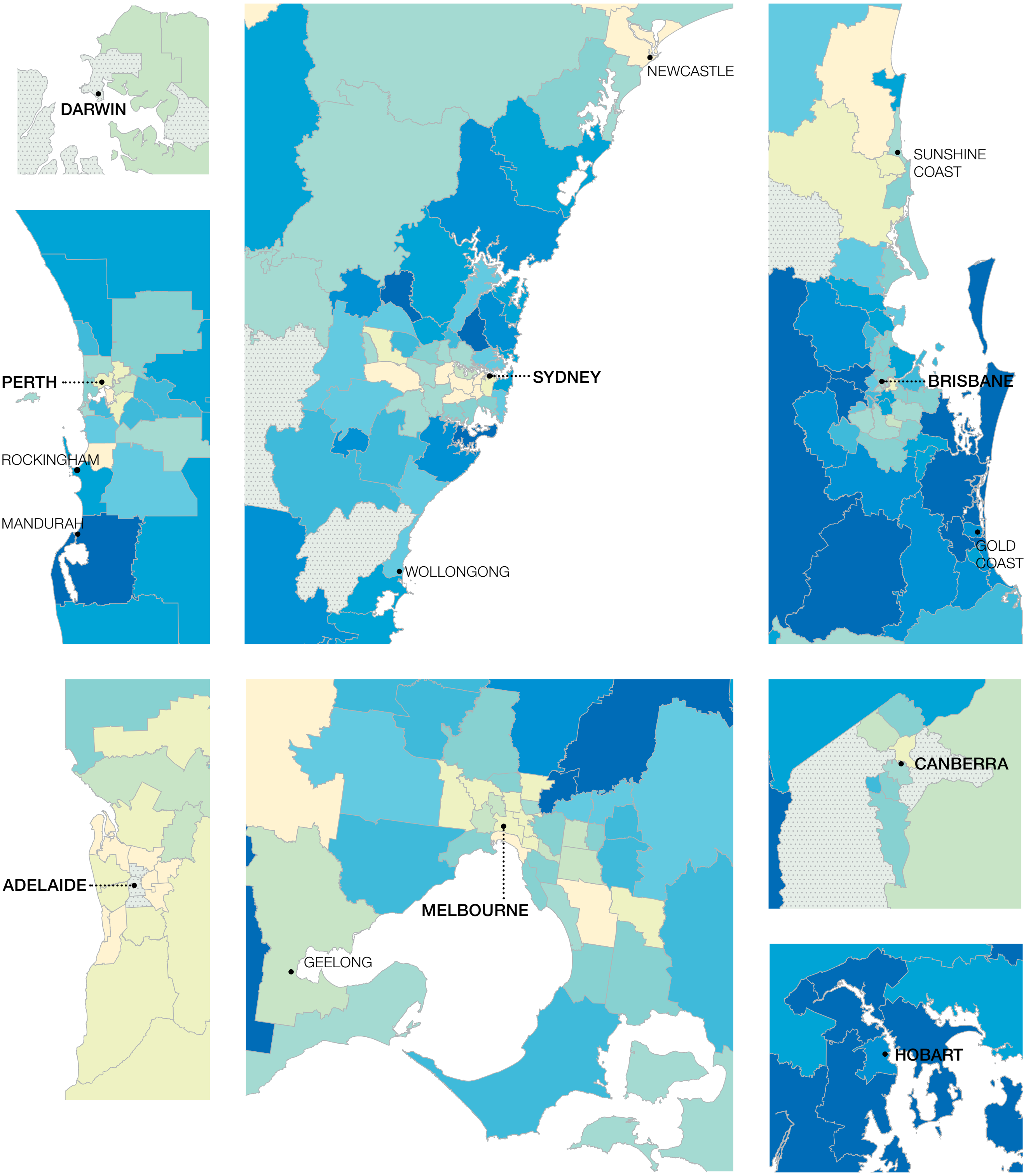
Lumbar spinal fusion hospitalisations 18 years and over

Figure 4.19: Number of hospitalisations for lumbar spinal fusion per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15: Australia map



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Figure 4.20: Number of hospitalisations for lumbar spinal fusion per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2012–13 to 2014–15: capital city area maps

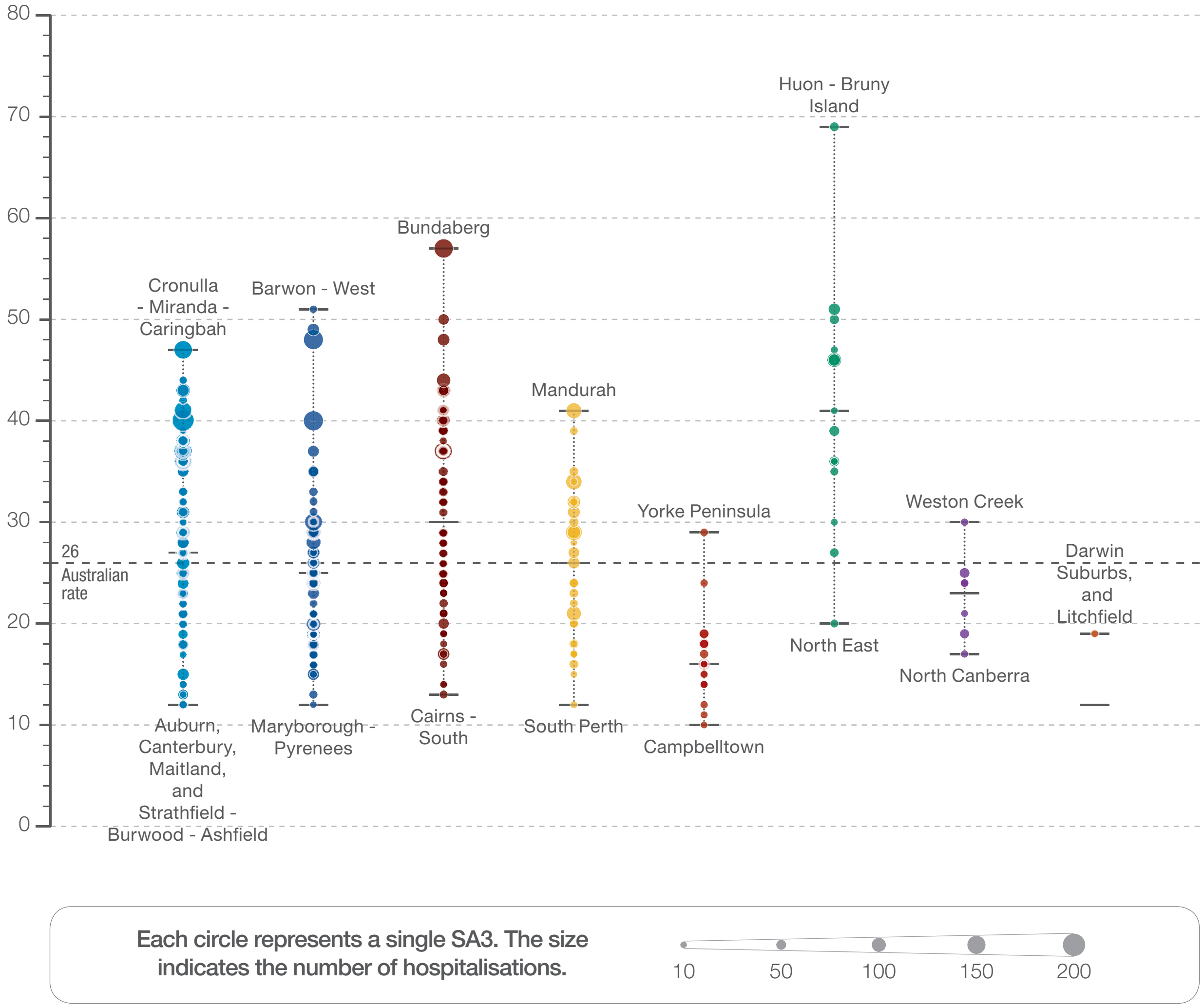


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Lumbar spinal fusion hospitalisations 18 years and over

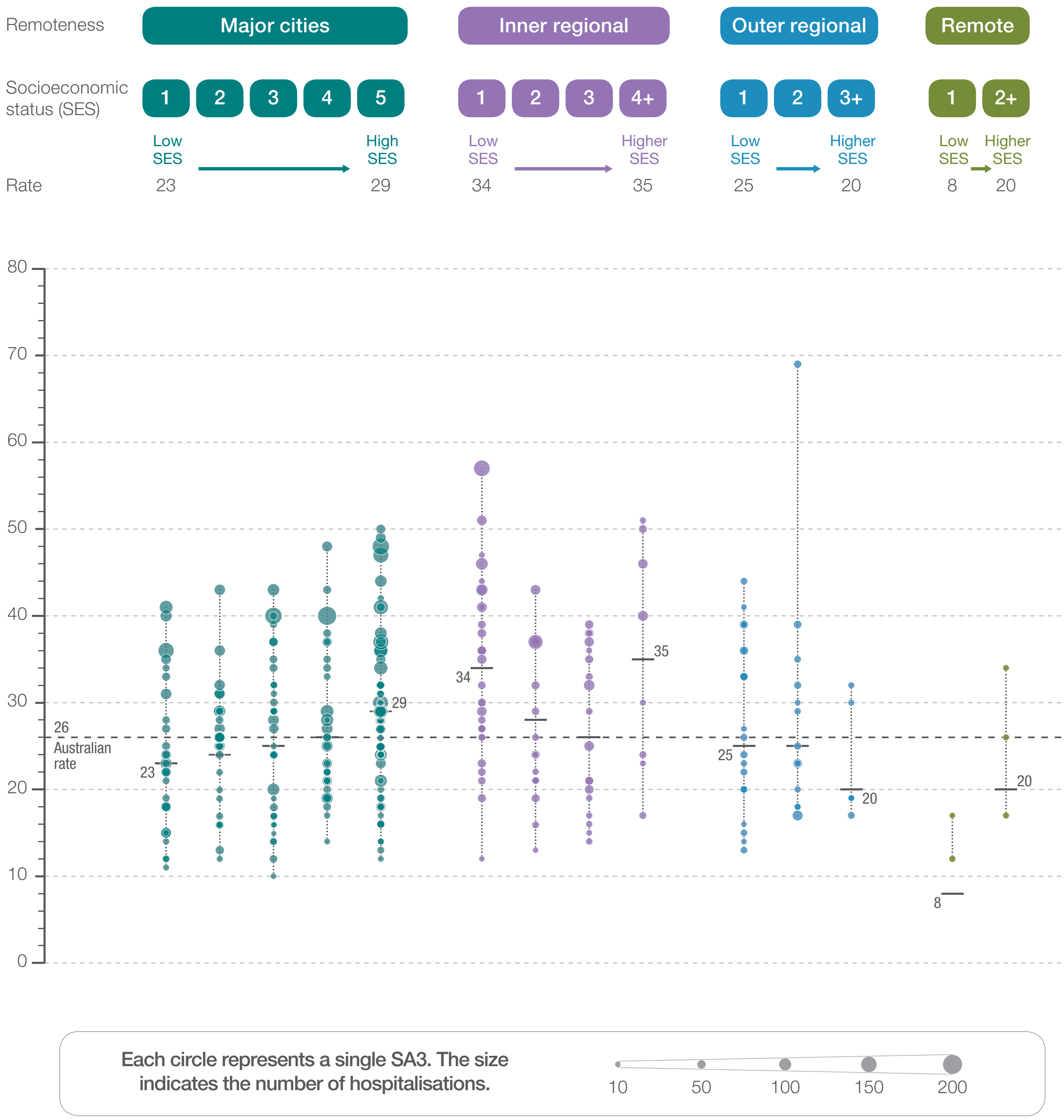
Figure 4.21: Number of hospitalisations for lumbar spinal fusion per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2012–13 to 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	47	51	57	41	29	69	30	19
State/territory	27	25	30	26	16	41	23	12
Lowest rate	12	12	13	12	10	20	17	19
No. hospitalisations	4,986	3,442	3,282	1,522	675	573	193	58



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Data from suppressed SA3s were included in analyses for larger geographic areas – for example, analysis by state and territory, remoteness and socioeconomic status. This explains why, for example, the overall rate for lumbar spinal fusion in the Northern Territory was outside the range of the publishable SA3 rates for the Northern Territory.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Figure 4.22: Number of hospitalisations for lumbar spinal fusion per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2012–13 to 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Data from suppressed SA3s were included in analyses for larger geographic areas – for example, analysis by state and territory, remoteness and socioeconomic status. This explains why, for example, the overall rate for lumbar spinal fusion in the Northern Territory was outside the range of the publishable SA3 rates for the Northern Territory.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2012–15 and ABS Estimated Resident Population 30 June 2012 to 2014.

Lumbar spinal fusion hospitalisations 18 years and over

Resources

- National Institute for Health and Care Excellence. Low back pain and sciatica in over 16s: assessment and management. Invasive treatments. NICE guideline NG59. Methods, evidence and recommendations. London: NICE; 2016.

Australian initiatives

The information in this chapter will complement work already under way to improve management of low back pain in Australia. At a national level, this work includes:

- Physiotherapy-led triage clinics for low back pain[20,21]
- Establishment of the Australia & New Zealand Musculoskeletal Clinical Trials Network to support musculoskeletal research[22]
- A pilot trial of a multi-site Australian Spine Registry, being undertaken by the Spine Society of Australia and Monash University, that will provide an online database of patient-reported and clinical outcomes.

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

- *A model of care for spinal pain*, Western Australia[23]
- *A model of care for the management of people with acute low back pain*, NSW Agency for Clinical Innovation.[24]

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4.4 Laparoscopic cholecystectomy hospitalisations

Context

This data item examines hospitalisations for laparoscopic cholecystectomy for people of all ages based on their place of residence. Cholecystectomy is removal of the gall bladder, which is now commonly performed laparoscopically (using minimally invasive keyhole surgery) rather than with open surgery. Laparoscopic cholecystectomy can have greater risks in certain situations; in these situations, conversion to open surgery is recommended – for example, if the patient has severe local inflammation, adhesions or suspected bile duct injury.[1]

Cholecystectomy is used to treat symptomatic gallstones. These can cause pain from blockage of the bile ducts, and cholecystitis or pancreatitis (inflammation of the gall bladder or pancreas, respectively). Risk factors for gallstones include age, female gender, obesity and a sedentary lifestyle.[2-4] Gallstones are estimated to occur in 5–25% of people in comparable countries, but each year only 2–4% of people develop symptoms (most commonly biliary colic) and require treatment.[5] Most people with gallstones never have symptoms. Surgery is not recommended for people with asymptomatic gallstones. Serious complications related to gallstones include acute pancreatitis, which affects 0.04–1.5% of people with gallstones annually and has a 3–20% mortality rate after a first attack.[5]

In 2013, Australia had one of the highest rates of laparoscopic cholecystectomy among countries in the Organisation for Economic Co-operation and Development (OECD).[6] In this study, the rate of laparoscopic cholecystectomy per 100,000 people was 216 in Australia compared with 202 in Canada, 197 in Germany, 133 in Denmark, 125 in the United Kingdom and 116 in New Zealand.[6] The United States rate was 275 per 100,000 people in 2006 (more recent data were not available).[6]

Laparoscopic cholecystectomy hospitalisations

Rates of cholecystectomy in many OECD countries rose sharply after the introduction of the laparoscopic procedure in the 1990s. Rates had been steady for some years before this; within two years of the new procedure being introduced, rates had increased by 24% in Australia and 17% in Canada.[7] Offering laparoscopic cholecystectomy to patients who would not have been fit to undergo the open procedure contributed to the increase, but the threshold for cholecystectomy may also have become lower.[7,8]

Geographic variation in rates of cholecystectomy has been noted within other countries. For example, the United Kingdom rate of cholecystectomy (open and laparoscopic) in 2009–10 ranged between 51[1] and 170.8 per 100,000 people (a 3.3-fold variation between areas).[8] This may be partly due to differences in underlying risk factors and the prevalence of gallstones, as well as variation in the way gallstones are managed, including the threshold for surgery.[8]

Early cholecystectomy

Early cholecystectomy for acute cholecystitis (without pancreatitis) results in a shorter hospital stay and reduced readmissions for recurrent acute cholecystitis.[9] However, a large proportion of patients with acute cholecystitis are not treated as urgent and are placed on a waiting list. For example, in a recent Australian study, 65% of patients with acute cholecystitis were categorised as semi-urgent or routine, and 5% of patients on the waiting list were readmitted for gallstone-related problems.[10]

In 2014–15, there was a small difference in median waiting times between Aboriginal and Torres Strait Islander Australians and other Australians (47 days compared with 44 days). The median waiting time was slightly longer in inner regional areas than in major cities (47 days compared with 43 days).[11]

Intraoperative cholangiography

Intraoperative cholangiography (imaging of the bile duct) can be used during cholecystectomy to delineate the biliary anatomy and to detect stones in the common bile duct, with the aim of preventing bile duct injuries and retained stones. However, evidence of its benefit when used routinely is conflicting.[12] There is also a lack of agreement among surgeons about the benefit of routine intraoperative cholangiography, as opposed to selective cholangiography.

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for laparoscopic cholecystectomy per 100,000 people in 2014–15.

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

Laparoscopic cholecystectomy

In 2014–15, there were 49,874 hospitalisations for laparoscopic cholecystectomy, representing 205 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for laparoscopic cholecystectomy across 318† local areas (Statistical Area 3 – SA3) ranged from 89 to 392 per 100,000 people. The rate was **4.4 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 170 per 100,000 people in the Australian Capital Territory to 226 in Tasmania (Figures 4.25–4.28).

After the highest and lowest 10% of results were excluded and 256 SA3s remained, the number of hospitalisations 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.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

Additional analysis

Intraoperative cholangiography

In 2014–15, 81% (40,356 of 49,874) of the laparoscopic cholecystectomy hospitalisations included intraoperative cholangiography.

The proportion of hospitalisations for laparoscopic cholecystectomy that included intraoperative cholangiography across 209^ SA3s ranged from 22.6% in Bunbury (Western Australia) to 96.2% in Carindale (Queensland). This proportion was **4.3 times as high** in the area with the highest proportion as in the area with the lowest proportion. The proportion of hospitalisations that included intraoperative cholangiography varied across states and territories, from 53% in the Northern Territory to 89% in the Australian Capital Territory.

Open cholecystectomy

In 2014–15, there were 3,767 hospitalisations for open cholecystectomy, representing 15 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for open cholecystectomy varied across states and territories, from 13 per 100,000 people in the Australian Capital Territory, Western Australia and Queensland to 20 per 100,000 people in Tasmania.

The Australian age- and sex-standardised rate of laparoscopic cholecystectomy was 13.7 times the rate of open cholecystectomy.

Note that conversions from laparoscopic to open cholecystectomy are included in the data for open cholecystectomy hospitalisations.

Data for intraoperative cholangiography or open cholecystectomy are not presented graphically; however, 2014–15 rates by SA3 for intraoperative cholangiography, and rates by state and territory for open cholecystectomy are available online at www.safetyandquality.gov.au/atlas.

^ There are 333 SA3s. For this analysis, data were suppressed for 124 SA3s due to a small number of hospitalisations.

† There are 333 SA3s. For this analysis, data were suppressed for 15 SA3s due to a small number of hospitalisations and/or population in an area.

Laparoscopic cholecystectomy hospitalisations

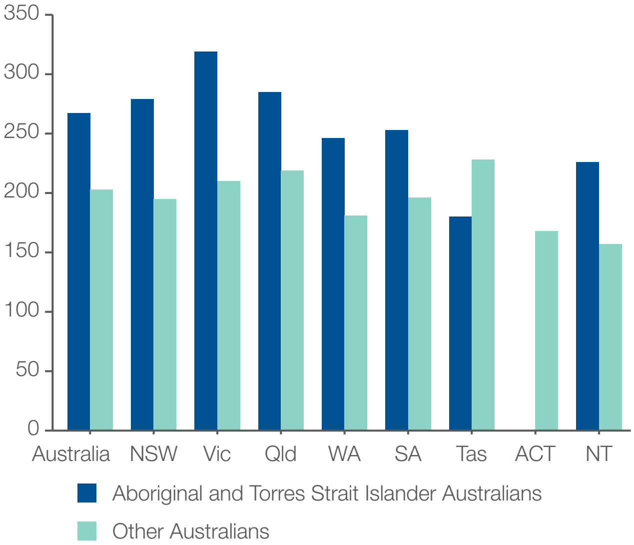
Analysis by remoteness and socioeconomic status

Rates of hospitalisations for laparoscopic cholecystectomy tended to be higher in inner regional areas than in other categories of remoteness. Rates tended to be lower in areas of least socioeconomic disadvantage (Figure 4.29).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (267 per 100,000 people) was 32% higher than the rate for other Australians (203 per 100,000 people) (Figure 4.23).

Figure 4.23: Number of hospitalisations for laparoscopic cholecystectomy per 100,000 people, age and sex standardised, by state and territory and Indigenous status, 2014–15



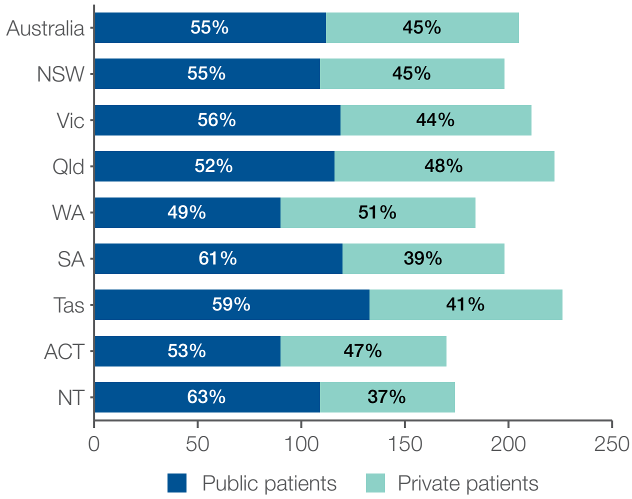
The data for Figure 4.23 are available at www.safetyandquality.gov.au/atlas.

Analysis by patient funding status

Overall, 45% of hospitalisations for laparoscopic cholecystectomy were for privately funded patients. This proportion varied from 37% in the Northern Territory to 51% in Western Australia (Figure 4.24).

The median age at operation was 47 years for publicly funded patients and 53 years for privately funded patients.

Figure 4.24: Number of hospitalisations for laparoscopic cholecystectomy per 100,000 people, age and sex standardised, by state and territory and patient funding status, 2014–15



The data for Figure 4.24 are available at www.safetyandquality.gov.au/atlas.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Interpretation

Potential reasons for the variation include differences in:

- Risk factors for gallstones, such as obesity, gender, diabetes and sedentary lifestyle
- Thresholds for performing the procedure in patients with biliary colic or asymptomatic gallstones[7]
- Referral patterns of general practitioners
- Risk factors and delays in care, which might be higher for people from rural and remote areas.

Variation in open cholecystectomy rates may relate to higher levels of risk factors, and delays in care, for people from rural and remote areas.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in these areas. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as in rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, 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.

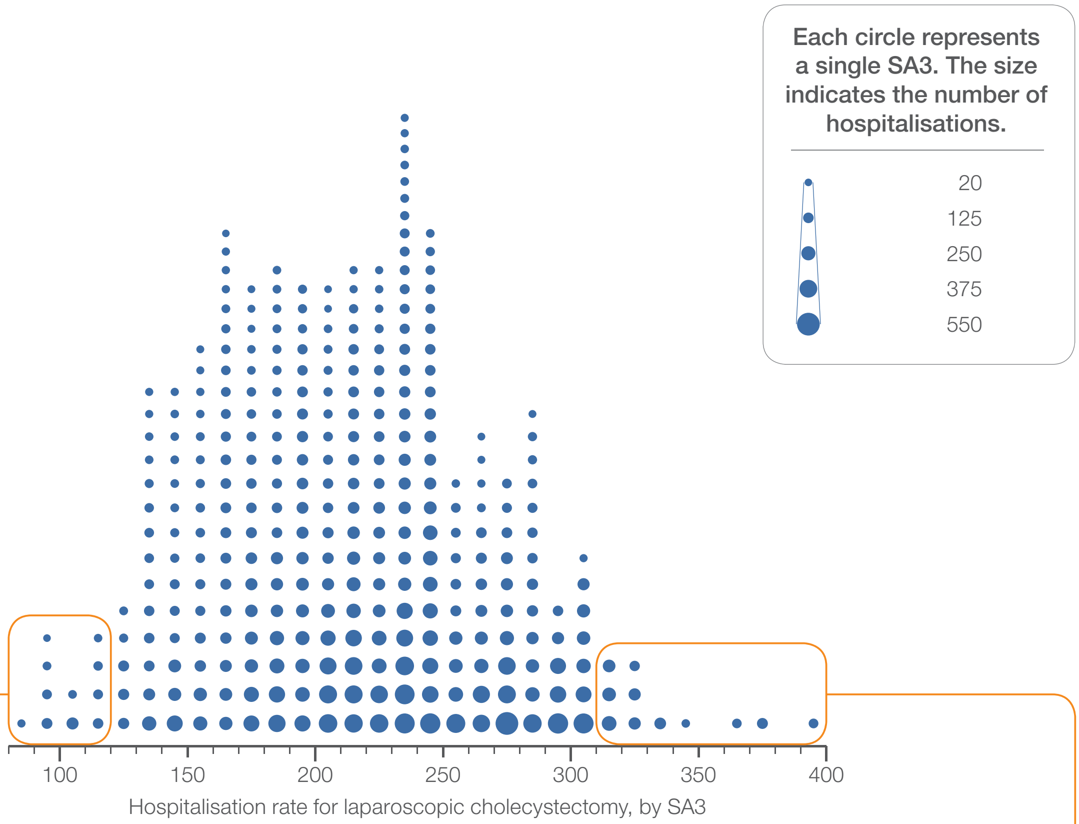
Addressing variation

Routine national hospital datasets collect information on the patient's conditions that are relevant to the hospital care provided at that time. They will not necessarily capture information on all the patient's symptoms and conditions. Therefore, it is not possible to use these data to analyse the extent to which thresholds for laparoscopic surgery differ across Australia. Given the high rates of laparoscopic cholecystectomy in Australia compared with many other countries, and the variation observed across Australia, a study to explore differences in the approach to surgical intervention in patients with minimal or non-specific symptoms would be valuable. Collection and analysis of data about the severity and nature of symptoms before cholecystectomy, and correlation with outcomes would be useful for examining the appropriate indications for cholecystectomy and identifying appropriate rates. A workshop to define threshold biliary symptoms for operation would help identify a consistent recommended approach.

This analysis has not examined variation in the management of patients with their first case of acute cholecystitis at a hospital level. Further analysis of differences in rates of surgery during the first admission for acute cholecystitis between different catchment areas of hospitals and healthcare networks would be useful to determine variation in this aspect of practice. An exploration of initiatives to increase rates of early laparoscopic cholecystectomy for acute cholecystitis is also warranted, given the evidence of benefit in this situation.[10-14]

Laparoscopic cholecystectomy hospitalisations

Figure 4.25: **Number of hospitalisations for laparoscopic cholecystectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15**



Lowest rate areas

SA3	State	Rate	Hospitalisations
South Perth	WA	**89**	43
Weston Creek	ACT	**92**	23
Eastern Suburbs - North	NSW	**94**	135
Perth City	WA	**95**	100
Leichhardt	NSW	**96**	63
Sydney Inner City	NSW	**100**	177
Cairns - North	Qld	**108**	61
Manly	NSW	**110**	53
North Sydney - Mosman	NSW	**114**	124
Cottesloe - Claremont	WA	**116**	87
Melbourne City	Vic	**117**	102

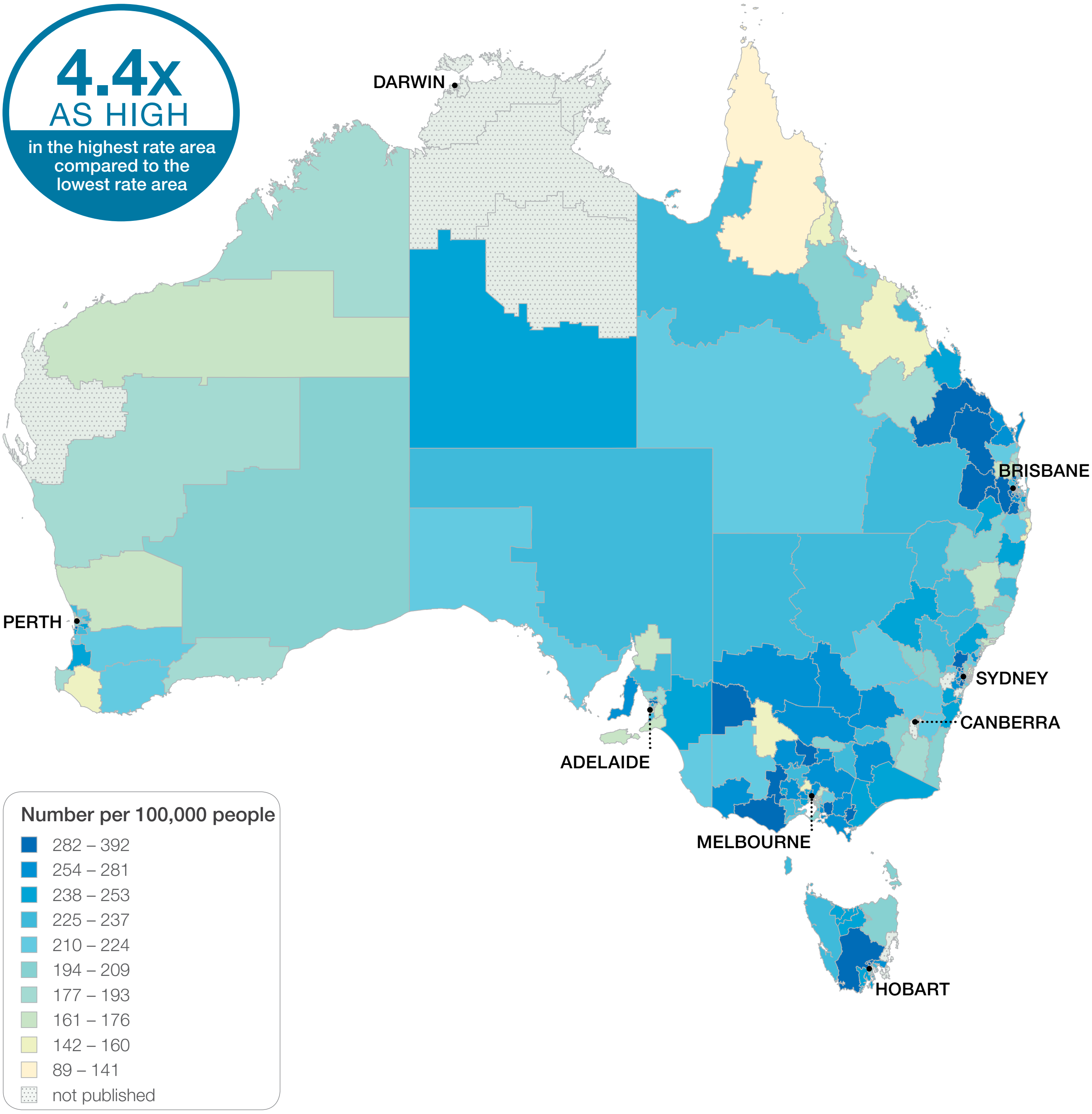
Highest rate areas

SA3	State	Rate	Hospitalisations
Hawkesbury	NSW	**392**	96
Richmond - Windsor	NSW	**375**	138
Maryborough - Pyrenees	Vic	**366**	92
Brighton	Tas	**343**	55
Burnett	Qld	**334**	165
St Marys	NSW	**329**	181
Camden	NSW	**326**	184
Campaspe	Vic	**323**	118
Cardinia	Vic	**318**	270
Ipswich Hinterland	Qld	**318**	198
Browns Plains	Qld	**313**	233

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

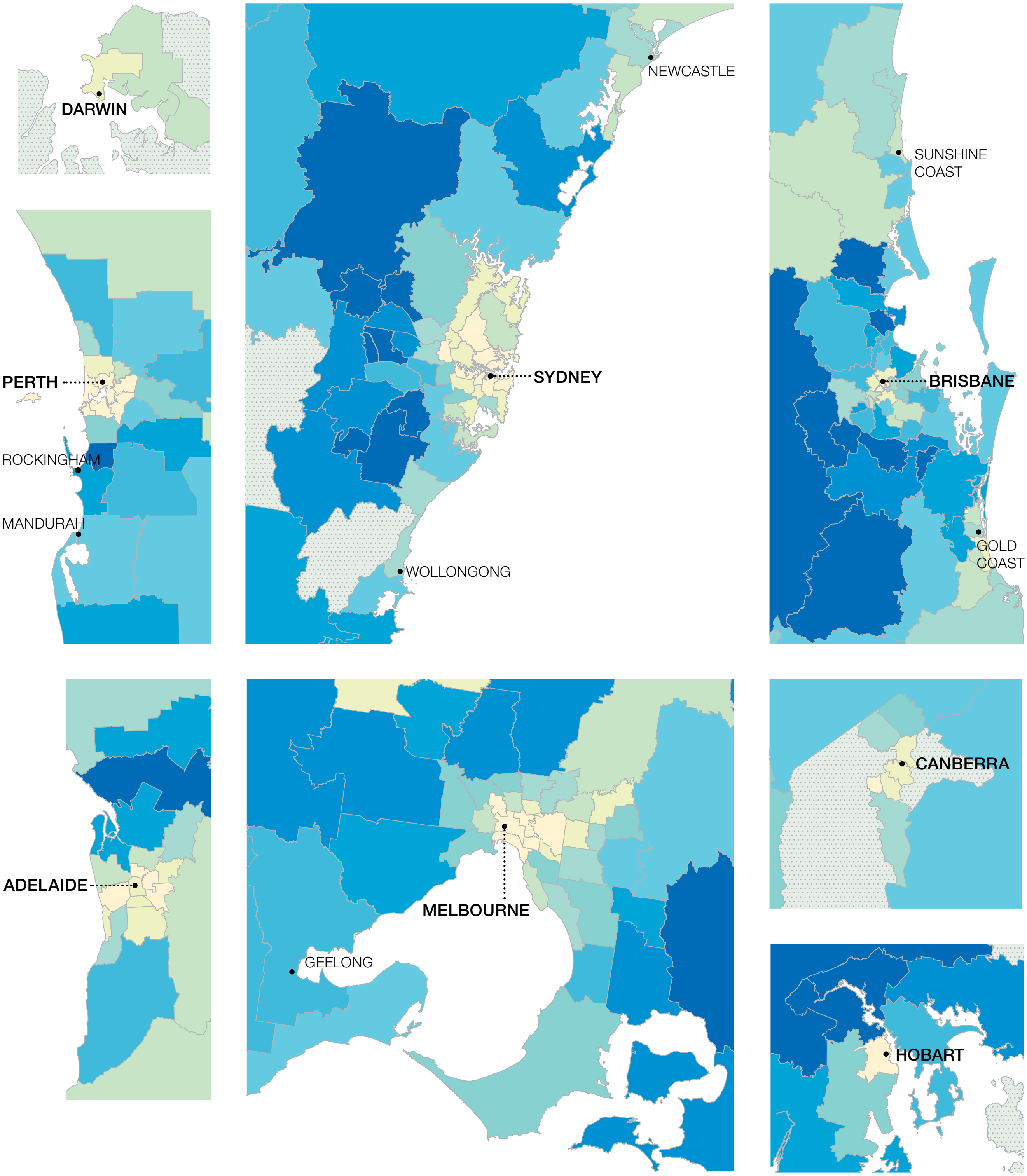
Laparoscopic cholecystectomy hospitalisations

Figure 4.26: **Number of hospitalisations for laparoscopic cholecystectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map**



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 4.27: **Number of hospitalisations for laparoscopic cholecystectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps**

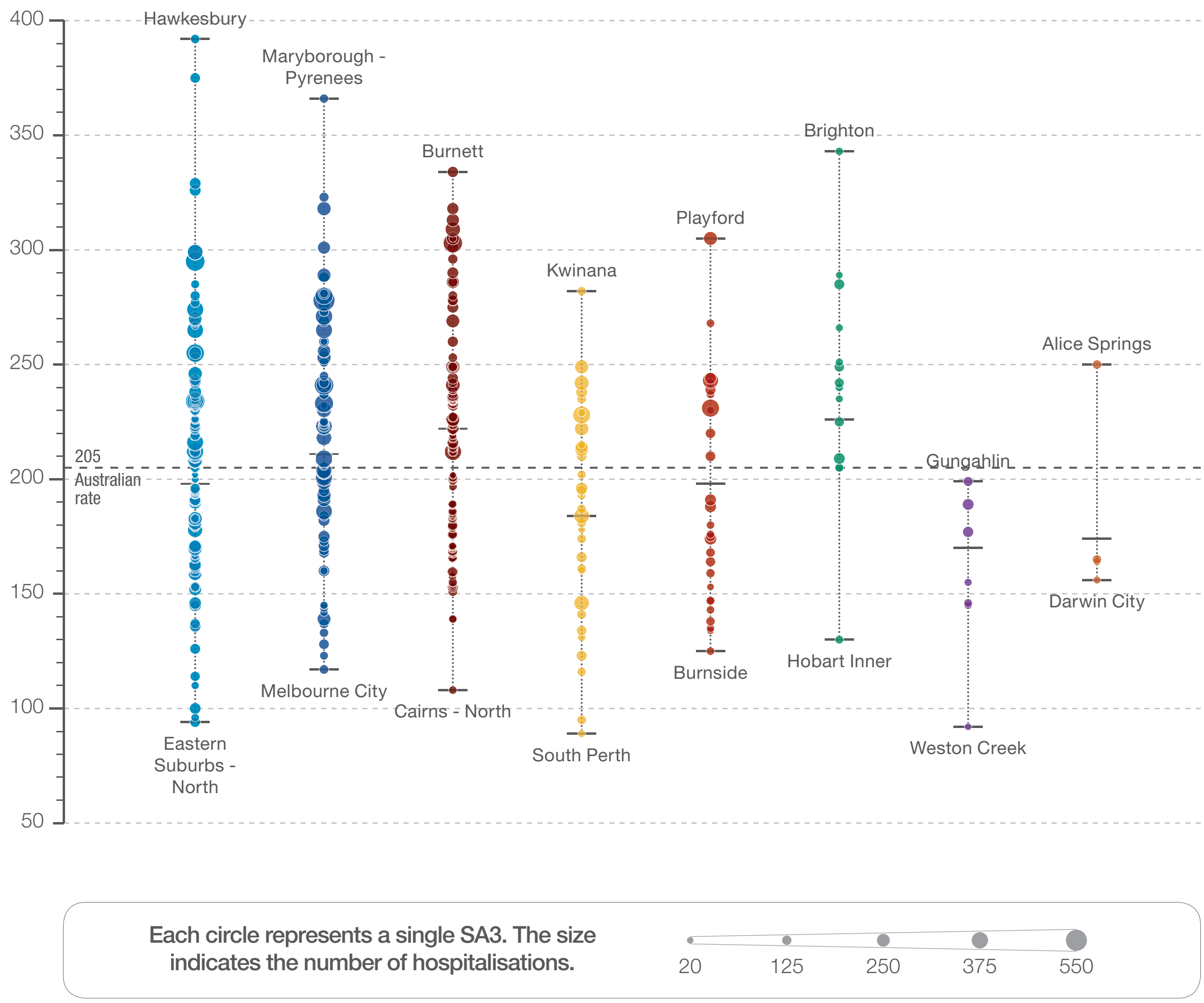


Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Laparoscopic cholecystectomy hospitalisations

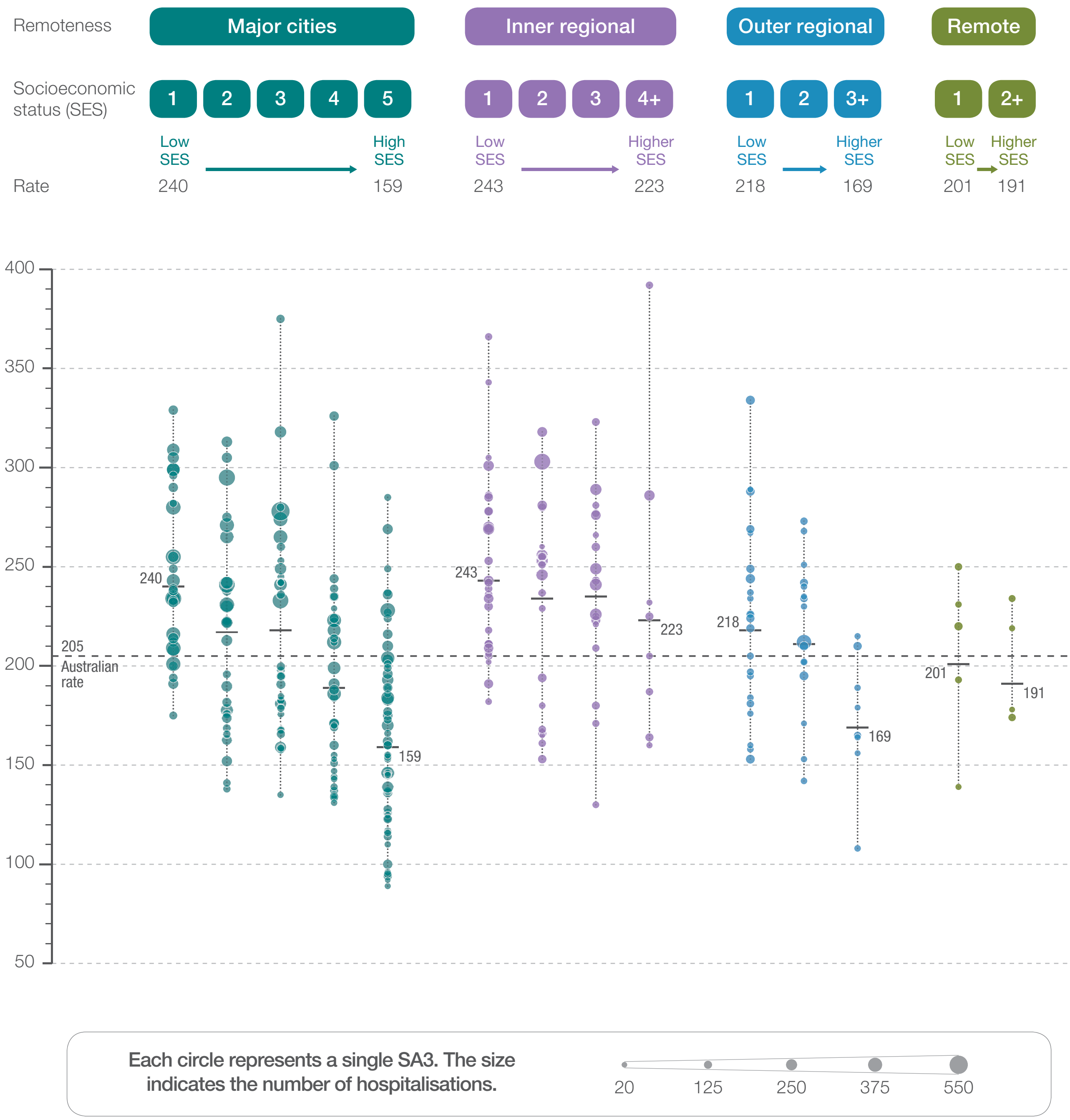
Figure 4.28: Number of hospitalisations for laparoscopic cholecystectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	392	366	334	282	305	343	199	250
State/territory	198	211	222	184	198	226	170	174
Lowest rate	94	117	108	89	125	130	92	156
No. hospitalisations	15,555	12,905	10,716	4,758	3,535	1,231	659	391



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 4.29: Number of hospitalisations for laparoscopic cholecystectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Laparoscopic cholecystectomy hospitalisations

Resources

- National Institute for Health and Care Excellence. Gallstone disease: diagnosis and management. United Kingdom: NICE; 2014.[15]

Australian initiatives

The information in this chapter will complement work already under way on laparoscopic cholecystectomy in Australia. At a national level, this work includes:

- A publication produced by the Royal Australian College of Surgeons, in partnership with Medibank, exploring variation in general surgical practice, including a report on variation in laparoscopic cholecystectomy. (www.surgeons.org/media/24091469/Surgical-Variance-Report-General-Surgery.pdf)
- Welcome to the Healthy Weight Guide, a website with information and tools to help you achieve and maintain a healthy weight, Australian Government Department of Health (www.healthyweight.health.gov.au).

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4.5 Appendicectomy hospitalisations

Context

This data item examines hospitalisations for appendicectomy in people of all ages based on their place of residence. Appendicectomy is the surgical removal of the appendix.[1] The most common reason for appendicectomy is appendicitis (inflammation of the appendix). Appendicitis can occur at any age, but is most common between the early teens and late forties.[2]

In 2013, Australia's rate of appendicectomy was among the highest in the Organisation for Economic Co-operation and Development (OECD). Rates per 100,000 population were 194 in South Korea, 177 in Australia, 168 in Germany, 139 in New Zealand, 105 in Canada and 94 in the United Kingdom.[3] Between 2000 and 2013, the rate of appendicectomy in Australia rose from 142 to 177 per 100,000 people.[3]

Appendicectomy was the most common emergency surgery performed in public hospitals in 2014–15.[4] In 2014–15, approximately 30,000 appendicectomies were performed in public or private hospitals as a result of an emergency admission.[4]

Acute appendicitis is essentially a clinical diagnosis[5,6] and is not determined by risk factors such as obesity or socioeconomic status. In a recent Australian study in a regional centre, 25% of patients had imaging before surgery; this was mainly ultrasound in women and children to exclude another pathology.[6]

Appendicectomy hospitalisations

It is not possible to monitor the rate of negative appendicectomy (that is, removal of a normal appendix) using nationally available data. Recent Australian studies of appendicectomy in adults have reported negative appendicectomy rates of 21–24%.[6-8] Reported rates of negative appendicectomy in other countries are 20–35% in the United Kingdom, 15–20% in the Netherlands, 16% in Canada and 12% in the United States.[6] Proposed methods for reducing the rate of negative appendicectomy in stable, uncomplicated patients with suspected appendicitis include greater use of imaging where the diagnosis is uncertain, observing a period of response to antibiotics in patients who are stable and reporting rates of both negative and perforated appendicectomy.[9,10] In the absence of a 'gold standard' diagnostic pathway, it is difficult to determine how much of the variation in rates of hospitalisation for appendicectomy is unwarranted. In addition, even with an agreed diagnostic pathway, linked data on the patient's treatment and care before surgery would be required at a national level.

Antibiotic treatment has been used instead of surgery as first-line treatment for some patients with appendicitis. The role of antibiotics in the treatment of suspected uncomplicated appendicitis will require further trials to assess the risk and benefits of this approach in stable, uncomplicated patients.[11-13] Patients with suspected uncomplicated appendicitis may benefit from initial antibiotic therapy during a period of limited observation or when surgery, if required, is likely to be delayed due to distance or access to theatre.

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for appendicectomy per 100,000 people in 2014–15.

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 40,752 hospitalisations for appendicectomy, representing 179 hospitalisations per 100,000 people (the Australian rate).

The number of hospitalisations for appendicectomy across 316† local areas (Statistical Area 3 – SA3) ranged from 103 to 360 per 100,000 people. The rate was **3.5 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 164 per 100,000 people in South Australia to 215 in the Northern Territory (Figures 4.32–4.35).

After the highest and lowest 10% of results were excluded and 254 SA3s remained, the number of hospitalisations per 100,000 people was 1.7 times as high in the area with the highest rate compared to the area with the lowest rate.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

† There are 333 SA3s. For this item, data were suppressed for 17 SA3s due to a small number of hospitalisations and/or population in an area. Some of the published SA3 rates were considered 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.

Appendicectomy hospitalisations

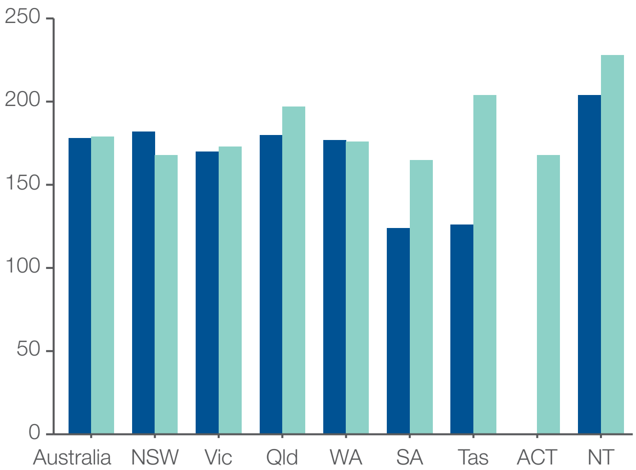
Analysis by remoteness and socioeconomic status

Rates of surgery tended to be higher in inner regional areas than in other categories of remoteness. There was no clear pattern according to socioeconomic disadvantage (Figure 4.36).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians was almost identical to the rate for other Australians (178 vs 179 per 100,000 people) (Figure 4.30).

Figure 4.30: Number of hospitalisations for appendicectomy per 100,000 people, age and sex standardised, by state and territory and Indigenous status, 2014–15

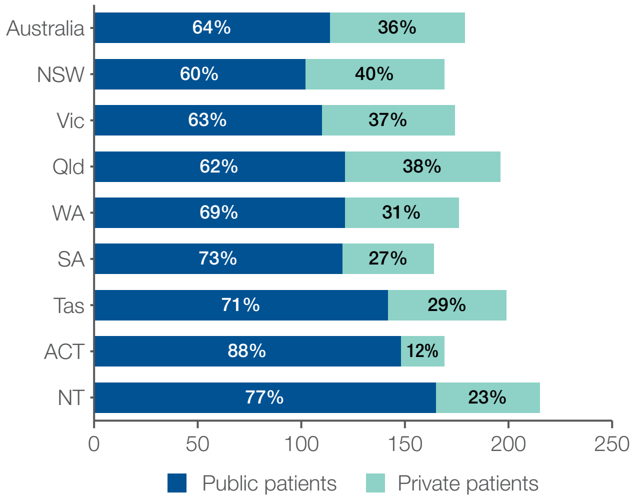


The data for Figure 4.30 are available at www.safetyandquality.gov.au/atlas.

Analysis by patient funding status

Overall, 36% of hospitalisations for appendicectomy were for privately funded patients. This proportion varied from 12% in the Australian Capital Territory to 40% in New South Wales. The median age of patients at the time of operation was 25 years for publicly funded patients and 31 years for privately funded patients (Figure 4.31).

Figure 4.31: Number of hospitalisations for appendicectomy per 100,000 people, age and sex standardised, by state and territory and patient funding status, 2014–15



The data for Figure 4.31 are available at www.safetyandquality.gov.au/atlas.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
Data for ACT (Aboriginal and Torres Strait Islander Australians) have been suppressed.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Interpretation

Potential reasons for the variation include differences in:

- The incidence of appendicitis and perforated appendicitis
- Use of ultrasound and computed tomography (CT) scans to aid diagnosis
- Use of C-reactive protein levels to aid diagnosis
- Thresholds for surgical management
- Use of antibiotics for uncomplicated appendicitis
- Capacity for prolonged observation of patients in whom diagnosis is uncertain.

The finding that the majority of appendicectomies are performed on publicly funded patients reflects the high proportion of emergency cases that are treated in public hospitals compared with the private system.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in the area. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, 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.

Addressing variation

CT scanning to diagnose appendicitis in adults reduces the rate of negative appendicectomy significantly, but the exposure to ionising radiation associated with CT scanning has prompted recommendations against its widespread use.[6,14] Ultrasound is recommended for imaging in suspected acute appendicitis in children and young adults, with CT scanning reserved for follow-up of equivocal results.[15] Australian resources guiding the appropriate use of CT scanning in children and young adults provide information to support decision-making by clinicians and consumers.[16]

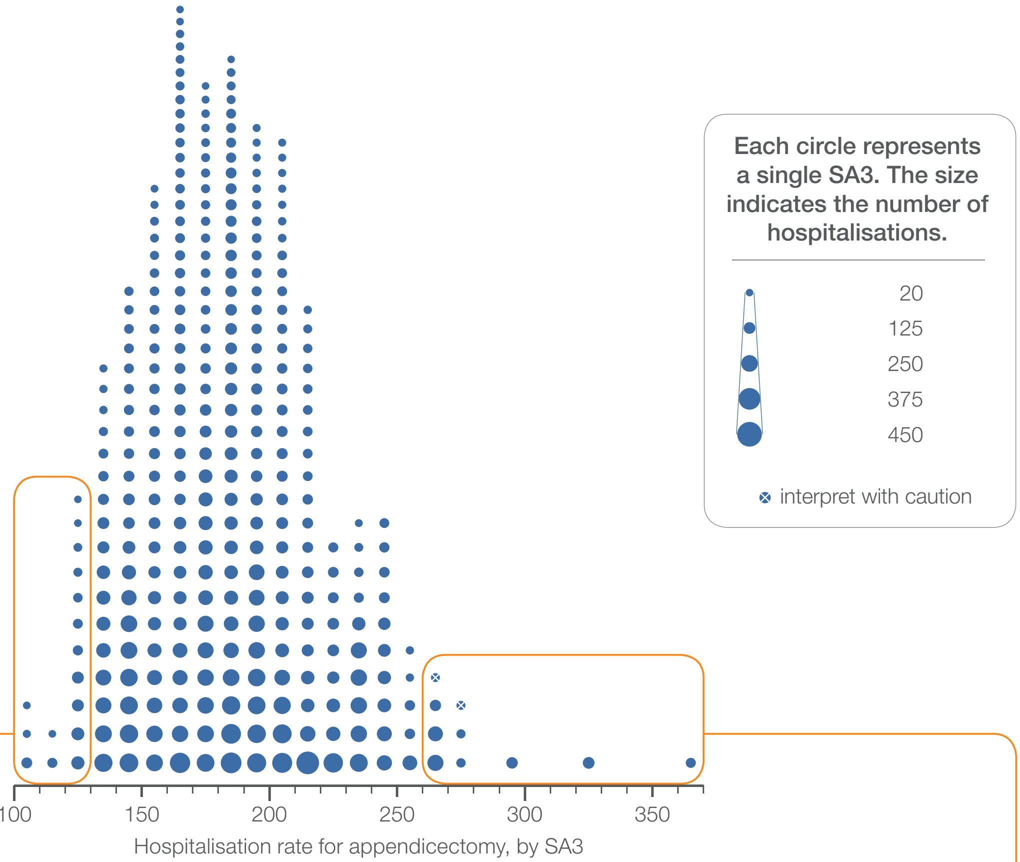
Reported reductions in the rate of negative appendicectomy attributed to using ultrasound, followed by CT scans in some cases, have varied widely. For example, two Dutch studies reported reductions of 15% and 3%, respectively.[10,17] The use of ultrasound has increased in recent years in some Australian hospitals. For example, between 1999 and 2009, the percentage of patients having ultrasound to aid in the diagnosis of appendicitis in a Sydney tertiary children's hospital rose from 28% to 43%.[18] The use of C-reactive protein in the same study increased from 0% to 26%.[18]

Commonly used clinical decision tools to aid diagnosis of appendicitis in children include blood tests such as the white blood count and levels of C-reactive protein.[19] However, blood tests alone are not diagnostic; the clinical findings and the patient's progress are as important as blood tests in deciding whether to perform appendicectomy or place the patient under overnight observation. Many respondents in a recent survey of consultant emergency physicians in Australia and New Zealand favoured prolonged observation to assist diagnosis, but this option can be limited by time targets for patient flow and the demand for emergency department beds.[18] Most (61%) agreed that there was a role for a validated clinical practice guideline for possible appendicitis in children.[19]

Appendicectomy hospitalisations

Views on disease progression and appropriate treatment are changing, and non-surgical management is often considered. Some studies have shown an association between the length of the pre-hospital delay and the proportion of perforations. However, evidence suggests that perforated appendicitis can rarely be prevented.[20] Monitoring perforation rates and negative appendicectomy rates could potentially provide greater insight into the variation in clinical criteria, including investigations and thresholds for surgery.

Figure 4.32: Number of hospitalisations for appendicectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Woden	ACT	**103**	36
South Canberra	ACT	**107**	26
Darebin - North	Vic	**108**	104
Adelaide City	SA	**117**	25
Moreland - North	Vic	**118**	85
South Coast	NSW	**120**	71
Perth City	WA	**122**	131
Canning	WA	**124**	132
Carlingford	NSW	**124**	80
Kogarah - Rockdale	NSW	**125**	162
Wheat Belt - South	WA	**125**	23
Hurstville	NSW	**126**	156
Richmond Valley - Hinterland	NSW	**128**	87
Lower North	SA	**128**	26
South Perth	WA	**129**	60
Burnside	SA	**129**	53

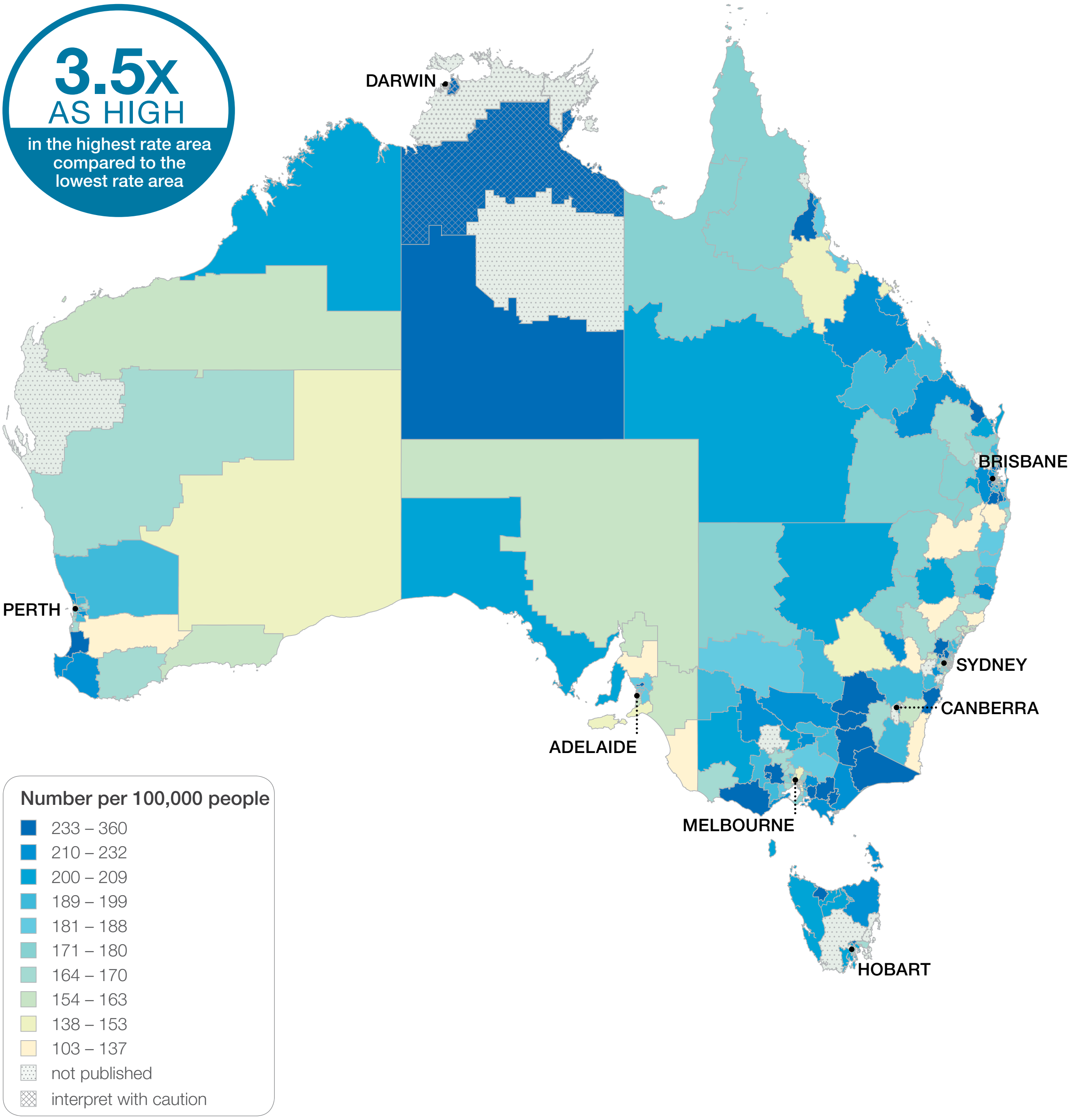
Highest rate areas

SA3	State	Rate	Hospitalisations
Hawkesbury	NSW	**360**	85
Richmond - Windsor	NSW	**329**	126
Baw Baw	Vic	**293**	119
Litchfield	NT	**278***	59
Dural - Wisemans Ferry	NSW	**275**	68
Creswick - Daylesford - Ballan	Vic	**271**	62
Katherine	NT	**265***	57
Wagga Wagga	NSW	**264**	236
Burnie - Ulverstone	Tas	**263**	116
Warrnambool - Otway Ranges	Vic	**261**	208

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

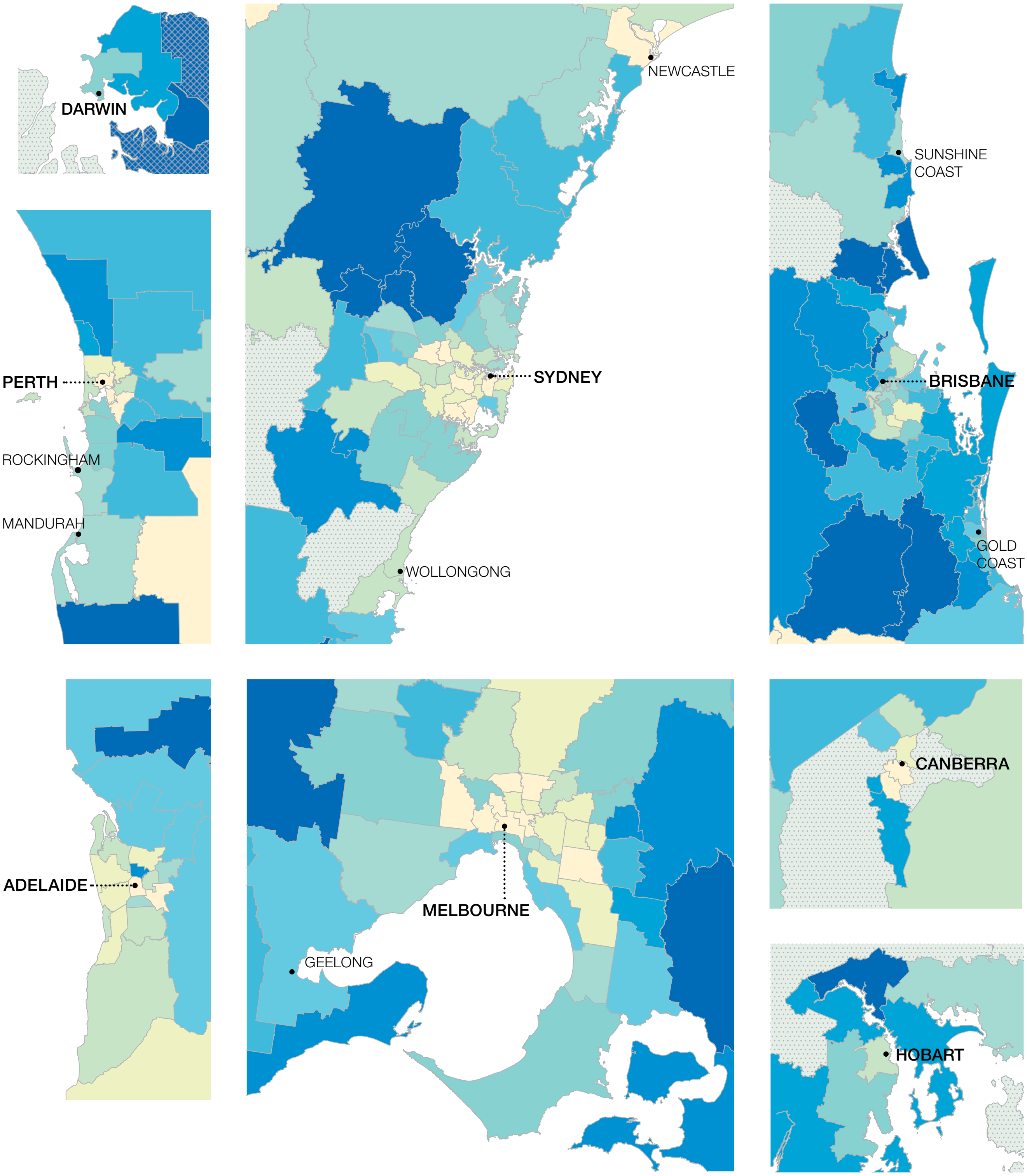
Appendicectomy hospitalisations

Figure 4.33: **Number of hospitalisations for appendicectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map**



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 4.34: **Number of hospitalisations for appendicectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps**



Notes:

Rates are age and sex standardised to the Australian population in 2001.

Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).

Analysis is based on the patient's area of usual residence, not the place of hospitalisation.

Hatching indicates a rate that is considered more volatile than other published rates and should be interpreted with caution.

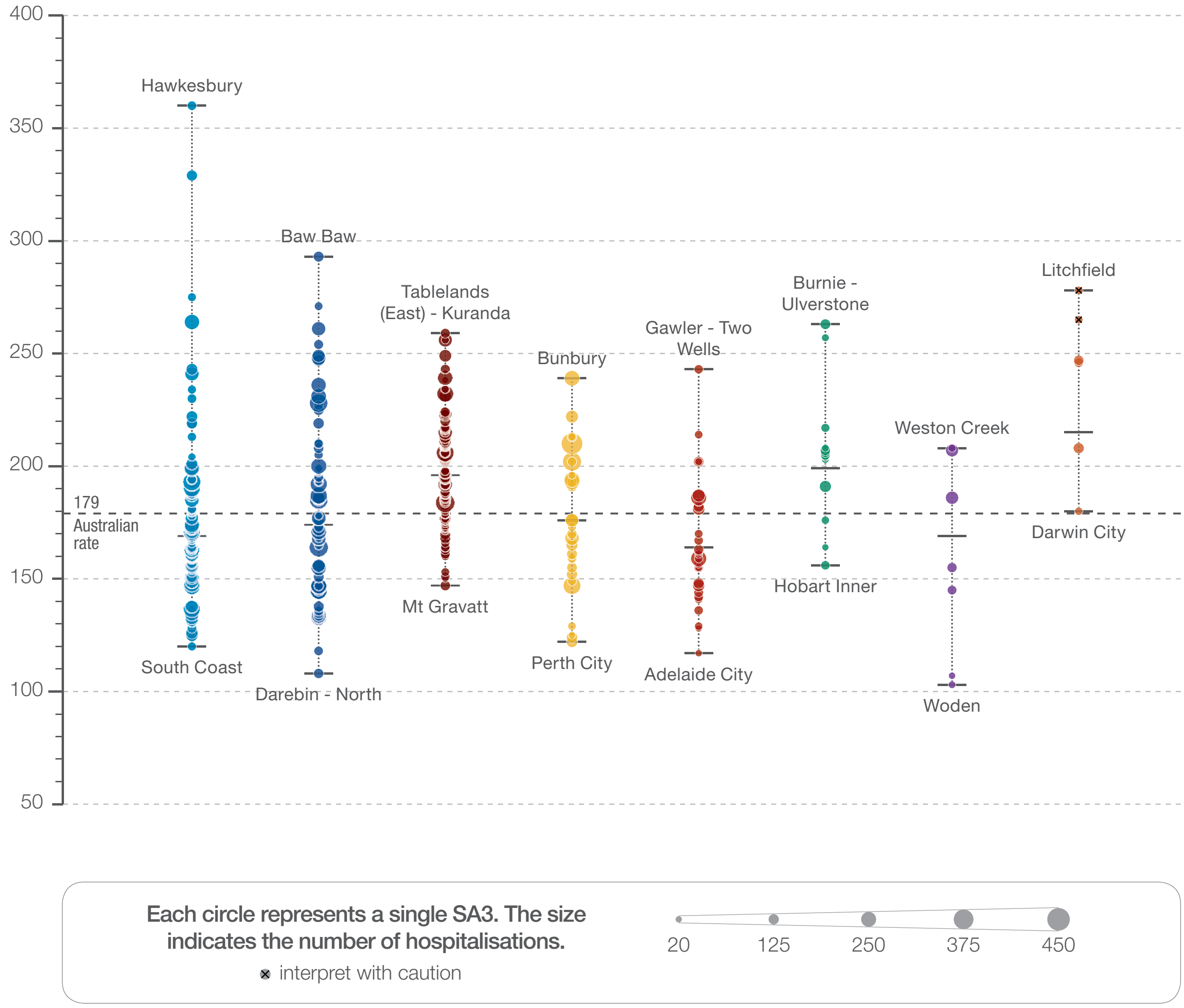
For further detail about the methods used, please refer to the Technical Supplement.

Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Appendicectomy hospitalisations

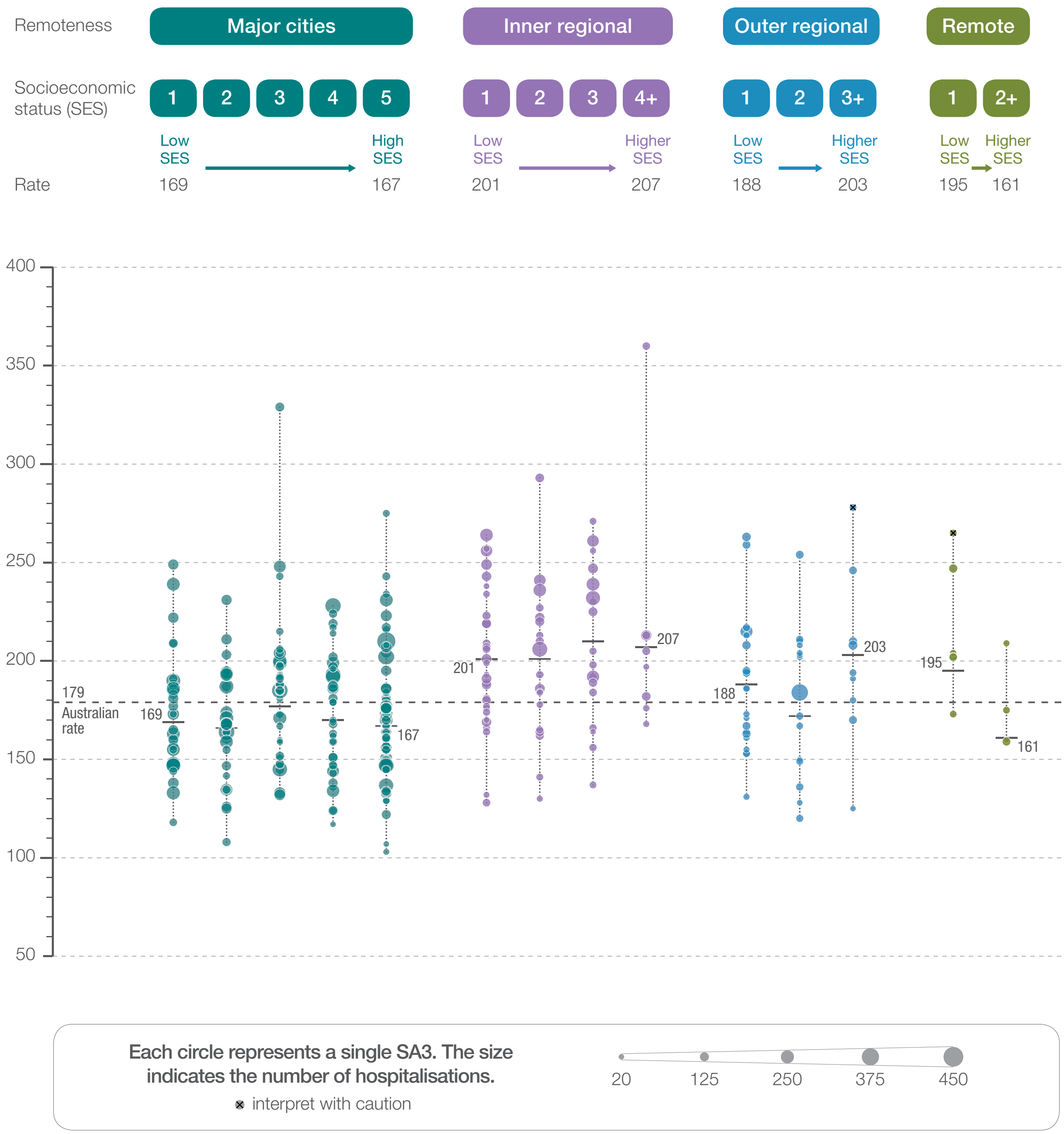
Figure 4.35: Number of hospitalisations for appendicectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	360	293	259	239	243	263	208	278*
State/territory	169	174	196	176	164	199	169	215
Lowest rate	120	108	147	122	117	156	103	180
No. hospitalisations	12,165	9,850	9,048	4,422	2,626	947	663	547



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 4.36: Number of hospitalisations for appendicectomy per 100,000 people, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses 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 National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Appendicectomy hospitalisations

Resources

- BMJ Best Practice. Acute appendicitis. London: BMJ Publishing Group; 2015.

Australian initiatives

The information in this chapter will complement work already under way to address the rate of appendicectomy in Australia. State and territory initiatives include:

- *A clinical practice guideline for acute management of abdominal pain in children* (www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2013_053.pdf), NSW Health.
- *Clinical practice guidelines for abdominal pain* (www.rch.org.au/clinicalguide/guideline_index/Abdominal_pain) that have been adapted for statewide use with the support of the Victorian Paediatric Clinical Network, Royal Children's Hospital Melbourne.
- Systematically applied audit process for monitoring appendicitis management and outcomes for children, South Australia Health.

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4.6 Cataract surgery hospitalisations 40 years and over

Context

This data item examines hospitalisations for cataract surgery in people aged 40 years and over based on their place of residence.

The first *Australian Atlas of Healthcare Variation* examined variation in cataract surgery based on data from the Medicare Benefits Schedule, which did not reflect all publicly funded services. Further analysis using hospital admissions data was suggested, to provide a better understanding of all cataract services, both public and private.

Cataract is the second most common cause of bilateral vision impairment in Australia.[1] The strongest risk factor for cataracts is age.[2] Diabetes and smoking also increase the risk.[2,3] Cataract surgery is the most common elective surgical procedure in Australia. It involves replacing the lens with a clear, permanent, artificial lens.[4] As well as restoring sight lost from cataract, artificial lenses can help correct poor sight from refractive errors. As a result, many people who previously had to wear glasses can become spectacle-free following a cataract operation.

Factors that influence the amount of cataract surgery in a community include the age structure of the population, indications and thresholds for the surgery, access to surgical services, and the financial systems for paying and incentivising surgeons.[5] Half of the population develops significant cataract by their 70s.[5] In Australia, 90% of cataract operations are for people aged 60 years and over, and only 1% are in people under 40 years of age.[6]

Measured visual acuity is one factor that determines the threshold for surgery; the functional impact of cataract on a person's life is also a key consideration. Poor eyesight affects the ability of people to live independently and places them at risk of preventable injuries – for example, from falls.[7]

Cataract surgery hospitalisations 40 years and over

International comparisons are often made using an overall 'cataract surgical rate', which is defined by the World Health Organization as the number of cataract operations per million population per year.[8] In 2012, Australia had a high ranking compared with other high-income countries, with a cataract surgical rate of 8,000 per million, which was twice as high as that of New Zealand, but lower than that of France, Sweden, the Netherlands and the United States (≥10,000 per million).[9] The cataract surgical rates per million population over the age of 40 for the states and territories, and national data examined in this Atlas are available at www.safetyandquality.gov.au/atlas.

The prevalence of vision loss from unoperated cataract is 12 times as high in Aboriginal and Torres Strait Islander Australians than in other Australians.[10] Poor access to eye services is the key factor in higher rates of untreated cataract among Aboriginal and Torres Strait Islander Australians.[11] Only 65% of Aboriginal and Torres Strait Islander Australians with vision impairment due to cataract undergo surgery.[11] Aboriginal and Torres Strait Islander Australians also experience longer waiting times for cataract surgery than other Australians (median waiting times of 140 and 92 days, respectively).[12] Waiting times for cataract surgery also vary between states and territories, ranging from a median waiting time of 37 days in Western Australia to 301 days in Tasmania.[12] Waiting times have not been investigated at a national level by Statistical Local Areas of patient residence.

About the data

Data are sourced from the National Hospital Morbidity Database, and include both public and private hospitals. Rates are based on the number of hospitalisations for cataract surgery per 100,000 people aged 40 years and over in 2014–15. Because a record is included for each hospitalisation for cataract surgery, rather than for each patient, patients hospitalised for this procedure more than once in the financial year will be counted more than once. Data for the Australian Capital Territory (ACT) are not presented separately, because not all ACT facilities that undertake cataract surgery contribute to the National Hospital Morbidity Database. In New South Wales, some cataract procedures are undertaken in outpatient departments as non-admitted care, and these procedures are not counted in the data presented.

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 comparison between populations with different age and sex structures. Data quality issues – for example, the recognition of Aboriginal and Torres Strait Islander status in datasets – could influence the variation seen.

What do the data show?

Magnitude of variation

In 2014–15, there were 245,797 hospitalisations for cataract surgery, representing 2,138 hospitalisations per 100,000 people aged 40 years and over (the Australian rate).

The number of hospitalisations for cataract surgery across 316† local areas (Statistical Area 3 – SA3) ranged from 835 to 3,279 per 100,000 people aged 40 years and over. The rate was **3.9 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 1,810 per 100,000 people aged 40 years and over in South Australia to 2,520 in Tasmania (Figures 4.39–4.42).

After the highest and lowest 10% of results were excluded and 254 SA3s remained, the number of hospitalisations per 100,000 people aged 40 years and over was 1.6 times as high in the area with the highest rate compared to the area with the lowest rate.

† There are 333 SA3s. For this item, data were suppressed for eight SA3s due to a small number of hospitalisations and/or population in an area.
Data from ACT private free-standing day hospital facilities, which undertake some cataract surgery, were not provided to the National Hospital Morbidity Database. For this reason, results for ACT (nine SA3s in total) were also suppressed.
Some of the published SA3 rates were considered 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.

Rates by SA3 for two additional years, 2012–13 and 2013–14, are available online at www.safetyandquality.gov.au/atlas.

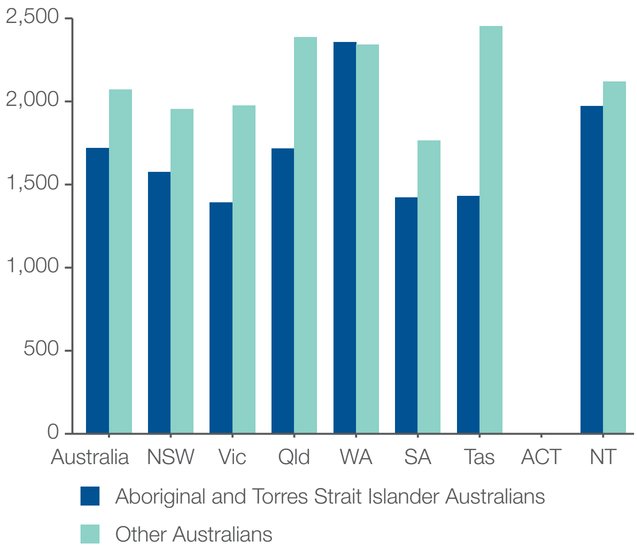
Analysis by remoteness and socioeconomic status

Rates tended to be higher in inner and outer regional areas than in major cities or remote areas. There was no clear pattern according to socioeconomic disadvantage (Figure 4.43).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander Australians (1,719 per 100,000 people) was 17% lower than the rate for other Australians (2,073 per 100,000 people) (Figure 4.37).

Figure 4.37: Number of hospitalisations for cataract surgery per 100,000 people aged 40 years and over, age and sex standardised, by state and territory and Indigenous status, 2014–15

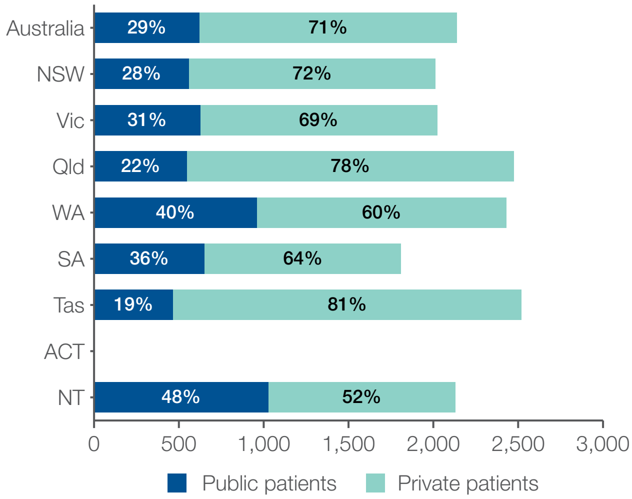


The data for Figure 4.37 are available at www.safetyandquality.gov.au/atlas.

Analysis by patient funding status

Overall, 71% of hospitalisations for cataract surgery were for privately funded patients. This proportion varied from 52% in the Northern Territory to 78% in Queensland and 81% in Tasmania. The median age of patients at the time of hospitalisation was 74 years for publicly funded patients and 73 years for privately funded patients (Figure 4.38).

Figure 4.38: Number of hospitalisations for cataract surgery per 100,000 people aged 40 years and over, age and sex standardised, by state and territory and patient funding status, 2014–15



The data for Figure 4.38 are available at www.safetyandquality.gov.au/atlas.

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hospitalisations for public patients do not incur a charge to the patient or to a third-party payer – for example, a private health insurance fund.
Hospitalisations for private patients do incur a charge to the patient and/or a third-party payer.
Data from ACT private free-standing day hospital facilities, which undertake some cataract surgery, were not provided to the National Hospital Morbidity Database. For this reason, results for ACT are not published.
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Cataract surgery hospitalisations 40 years and over

Interpretation

Potential reasons for the variation include differences in:

- Risk factors for cataract
- Prevalence and severity of cataracts
- Access to eye screening and assessment services
- The decision-making criteria of patients and specialists about the level of visual acuity and functional impairment that indicate the need for surgery
- The availability of specialists in rural and remote locations
- Provision of public cataract surgery facilities and access to these services
- Rates of private health insurance and levels of access to private hospitals among some population groups
- Special initiatives to reduce waiting lists for surgery in some states and territories during 2014–15
- Government policies that involve governments purchasing the services of private providers in private hospitals for public patients.

Variation between areas in rates of surgery may also be influenced by the number of clinicians providing services to people living in the area. The practices of specific clinicians are likely to have a greater impact on rates in smaller local areas with fewer clinicians, such as rural and regional locations. Specific clinicians may influence rates across several local areas, especially those with small populations. The effects of practice styles of individual clinicians will be diluted in areas with larger numbers of practising clinicians.

As well, 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.

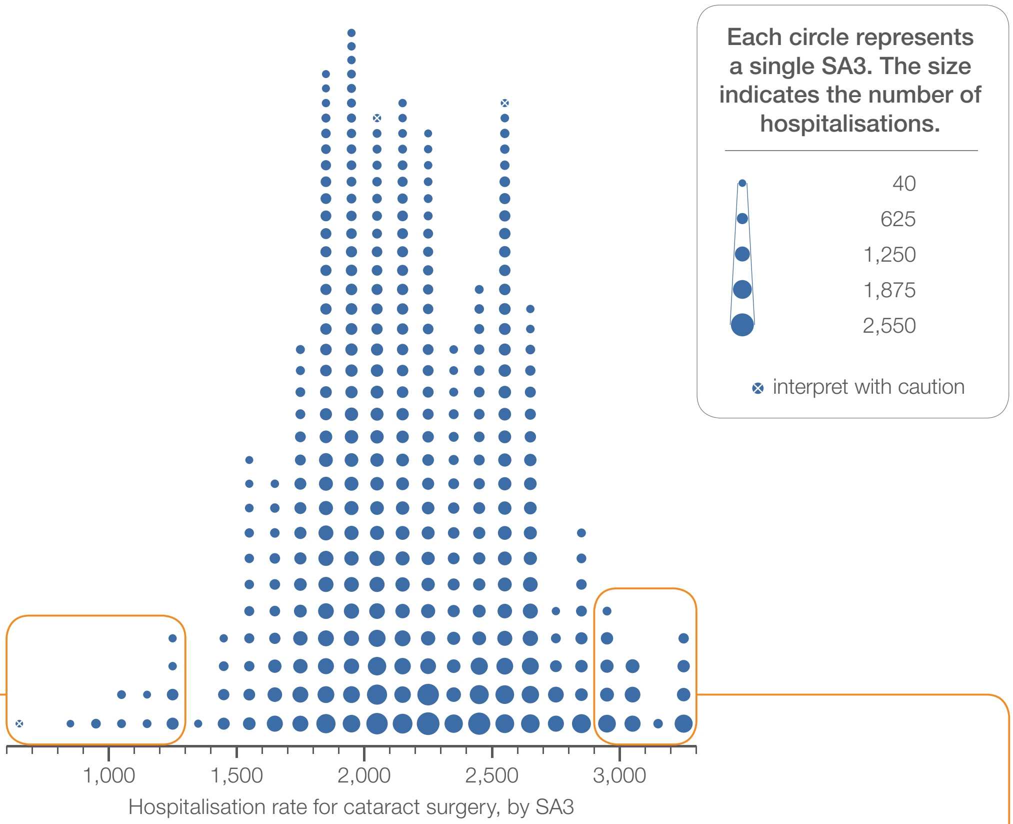
Addressing variation

A major barrier to cataract surgery for Aboriginal and Torres Strait Islander Australians is limited public ophthalmology services.[13] Other barriers include poor coordination between hospital, other healthcare and eye care services. Case management to help patients navigate the referral process and hospital system may go some way towards addressing these issues.[14] Improving literacy around eye health may also be important to increase the number of Aboriginal and Torres Strait Islander Australians who seek help for cataract before it causes blindness.[15]

Increasing the availability of eye services that are specific for Aboriginal and Torres Strait Islander Australians, and increasing the cultural competence of mainstream services are also paramount for improving rates of cataract surgery among Aboriginal and Torres Strait Islander Australians.[14,16] Providing training opportunities in Aboriginal and Torres Strait Islander clinic settings may increase cultural awareness and encourage specialists to include this work in their practice.[13,14]

‘Surgical blitzes’ in regional and remote areas have resulted in short-term increases in the numbers of cataract procedures for Aboriginal and Torres Strait Islander Australians, but they may also prevent planning for the required ongoing services.[17] Sustainable strategies for increasing the rate of cataract surgery among Aboriginal and Torres Strait Islander Australians in regional areas have included integrated eye health services, which incorporated optometry, eye health nursing, ophthalmology and cataract surgery services.[18] The *Roadmap to Close the Gap for Vision*[14] provides many other strategies that would improve the provision of cataract surgery for Aboriginal and Torres Strait Islander and other Australians.

Figure 4.39: Number of hospitalisations for cataract surgery per 100,000 people aged 40 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15



Lowest rate areas

SA3	State	Rate	Hospitalisations
Daly - Tiwi - West Arnhem	NT	**683***	40
Brighton	Tas	**835**	51
Mount Druitt	NSW	**978**	385
Queanbeyan	NSW	**1,064**	241
Bathurst	NSW	**1,083**	254
Esperance	WA	**1,154**	97
St Marys	NSW	**1,182**	241
Lower North	SA	**1,202**	185
Merrylands - Guildford	NSW	**1,208**	774
Blacktown	NSW	**1,245**	696
Snowy Mountains	NSW	**1,268**	148

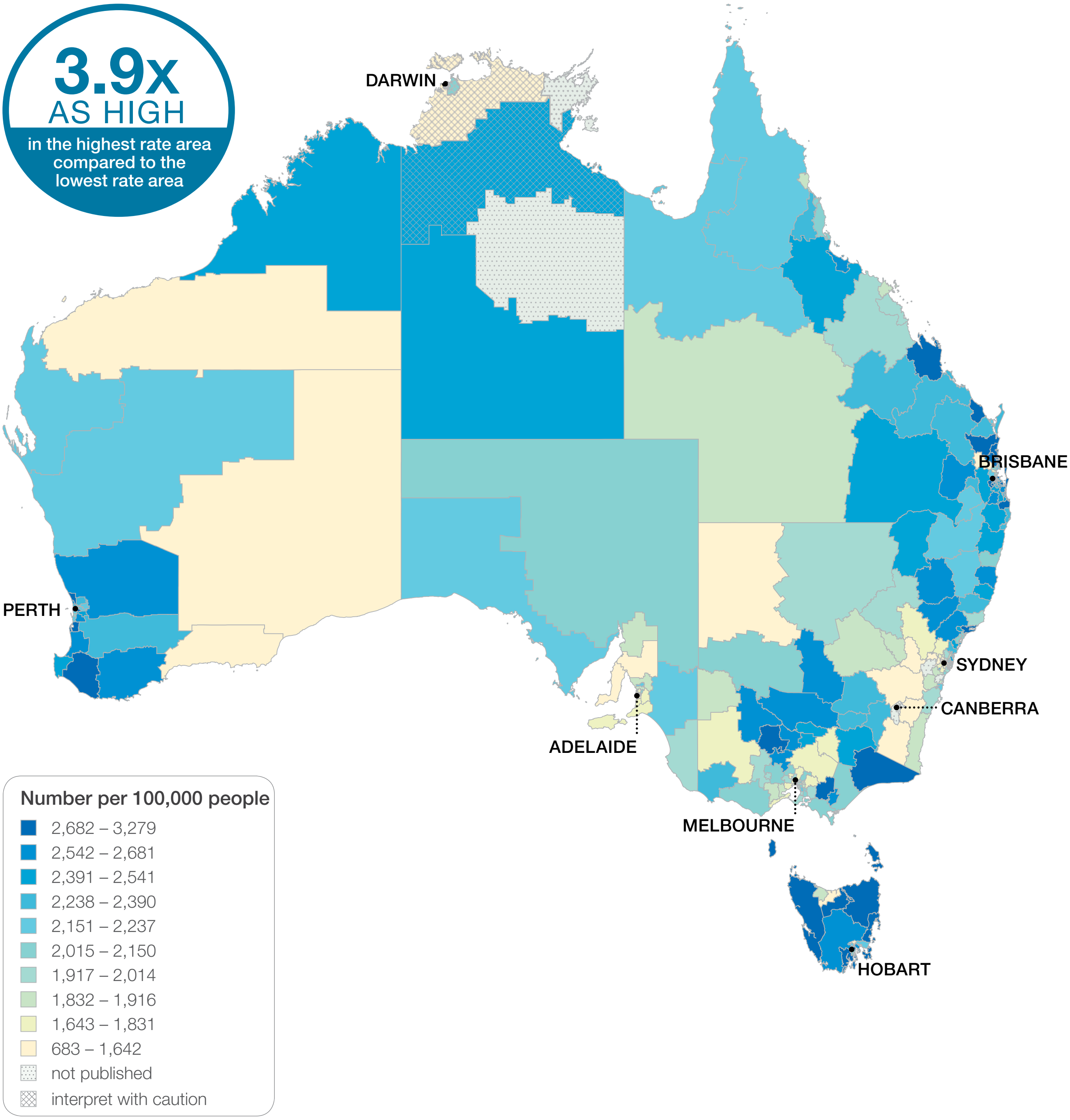
Highest rate areas

SA3	State	Rate	Hospitalisations
North East	Tas	**3,279**	827
Caloundra	Qld	**3,266**	1,753
Meander Valley - West Tamar	Tas	**3,255**	494
Gympie - Cooloola	Qld	**3,239**	1,002
Huon - Bruny Island	Tas	**3,116**	356
Launceston	Tas	**3,094**	1,435
Gippsland - East	Vic	**3,015**	1,067
Gosnells	WA	**3,000**	1,369
Nambour - Pomona	Qld	**2,990**	1,070
Noosa	Qld	**2,938**	821
Maroochy	Qld	**2,933**	964
Loddon - Elmore	Vic	**2,925**	244
Rockhampton	Qld	**2,905**	1,699

Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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.
Data from ACT private free-standing day hospital facilities, which undertake some cataract surgery, were not provided to the National Hospital Morbidity Database. For this reason, results for ACT are not published.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

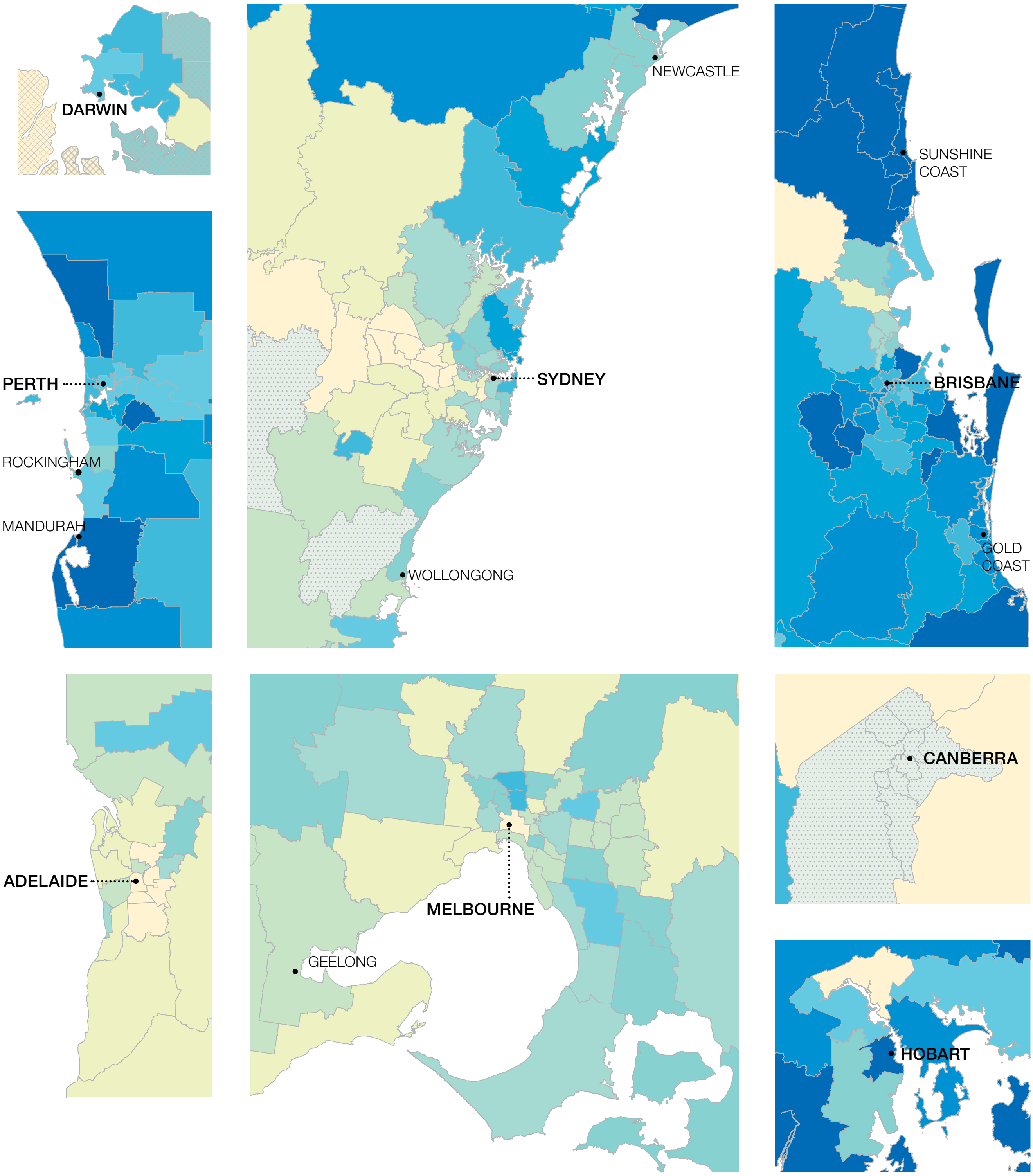
Cataract surgery hospitalisations 40 years and over

Figure 4.40: **Number of hospitalisations for cataract surgery per 100,000 people aged 40 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: Australia map**



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is considered more volatile than other published rates and should be interpreted with caution.
Data from ACT private free-standing day hospital facilities, which undertake some cataract surgery, were not provided to the National Hospital Morbidity Database. For this reason, results for ACT are not published.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 4.41: **Number of hospitalisations for cataract surgery per 100,000 people aged 40 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), 2014–15: capital city area maps**

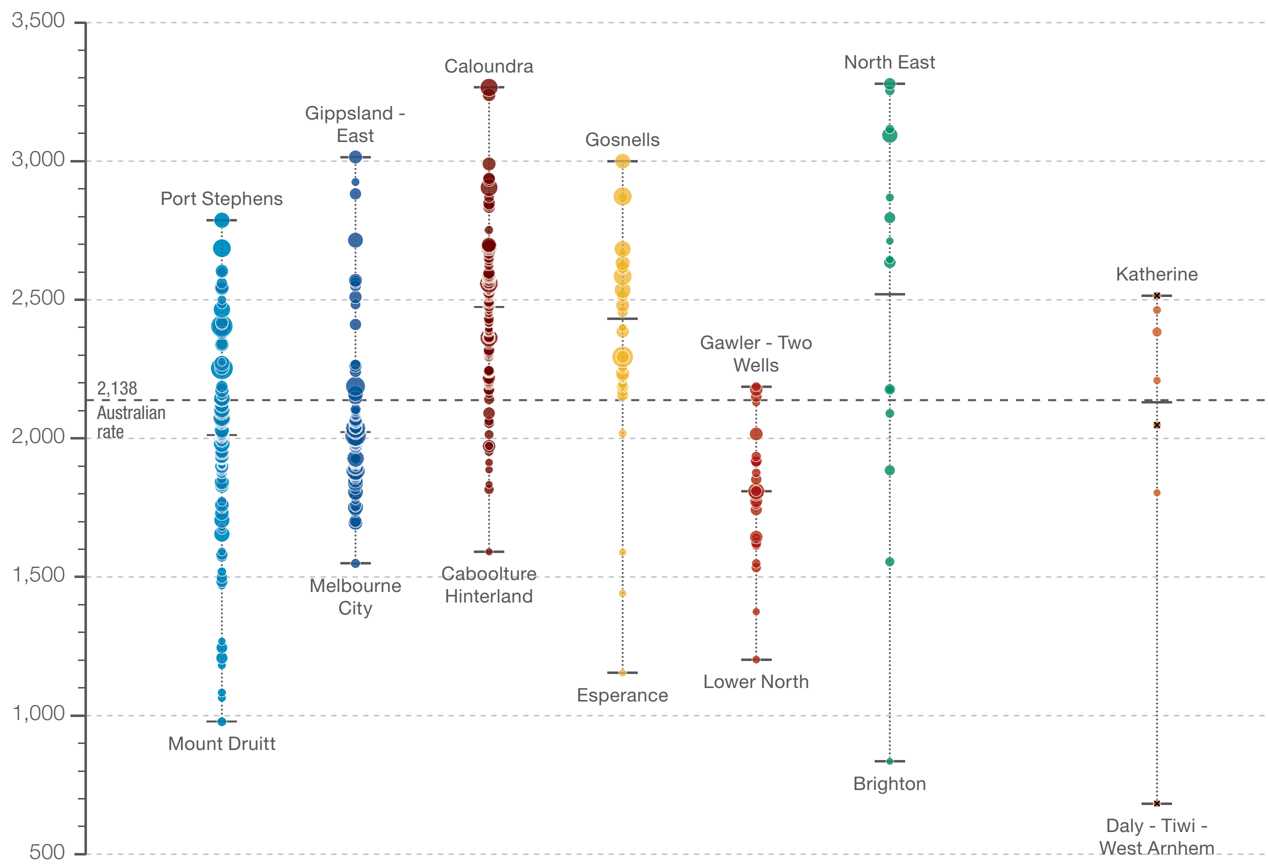


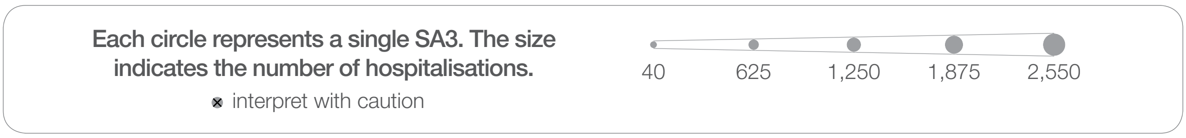
Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Hatching indicates a rate that is considered more volatile than other published rates and should be interpreted with caution.
Data from ACT private free-standing day hospital facilities, which undertake some cataract surgery, were not provided to the National Hospital Morbidity Database. For this reason, results for ACT are not published.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Cataract surgery hospitalisations 40 years and over

Figure 4.42: Number of hospitalisations for cataract surgery per 100,000 people aged 40 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), state and territory, 2014–15

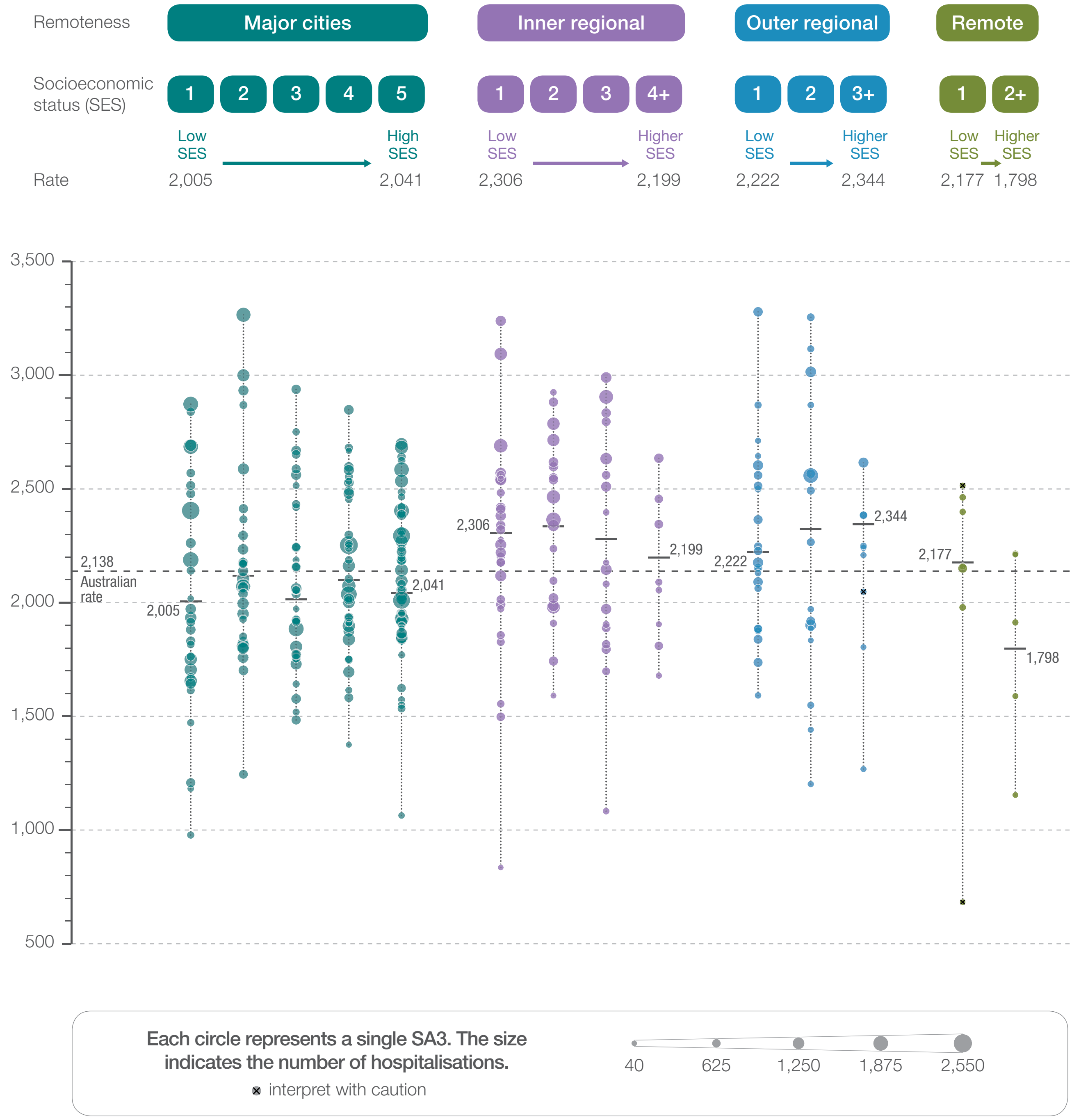
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	2,787	3,015	3,266	3,000	2,187	3,279	n.p.	2,515*
State/territory	2,012	2,023	2,474	2,431	1,810	2,520	n.p.	2,130
Lowest rate	978	1,549	1,591	1,154	1,202	835	n.p.	683*
No. hospitalisations	77,410	58,451	54,350	26,947	17,289	7,602	n.p.	1,381





Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses and asterisks 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.
Data from ACT private free-standing day hospital facilities, which undertake some cataract surgery, were not provided to the National Hospital Morbidity Database. For this reason, results for ACT are not published.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Figure 4.43: Number of hospitalisations for cataract surgery per 100,000 people aged 40 years and over, age and sex standardised, by Statistical Area Level 3 (SA3), remoteness and socioeconomic status, 2014–15



Notes:
Rates are age and sex standardised to the Australian population in 2001.
Rates are based on the number of hospitalisations in public and private hospitals (numerator) and people in the geographic area (denominator).
Analysis is based on the patient's area of usual residence, not the place of hospitalisation.
Crosses indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Data from ACT private free-standing day hospital facilities, which undertake some cataract surgery, were not provided to the National Hospital Morbidity Database. For this reason, results for ACT are not published.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database 2014–15 and ABS Estimated Resident Population 30 June 2014.

Cataract surgery hospitalisations 40 years and over

Resources

- 2015 annual update on the implementation of *The Roadmap to Close the Gap for Vision*. www.mspgh.unimelb.edu.au/centres-institutes/centre-for-health-equity/research-group/indigenous-eye-health#roadmap-to-close-the-gap-for-vision
- Roadmap Regional Implementation Toolkit. www.mspgh.unimelb.edu.au/centres-institutes/centre-for-health-equity/research-group/indigenous-eye-health/roadmap-to-close-the-gap-for-vision/overview/toolkit#toolkit
- National Eye Health Survey data.[1]

Australian initiatives

The information in this item complements work already under way to address the rates of cataract surgery in Australia. At a national level, this work includes:

- National Framework for Action to Promote Eye Health and Prevent Avoidable Blindness and Vision Loss
- Ophthalmology expansion of the Medical Specialist Outreach Assistance Program
- Eye and Ear Surgical Support Services program 2015–2017, an Australian Government support program aimed at improving access to surgical services for Aboriginal and Torres Strait Islander Australians living in remote and rural areas
- The National Visiting Optometrists Scheme
- The National Rural Health Outreach Fund.

State and territory initiatives include:

- Queensland Health initiative to reduce waiting times for eye surgery
- Rebuilding Health Services, Tasmania
- Tasmanian Health Assistance Package (Australian Government funded)
- TAZREACH funding for cataract surgery for Aboriginal and Torres Strait Islander patients, Tasmania
- Victorian elective surgery initiative
- The Pilbara Aboriginal Eye Health Program, Western Australia
- The Derbarl Yerrigan Eye Health Program, Western Australia
- The Aboriginal Vision Program (New South Wales and Northern Territory)
- The Central Australia and Barkly Integrated Eye Health Strategy, Northern Territory.

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Technical supplement

Introduction

This is the *Second Australian Atlas of Healthcare Variation* in a series providing statistics at a local level identifying variation across Australia for a number of health items. Statistics in the Atlas are presented in the form of maps, graphs and tables. This technical supplement provides information on the methodology used for data extraction, and analysis for presentation in the maps and graphs. Activity rates are presented by local areas using the Australian Bureau of Statistics (ABS) Statistical Area Level 3 (SA3) geography, as well as at state and territory, and national levels.

The Australian Commission on Safety and Quality in Health Care (the Commission) 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 www.meteor.aihw.gov.au/content/index.phtml/itemId/660066.

The specifications include details such as the data source, the relevant population, inclusions and exclusions, the numerator and denominator, computation, disaggregation and data suppression rules. Unless otherwise stated, indicators relate to all ages.

The specifications for the potentially preventable hospitalisations and maternity indicators are based on the nationally agreed specifications:

- National Healthcare Agreement: PI 18 – selected potentially preventable hospitalisations, 2017 (www.meteor.aihw.gov.au/content/index.phtml/itemId/630028)
- National Core Maternity Indicators: PI 06 – caesarean section for selected women giving birth for the first time, 2016 (www.meteor.aihw.gov.au/content/index.phtml/itemId/613184)
- National Core Maternity Indicators: PI 13(b) – third and fourth degree tears for all vaginal births, 2016 (www.meteor.aihw.gov.au/content/index.phtml/itemId/613194).

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Individual specifications based on the national specifications have been created for the purpose of this report to allow reporting at the SA3 level of analysis of individual indicators.

It is noted that states and territories may code conditions differently – for example, for infective and inflammatory conditions in urinary tract infections. This should be taken into account during interpretation and comparison across jurisdictions.

Two data sources were used in the Atlas:

- National Hospital Morbidity Database (NHMD)
- National Perinatal Data Collection (NPDC).

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 Australians in any of the data sources used. 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.

1. National Hospital Morbidity Database

Data for most of the indicators in the Atlas were sourced from the NHMD. Most NHMD data used in this report are for 2014–15. For each reference year, the NHMD includes episodes for admitted patients discharged (separated) between 1 July and 30 June.

For indicators where the annual number of hospitalisations is too low or unreliable to report at a local level, three financial years of data (2012–13, 2013–14 and 2014–15) are combined. In this case, rates are based on the number of hospitalisations for three years and the summed population for three years. This method differs from the calculation of an average annual rate, although the results from both methods will generally be the same, or very similar, particularly for areas with low proportional population change between years.

The NHMD is a comprehensive dataset that has 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 may be included. The data elements (variables) included in the NHMD are based on the Admitted Patient Care National Minimum Data Set (APC NMDS). More information on the 2014–15 APC NMDS can be found on METeOR (www.meteor.aihw.gov.au/content/index.phtml/itemId/535047).

For indicators that have been aggregated over three years, information on the years 2012–13 and 2013–14 can also be found on METeOR (www.meteor.aihw.gov.au/content/index.phtml/itemId/466132 and www.meteor.aihw.gov.au/content/index.phtml/itemId/491555). There are no known issues with the data contained in this report however ACT is undergoing a system-wide review of ACT Health data and reporting that will be finalised 31 March 2018.

A summary of key data quality issues related to the 2014–15 NHMD is available at www.meteor.aihw.gov.au/content/index.phtml/itemId/638202. Data quality issues related to the NHMD for 2012–13 and 2013–14 are available at www.meteor.aihw.gov.au/content/index.phtml/itemId/568730 and www.meteor.aihw.gov.au/content/index.phtml/itemId/611030.

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 of type of care (for example, from acute care to rehabilitation). In this report, separations are referred to as 'hospitalisations'.

Because a record is included for each hospitalisation, rather than 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.

Hospitalisation 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. Records with unknown or invalid age or sex were also excluded from the analysis if any age or sex was required for standardisation.

Hospitalisation records for which the place of usual residence of the patient was unknown, invalid, no fixed address, at sea or overseas were included in the total for Australia only, because these records could not be allocated to an SA3, or state or territory.

In 2011–12, it was estimated that 88% of Aboriginal and Torres Strait Islander patients were correctly identified in public hospital admission records. The levels of weighted completeness (and 95% confidence intervals) of Aboriginal and Torres Strait Islander identification for public hospitals in 2011–12 were 80% (76–83%) in New South Wales, 78% (71–84%) in Victoria, 87% (84–91%) in Queensland, 96% (92–98%) in Western Australia, 91% (85–95%) in South Australia, 64% (53–74%) in Tasmania, 58% (46–69%) in the Australian Capital Territory and 98% (96–99%) in the Northern Territory. It is unknown to what extent Aboriginal and Torres Strait Islander Australians might be under-identified in private hospital admission records.

There were wide variations in Aboriginal and Torres Strait Islander identification by remoteness, ranging 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 www.aihw.gov.au/publication-detail/?id=60129543215.

Components of NHMD analysis

Diagnoses and procedures

Hospital diagnosis and procedure data used in this report were reported to the NHMD by states and territories using the eighth edition 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, for 2013–14 and 2014–15. For 2012–13, the seventh edition was used.

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. Further information on the quality and comparability of the coded data at a state and territory level can be found in *Australian Hospital Statistics 2012–13* and *Admitted Patient Care: Australian Hospital Statistics* for 2013–14 and 2014–15, available at www.aihw.gov.au/publication-detail/?id=60129546922, www.aihw.gov.au/publication-detail/?id=60129550483 and www.aihw.gov.au/publication-detail/?id=60129554702.

Aboriginal and Torres Strait Islander status

For indicators based on NHMD data, hospitalisations for Aboriginal and Torres Strait Islander Australians 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.

Patient funding status

NHMD data in this report are presented separately for hospitalisations relating to the funding status of the patient. This reflects the funding arrangements for the patient's hospitalisation, rather than the sector of the hospital to which they were admitted.

Hospitalisations were categorised into funding status of patients – public or private – using the APC NMDS variable *Source of funding*. For further details, see www.meteor.aihw.gov.au/content/index.phtml/itemId/553314.

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In some cases, the *Patient election status* (www.meteor.aihw.gov.au/content/index.phtml/itemId/326619) or *Hospital sector* (www.meteor.aihw.gov.au/content/index.phtml/itemId/269977) variables were also used. This is the approach used for reporting national hospital data by patient funding status. Hospitalisations for publicly funded patients comprise those for whom the patient funding source was:

- Health service budget (due to eligibility under a Reciprocal Health Care Agreement)
- Health service budget (no charge raised as a result of hospital decision) AND in public hospitals
- Health service budget (not covered elsewhere)
- 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 hospital decision) AND in private hospitals
- 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-funding
- Other funding source
- Not known.

Transfers

People admitted to hospital are sometimes transferred to other hospitals for care. For two indicators – acute myocardial infarction and atrial fibrillation – a best estimate was used of occurrence of an event for which hospitalised care for the conditions was provided, rather than an estimate of the number of separate hospitalisation episodes if each episode following a transfer was counted. This was calculated by excluding hospitalisations starting with a transfer from another hospital, so that only the first hospitalisation was counted. Further information is available at www.meteor.aihw.gov.au/content/index.phtml/itemId/269976. Results from this method may differ slightly from calculations that exclude hospitalisations ending in a transfer. Further information is available at www.meteor.aihw.gov.au/content/index.phtml/itemId/270094.

2. National Perinatal Data Collection

The NPDC includes data about births in Australia, including births in hospitals, birth centres and the community. All live births and stillbirths of at least 20 weeks gestation or at least 400 grams birth weight are in scope of the collection, except in Western Australia, where births are included if gestational age is at least 20 weeks, or if gestation age is unknown and birth weight is at least 400 grams. The data are based on births reported to the perinatal data collection in each state and territory in Australia. Midwives and other birth attendants, using information obtained from mothers and from hospital or other records, complete notification forms for each birth. A standard de-identified extract is provided to the AIHW annually to form the NPDC. The data elements in the NPDC include the Perinatal National Minimum Data Set (Perinatal NMDS) and additional data elements. More information on the Perinatal NMDS for 2012–13, 2013–14 and 2014–15 can be found on METeOR, at www.meteor.aihw.gov.au/content/index.phtml/itemId/461787, www.meteor.aihw.gov.au/content/index.phtml/itemId/489433 and www.meteor.aihw.gov.au/content/index.phtml/itemId/517456.

Additional data elements are at different stages in the process of standardisation. Some have had national data standards but have not yet been implemented in the Perinatal NMDS. Others do not have common definitions for collecting the data, or data are not available for all jurisdictions.

Data quality issues related to the NPDC for 2012, 2013 and 2014 are also available at www.meteor.aihw.gov.au/content/index.phtml/itemId/597483, www.meteor.aihw.gov.au/content/index.phtml/itemId/624809 and www.meteor.aihw.gov.au/content/index.phtml/itemId/657522. There are no known issues with the data contained in this report however ACT is undergoing a system-wide review of ACT Health data and reporting that will be finalised 31 March 2018.

NPDC data in this report relate to births that occurred in the calendar years 2012, 2013 and 2014. For the two maternity indicators, the annual number of events is low at the SA3 level, and three years of data are combined. Rates are based on the number of events for three years and the number of births for three years. This method differs from the calculation of an average annual rate, although the results from both methods will generally be the same, or very similar, particularly for areas with low proportional birth change between years.

Data from the NPDC are presented by place of usual residence of the mother. Data by state and territory, and SA3 exclude Australian non-residents, residents of external territories, and records where either state or territory, or SA3 of usual residence was not stated. However, these records are included in the total for Australia. This may differ from data produced from the NPDC for other purposes, which may require the exclusion of these records from the Australian total.

The standard presentation of the perinatal indicators produced from the NPDC is number per 100, rather than number per 1,000, as used in this report. This should be taken into account if comparing perinatal data between different sources and reports.

All states and territories have a data item to record Aboriginal and Torres Strait Islander status of the mother on their perinatal form, although there are some differences among the states and territories. In 2014, information on Aboriginal and Torres Strait Islander status was provided for nearly all mothers (99.8%) 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 2014 – in brief*; www.aihw.gov.au/publication-detail/?id=60129557656.

Components of NPDC analysis

Aboriginal and Torres Strait Islander status

For indicators based on NPDC data, data for Aboriginal and Torres Strait Islander women are compared with data for non-Indigenous women. Non-Indigenous women comprises 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 by Aboriginal and Torres Strait Islander status.

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 are not included in the analysis of patient funding status. The exception was where the Northern Territory home birth services were provided by the hospital and the mother was an admitted patient. The number of these records is small and is included in the analysis by the admitted patient elected accommodation status.

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3. Analysis methods

Populations

Most indicators use an estimated resident population in the denominator, with the exception of the indicators for *Caesarean section* and *Third- and fourth-degree perineal tears*, where the denominators are births from the NPDC.

Where available, populations were based on the estimated resident population from the ABS at the start of the reporting period, based on data from the 2011 Census of Population and Housing. For example, for the reporting period 2014–15, the estimated resident population at 30 June 2014 was used. For indicators where three financial years of data (2012–13, 2013–14 and 2014–15) were used, the population was the sum of the estimated resident population at 30 June 2012, 30 June 2013 and 30 June 2014.

The population of Aboriginal and Torres Strait Islander Australians was based on the projected Aboriginal and Torres Strait Islander population (Series B: www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/AEE5C09DB715A1BBCA257CC900143F80/$File/aboriginal%20and%20torres%20strait%20islander%20population%20projections%20fact%20sheet.pdf). The population of other Australians was based on the estimated resident population.

Derived populations

For the knee replacement and lumbar spinal surgery indicators with an age range of 18 years and over, separate male and female estimates of Aboriginal and Torres Strait Islander Australians aged 18 and 19 years were not published by the ABS. They were derived as follows:

- Sex ratios of Aboriginal and Torres Strait Islander Australians were calculated for people aged 18 and 19 years separately, and for each state and territory, based on 2011 Census counts of Aboriginal and Torres Strait Islander males and females aged 18 and 19 years, in each state and territory
- The sex ratios were applied to the total of Aboriginal and Torres Strait Islander Australians aged 18 and 19 years in each state and territory, to calculate Aboriginal and Torres Strait Islander males and females by single year of age in each state and territory
- The corresponding population of other Australians was calculated by deducting the estimate of Aboriginal and Torres Strait Islander Australians from the estimated resident population.

For the acute myocardial infarction indicator, population data for Aboriginal and Torres Strait Islander Australians aged 35–84 years for each state and territory were sourced from the Australian Government Department of Health, because the highest age group for publicly available ABS data was 65 years and over for Tasmania and the Australian Capital Territory. These data were commissioned by the Department of Health for analyses that require detailed breakdowns of Aboriginal and Torres Strait Islander data. The data were based on the population information available from the ABS 2011 Census of Population and Housing, and the ABS estimated resident population for later years. More information is available from Public Health Information Development Unit of Torrens University Australia at www.phidu.torrens.edu.au/help-and-information/indigenous-estimates.

The population of other Australians was calculated by deducting the number of Aboriginal and Torres Strait Islander Australians from the estimated resident population published by the ABS.

Age and sex standardisation

This report presents age- and sex-standardised rates. Age and sex standardisation is a technique used 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 at 30 June 2001 was used as the standard population. Some indicators used specific age ranges or were only relevant to women. In these cases, only the relevant age and sex groups were included in age- and sex-standardisation calculations. Standardised rates based on different age groups and/or standard populations are not directly comparable.

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 for all other analyses. This did not apply to the acute myocardial infarction indicator and two maternity indicators, which used specific age ranges under 85 years.

For the maternity indicators, records with no stated age were the only records excluded from age standardisation. For third- and fourth-degree perineal tears, a small number of vaginal births to females aged under 15 years and over 44 years were included in the lowest age group (15–19 years) and the highest age group (35–44 years), respectively. The standard population was restricted to females aged 15–44 years. This was to avoid skewing of the age-standardised rates as a result of a small number of such records.

The general age standardisation formula for populations is available at: www.meteor.aihw.gov.au/content/index.phtml/itemId/327276.

Geography levels

This report presents data based on the ABS Australian Statistical Geography Standard (ASGS edition 2011) SA3 geography (www.meteor.aihw.gov.au/content/index.phtml/itemId/455824). There are 333 SA3s covering Australia without gaps or overlaps. SA3s generally have a population of between 30,000 and 130,000 people, and are built up on whole SA2s (www.meteor.aihw.gov.au/content/index.phtml/itemId/659774). These areas were grouped by state or territory, remoteness and socioeconomic status to assist comparisons. For further information, see www.abs.gov.au/geography.

Allocation to an SA3 was based on the patient's usual place of residence, rather than the place where they received the service. The geographical data that were used to allocate a record to an SA3 level varied depending on the data source (see Table 1).

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 captured on the patient's address at the service level.

Table 1: Geographical data used to allocate an SA3

Data source	Data on geographical location
NHMD	Statistical Area Level 2* (SA2) was used. If SA2 was not available, SA2 was derived. Except New South Wales, all states and territories provided SA2 for most records. If SA2 was not available, the following geographic units were used to map to SA2: • For New South Wales, Statistical Local Area† (SLA) was used. For 2014–15, postcode was used if an SLA could not be mapped on an SA2. Postcode was not used for 2012–13 and 2013–14 • For Victoria, SLA was used • For South Australia, postcode was used • For the Northern Territory, postcode was used.
NPDC	SA2 was used. If SA2 was not available, SLA was used. SA2 was provided by all states and territories except the Australian Capital Territory (for 2012, 2013 and 2014) and the Northern Territory (2012 only). For both territories, SLA was used for the years specified above.

* www.meteor.aihw.gov.au/content/index.phtml/itemId/457289
† This is the geographic area defined in the ABS Australian Standard Geographical Classification edition 2011 (the classification used before the ASGS).

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For the NHMD, when SLA or postcode was used, an appropriate ABS correspondence files were used to identify the corresponding SA2. The SA2 was then mapped to SA3, with a one-to-one relationship. In some cases, a geographic unit overlapped SA2 boundaries. Where this occurred, records for that geographic unit 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 nature of the allocation, the SA2 data for individual records might not be accurate and reliable; however, the overall distribution of records by SA2 is considered useful.

For the NPDC, when SLA was used, an ABS correspondence file was used to directly correspond SLA to SA3. In some cases, an SLA overlapped SA3 boundaries. Where this occurred, records that overlapped boundaries were proportionately distributed across the SA3s, according to the proportion of the SLA population in the SA3s. This is standard practice for the NPDC.

Remoteness and socioeconomic analysis

SA3s were grouped into remoteness categories and socioeconomic quintiles based on the ABS 2011 ASGS and the ABS 2011 Socio-Economic Indexes for Areas (SEIFA), respectively. For more information on SEIFA, see www.meteor.aihw.gov.au/content/index.phtml/itemId/517903. This method of grouping was applied to the data sources used in this report to assign the provided or derived SA3s to remoteness and socioeconomic groups. Because of the method used, national data by remoteness and socioeconomic status presented here 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.

The ABS 2011 ASGS has five remoteness categories, which 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.

The ABS publishes a remoteness category for each SA1 (see www.meteor.aihw.gov.au/content/index.phtml/itemId/457287). The proportion of the population in each remoteness category was calculated for each SA3 using the following ABS correspondence files: SA1 to remoteness area (see ASGS *Volume 5 – Remoteness Structure*, 2011), SA1 to SA2 and SA2 to SA3 (see ASGS *Volume 1 – Main Structure and Greater Capital City Statistical Areas*, 2011). The remoteness category with the highest proportion of population was allocated to the SA3.

The SEIFA Index of Relative Socio-Economic Disadvantage (IRSD) was used for socioeconomic analysis. SEIFA IRSD is a product developed by the ABS (see *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2011*, www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/2033.0.55.001Main+Features12011?OpenDocument) that ranks areas in Australia according to relative socioeconomic disadvantage. The index is based on information collected in the 2011 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. The SA1s are then ranked according to their level of disadvantage (index value) and grouped into five equal categories (quintiles), with the lowest category reflecting the lowest 20% of areas with the greatest overall level of disadvantage. For each SA3, the number of SA1s in each quintile was calculated, and the quintile with the largest number of SA1s was selected as the quintile for that SA3.

Combining remoteness and SEIFA

When remoteness categories and socioeconomic quintiles are combined, there are 25 possible combinations that SA3s can be assigned to. Some categories and quintiles were combined to ensure that each of the final 14 combinations contained at least six SA3s for comparison purposes (Table 2).

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 low numbers of events and/or very small populations are more susceptible to random fluctuations and therefore may not provide a reliable representation of activity in that area. For this reason, results for some areas were suppressed (Table 3).

Data from suppressed SA3s were included in analyses for larger geographic areas – for example, analysis by state and territory, remoteness and socioeconomic status. This explains why, for example, the overall rate for lumbar spinal fusion in the Northern Territory was outside the range of the publishable SA3 rates for the Northern Territory (see Figure 4.21 and 4.22). Only two Northern Territory SA3 rates were publishable, and these rates were the same.

Table 2: Number* of SA3s by combined ASGS remoteness categories and SEIFA IRSD quintiles

<table>
<tr><th rowspan="2">ASGS remoteness</th><th colspan="5">Quintiles of SEIFA IRSD</th></tr>
<tr><th>1 (Low)</th><th>2</th><th>3</th><th>4</th><th>5 (High)</th></tr>
<tr><td>Major cities</td><td>30</td><td>27</td><td>33</td><td>37</td><td>61</td></tr>
<tr><td>Inner regional</td><td>31</td><td>20</td><td>18</td><td colspan="2">9</td></tr>
<tr><td>Outer regional</td><td>23</td><td>16</td><td colspan="3">9</td></tr>
<tr><td>Remote and Very remote</td><td>10</td><td colspan="4">7</td></tr>
</table>

* Numbers are not in proper columns where socioeconomic quintiles were combined. 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.

Table 3: Rules for suppression of standardised rate for an area

Data source	Numerator	Denominator	Denominator for age- and sex-specific groups
NHMD	• Fewer than 20 (single year of data), or • Fewer than 10 (three years of data)	Fewer than 1,000	Fewer than 30
NPDC	Fewer than 5	Fewer than 100	Fewer than 10

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As most of the 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 used for standardisation was fewer than 30. As a result of this, the Northern Territory requested that consideration be given to relaxing this suppression rule. To do this, the AIHW undertook some sensitivity analysis to investigate the volatility of the rates of the affected SA3s (Box 1). For consistency, this sensitivity analysis was conducted for all data at the SA3 level – that is, not just results from Northern Territory SA3s.

Standardised rates were suppressed for volatility, and publishable rates (including those published with caution) were presented in the report as whole numbers.

Box 1:
Summary of sensitivity analysis

For each indicator and each SA3 that was suppressed as a result of a low (below-threshold) denominator for one or more age- and sex- specific groups (affected SA3), the following analysis was undertaken:

1. The numerator was increased by 1 in each of the groups with a low denominator to generate a simulated rate.
2. All rates, including the simulated rates, were rounded to whole numbers.
3. All publishable SA3 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 SA3 rates for non-affected SA3s and the actual rates for affected SA3s were ranked from lowest to highest and split into deciles.
5. The allocated decile of the simulated rate (step 3) was compared with the allocated decile of the actual rate (step 4).

To achieve maximum differences between the simulated and actual rates, rates were simulated by increasing, rather than decreasing, the relevant numerators by 1. This was because some numerators could be zero and could not be decreased to become negatives. 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 with the actual rates (the most extreme scenario). This was a conservative approach 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:

1. There was no difference in the decile allocated for the simulated and actual rate. For example, both simulated and actual rates were in the lowest decile.
2. There was a difference of one decile, and the simulated rate was not on the cusp of the next decile. 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 has been published with caution. This is because the rate is considered potentially more volatile than other published SA3 rates. The rates published with caution are not included in the calculation of the total magnitude of variation, and are represented in the report with an asterisk (tables), cross (graphs) and hatching (maps).

Presentation of data in Australia and capital city area maps

Rounded rates for SA3s were ranked from lowest to highest and then 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 there was more than one SA3 with the same rate at the boundary of a decile. Where this occurred, SA3s with the same rate were assigned to the same decile.

Identification of highest and lowest rate areas

SA3s with the highest and lowest rates have been identified for each indicator. 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. This is because inclusion of the next column of the histogram would have resulted in a list of SA3s too long for publication.

Glossary

Aboriginal Community Controlled Health Service	A primary health care 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.
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.
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	Patient, potential patient, carer or organisation representing consumer interests.
data linkage	Used synonymously with 'data integration' and 'record matching', refers to the bringing together of information from more than one source that relates to the same individual or institution.
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 Care Home	A model of care involving a practice or service that coordinates comprehensive care for patients with chronic and complex conditions. The Health Care Home will develop a shared care plan with the patient, which will be implemented by a team of healthcare providers. This plan will identify the local providers best able to meet each patient's needs, coordinate care with these providers, and include strategies to help each patient better manage their conditions and improve their quality of life. Selected general practices and Aboriginal Community Controlled Health Services in Australia will start enrolling Health Care Home patients in late 2017.

Glossary

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 have an impact on 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; includes general practices, community health centres, medical specialists, nursing services, allied health services, public and private hospitals, day procedure services, Aboriginal Community Controlled Health Services, community nursing and Hospital in the Home.
hospital	All public, private and acute hospitals; free-standing 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 (or hospitalisations)	The administrative process of becoming a patient in a hospital.
Hospital in the Home	Provision of care to hospital-admitted patients in their place of residence as a substitute for hospital accommodation. Place of residence may be permanent or temporary (see www.meteor.aihw.gov.au/content/index.phtml/itemId/270305).
length of stay	The average (mean) number of days spent in hospital for each stay (episode of care) for patients who stay at least one night.
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 or 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.
Medicare Benefits Schedule (MBS)	A listing of the Medicare services that the Australian Government subsidises.
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	The AIHW National Hospital Morbidity Database (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, free-standing 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 off-shore territories are not in scope but may be included. More information is available in the Technical Supplement.

National Perinatal Data Collection	The AIHW National Perinatal Data Collection (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 on an annual basis to form the NPDC. More information is available in the Technical Supplement.
National Safety and Quality Health Service (NSQHS) Standards	The NSQHS Standards were developed by the Commission in collaboration with states and territories, technical experts, clinicians, patients and carers, and a range of other stakeholders. The primary aims of the NSQHS Standards are to protect the public from harm and to improve the quality of healthcare. They are evidence based, address the major safety and quality issues that affect a large number of patients in areas where there is variation and it is known practices can be improved. The NSQHS Standards (first edition) were released in 2011. The second edition of the NSQHS Standards will be launched in November 2017
Pharmaceutical Benefits Scheme (PBS)	An Australian Government program that subsidises medicines.
pharmaceutical treatment (or 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 intrauterine).
population	The Atlas uses population estimates based on the Australian Bureau of Statistics estimated resident population at 30 June 2014. Age-standardised rates are calculated as at 30 June 2001 and are based on the 2001 Census results.
potentially preventable hospitalisation	Hospital separations from a specified range of conditions where hospitalisation could have potentially been prevented through the provision of appropriate individualised preventive health interventions and early disease management, usually delivered in primary care and community-based care settings (including by general practitioners, medical specialists, dentists, nurses and allied health professionals). Potentially preventable hospitalisation conditions are classified as vaccine preventable, chronic and acute.
primary care	Relates to the treatment of non-admitted patients in the community. It is usually the first point of contact people have with the health system.
Primary Health Networks	Primary Health Networks (PHNs) began to operate on 1 July 2015 to replace Medicare Locals. PHNs 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. PHNs work directly with general practitioners, other primary care providers, secondary care providers and hospitals.
remoteness categories	Categories of geographical remoteness based on the Australian Bureau of Statistics 2006 Census of Population and Housing.
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, ‘separation’ usually refers to a hospital admission.

Glossary

socioeconomic disadvantage	Local areas are grouped into socioeconomic quintiles based on the 2011 Index of Relative Socio-Economic Disadvantage (IRSD) at the 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 Australian Bureau of Statistics Socio-Economic Indexes for Areas (SEIFA) – Index of Relative Socio-Economic Disadvantage was used to calculate the socioeconomic status at the SA3 level in the Atlas. SEIFA includes four summary measures created from 2006 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)	Geographic areas defined in the Australian Bureau of Statistics (ABS) Australian Statistical Geography Standard. The aim of SA3s is to create a standard framework for the analysis of ABS data at the regional level through clustering groups that have similar regional characteristics. There are 333 spatial SA3s, which cover the whole of Australia without gaps or overlaps. SA3s usually have a population of between 30,000 and 130,000 people. At 30 June 2011, about 50 had fewer than 30,000 people and 35 had more than 130,000 people. (Data are reported for the 2011 Census year.) 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, Parramatta and Geelong). In regional areas, they represent areas serviced by regional cities with populations of more than 20,000 people. In outer regional and remote areas, they represent areas that are widely recognised as having a distinct identity, and similar social and economic characteristics (for example, the Macedon Ranges in Victoria and the Southern Highlands in New South Wales). There are a few ‘zero SA3s’ – that is, SA3s that have a very small or zero population. These are mainly 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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AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

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