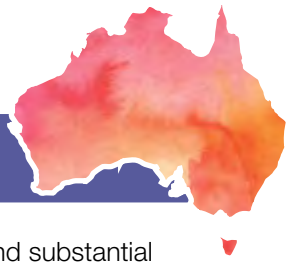
Chapter 2

Chronic disease and infection: potentially preventable hospitalisations



At a glance

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

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

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

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

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

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

Recommendations

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

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

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

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

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

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

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

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

COPD

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

Heart failure

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

i. Multidisciplinary care across the acute and primary care sectors

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

Diabetes

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

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

ii. The Australian National Diabetes Strategy 2016–2020.

2.1 Chronic obstructive pulmonary disease (COPD)

Why is this important?

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

What did we find?

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

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

What can be done?

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

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

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

Chronic obstructive pulmonary disease (COPD)

Context

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

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

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

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

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

Who is at greater risk?

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

COPD and Aboriginal and Torres Strait Islander people

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

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

About the data

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

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

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

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

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

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

What do the data show?

Magnitude of variation

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

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

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

Analysis by remoteness and socioeconomic status

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

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

Notes:

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

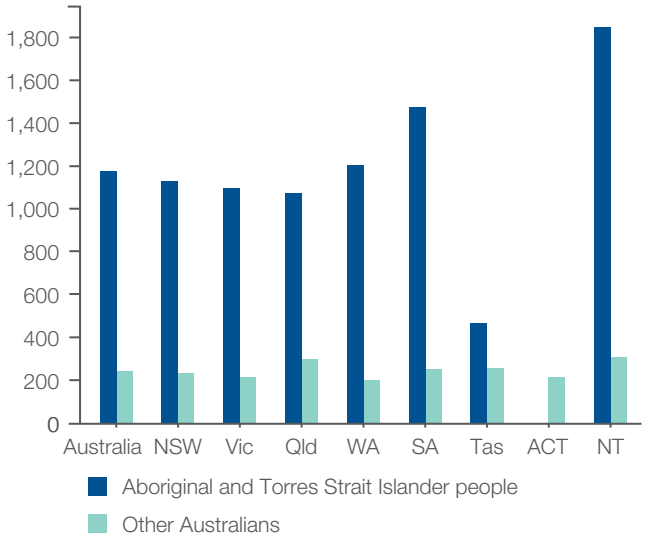
For further detail about the methods used, please refer to the Technical Supplement.

Chronic obstructive pulmonary disease (COPD)

Analysis by Aboriginal and Torres Strait Islander status

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

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



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

Trends over time

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

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

Interpretation

Potential reasons for the variation include differences in:

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

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

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

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

Smoking rates

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

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

System factors

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

Primary care

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

Reducing COPD hospitalisations

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

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

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

Chronic obstructive pulmonary disease (COPD)

Pulmonary rehabilitation

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

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

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

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

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

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

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

Reducing COPD hospitalisations among Aboriginal and Torres Strait Islander people

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

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

Cultural safety and culturally appropriate care

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

Expanding use of spirometry

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

Primary Health Network support

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

Integrated care

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

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

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

Chronic obstructive pulmonary disease (COPD)

Pharmacist interventions

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

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

Nutrition

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

Telehealth

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

Palliative care

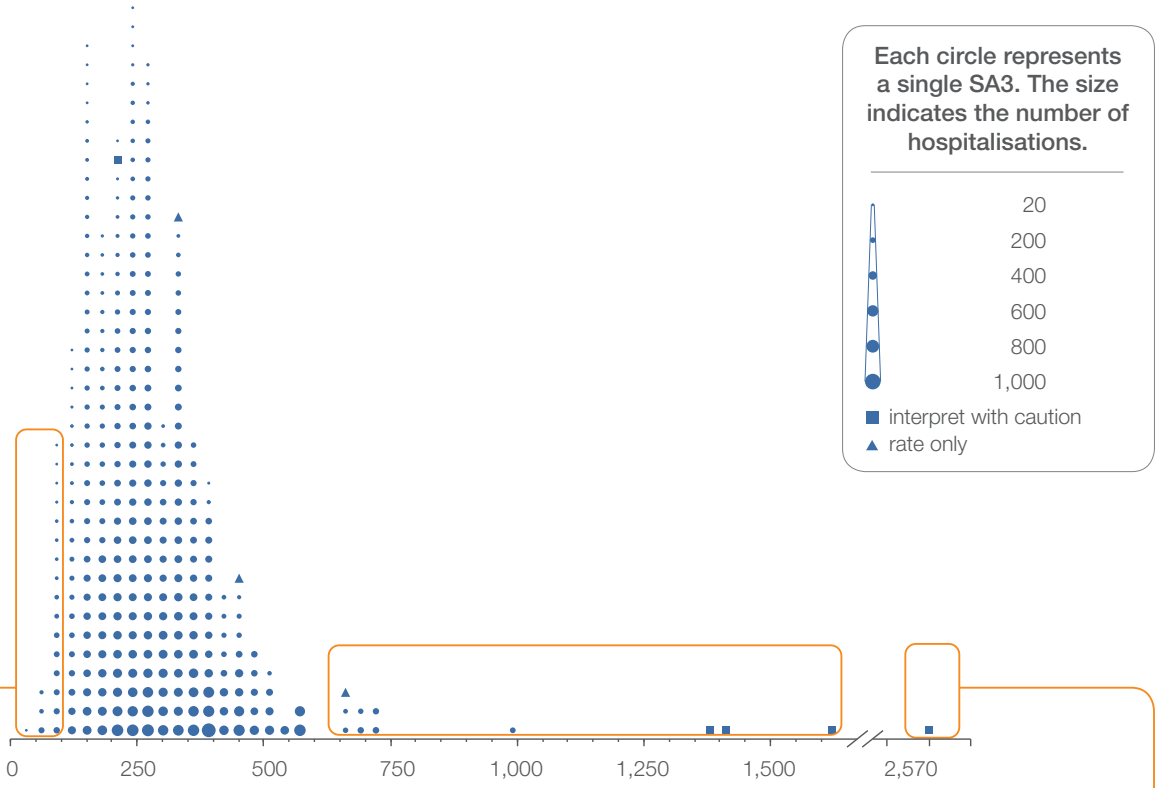
People with COPD experience distressing symptoms, such as breathlessness, anxiety and insomnia, which are often poorly controlled and under-treated in advanced disease.[4] Early access to palliative care is recommended for people with persisting symptoms of COPD. Symptom palliation should be implemented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

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

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

Rates by local area

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



Lowest rate areas

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

Highest rate areas

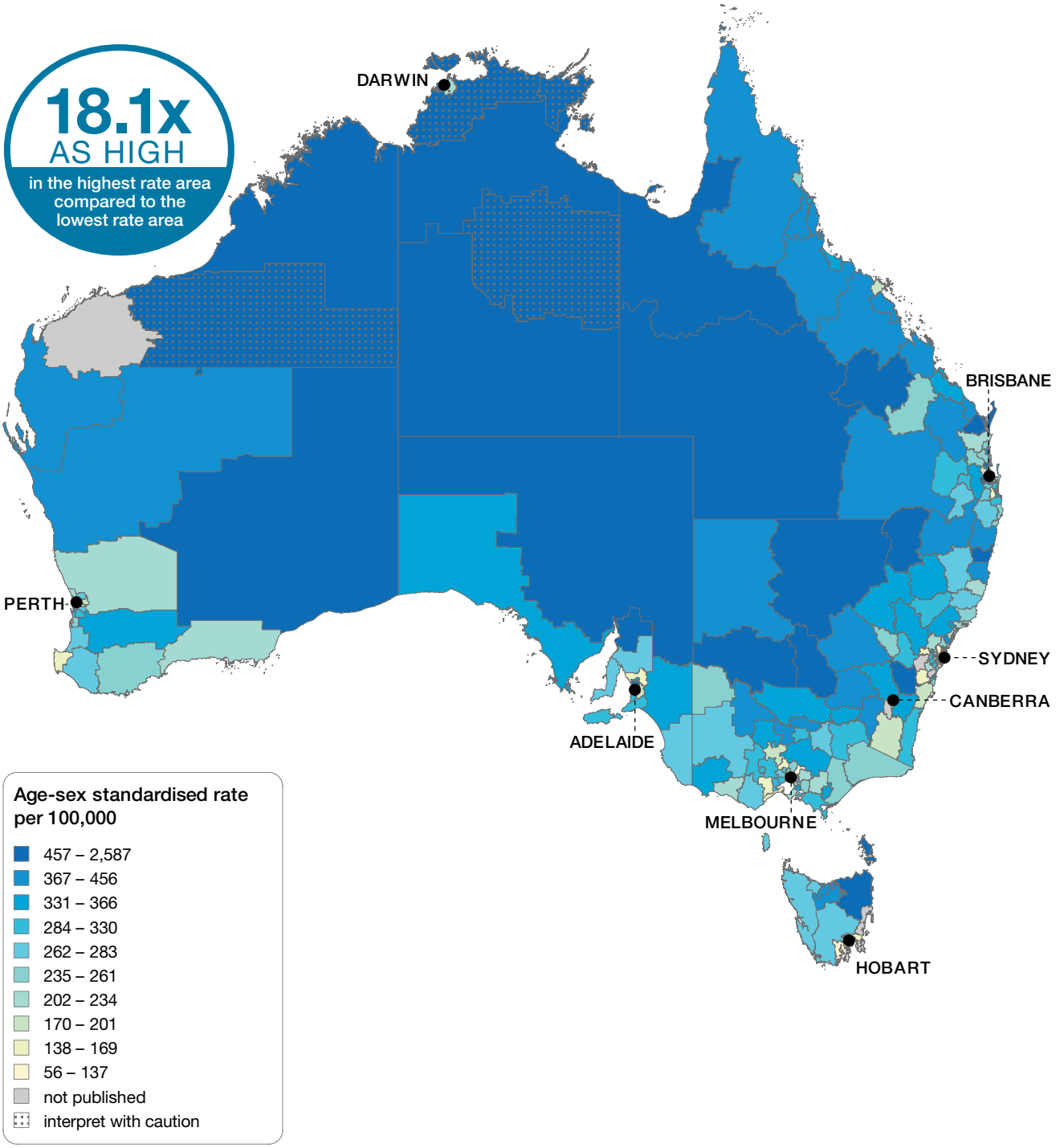
SA3	State	Rate	Hospitalisations
East Arnhem	NT	2,587*	201
Barkly	NT	1,631*	40
Daly - Tiwi - West Arnhem	NT	1,423*	214
East Pilbara	WA	1,386*	125
Katherine	NT	1,013	172
Alice Springs	NT	744	210
Bourke - Cobar - Coonamble	NSW	728	224
Outback - North and East	SA	696	214
Outback - North	Qld	693	153
Kimberley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

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

Chronic obstructive pulmonary disease (COPD)

Rates across Australia

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



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
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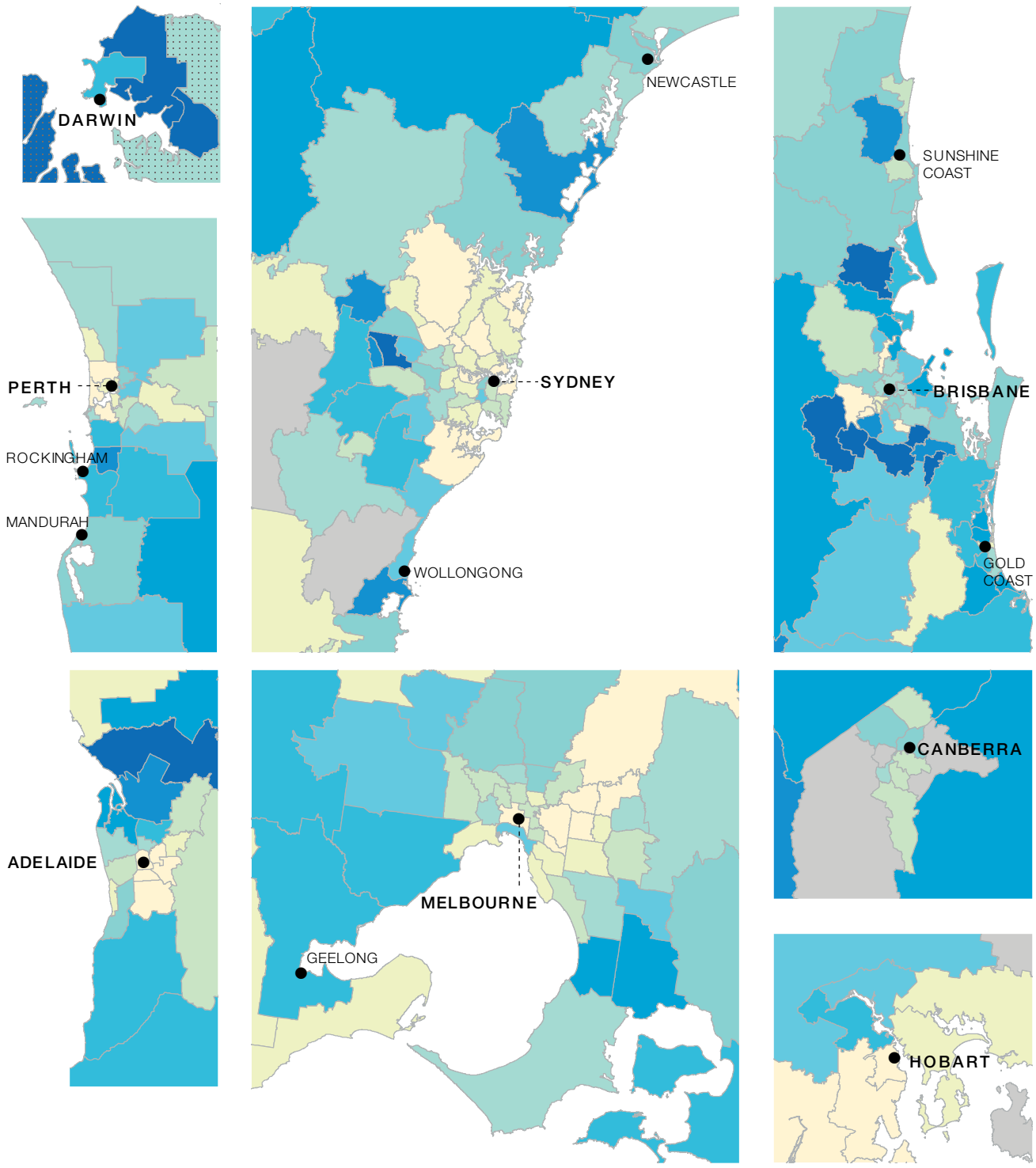
Rates across capital city areas

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



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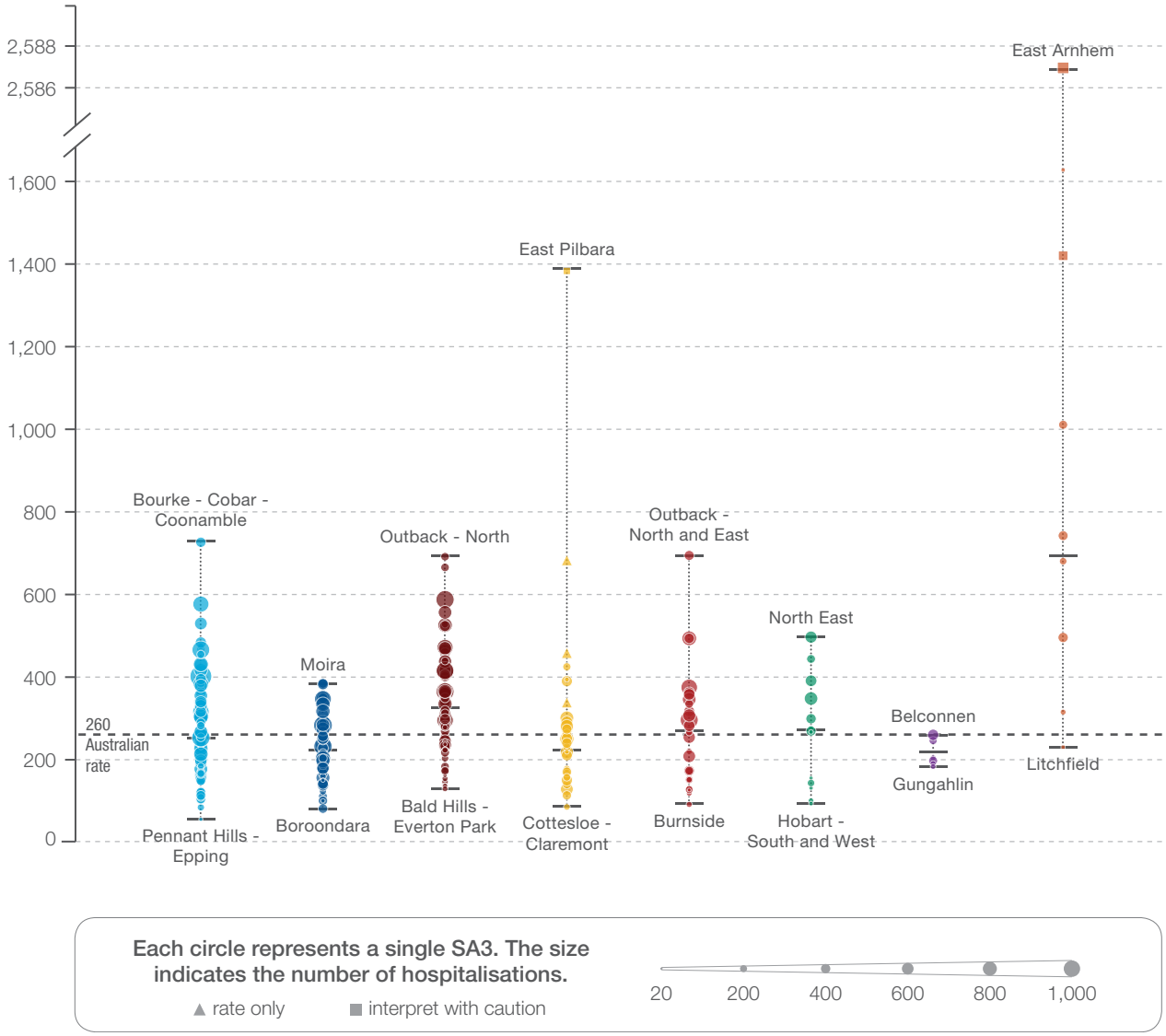
Chronic obstructive pulmonary disease (COPD)

Rates by state and territory

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

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



Notes:
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Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
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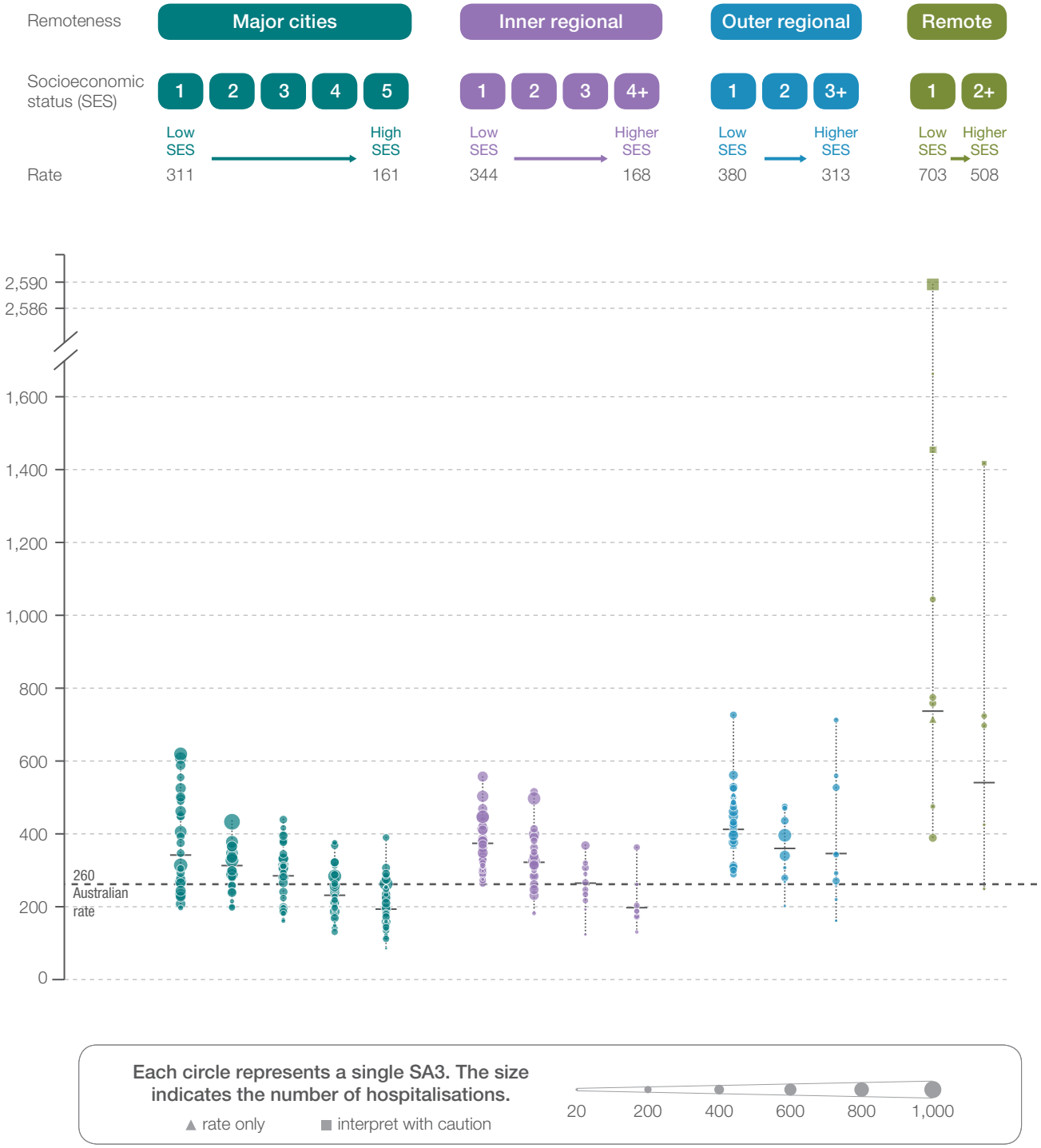
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

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



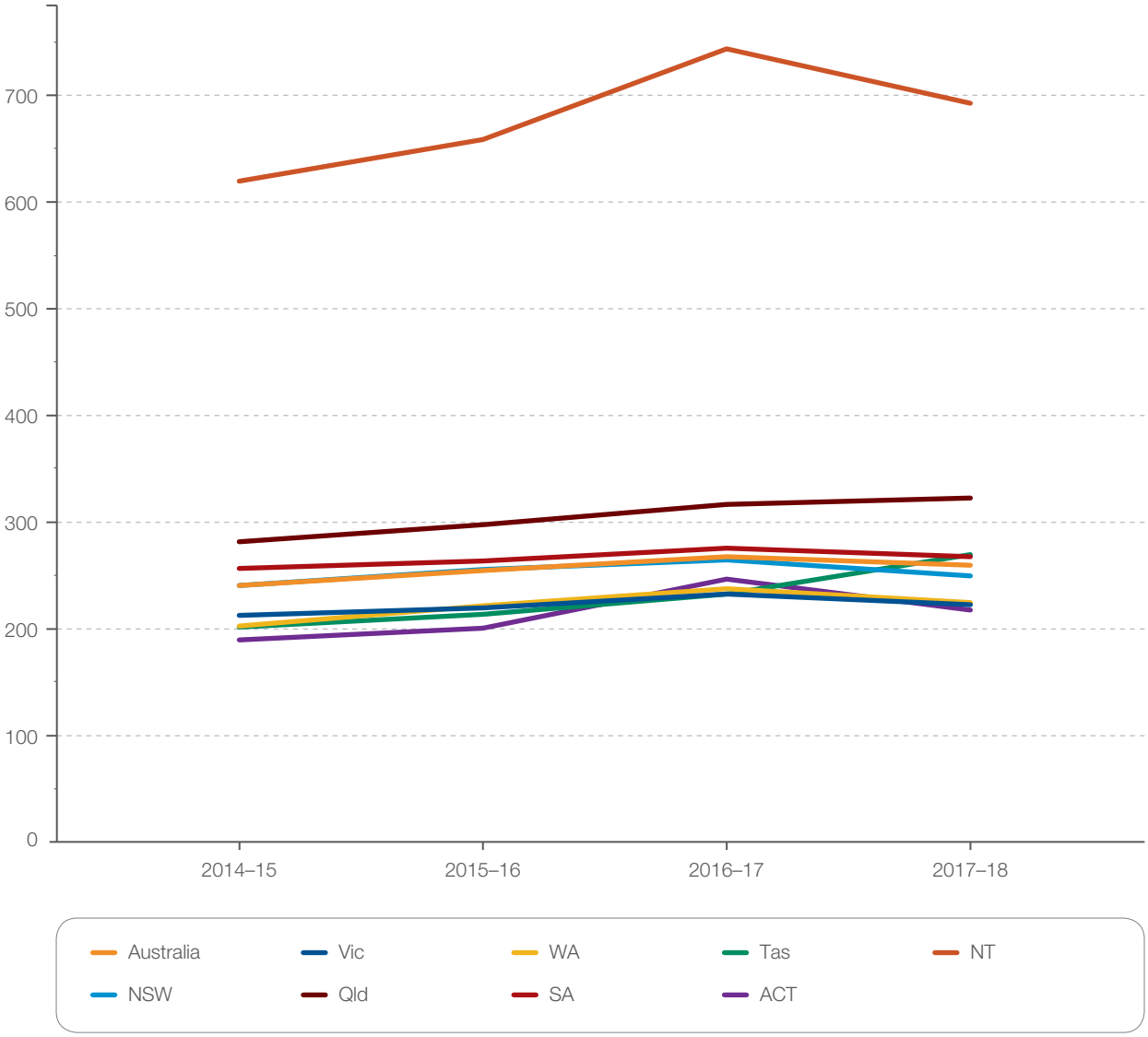
Notes:
Squares (■) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are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

Chronic obstructive pulmonary disease (COPD)

Rates across years

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

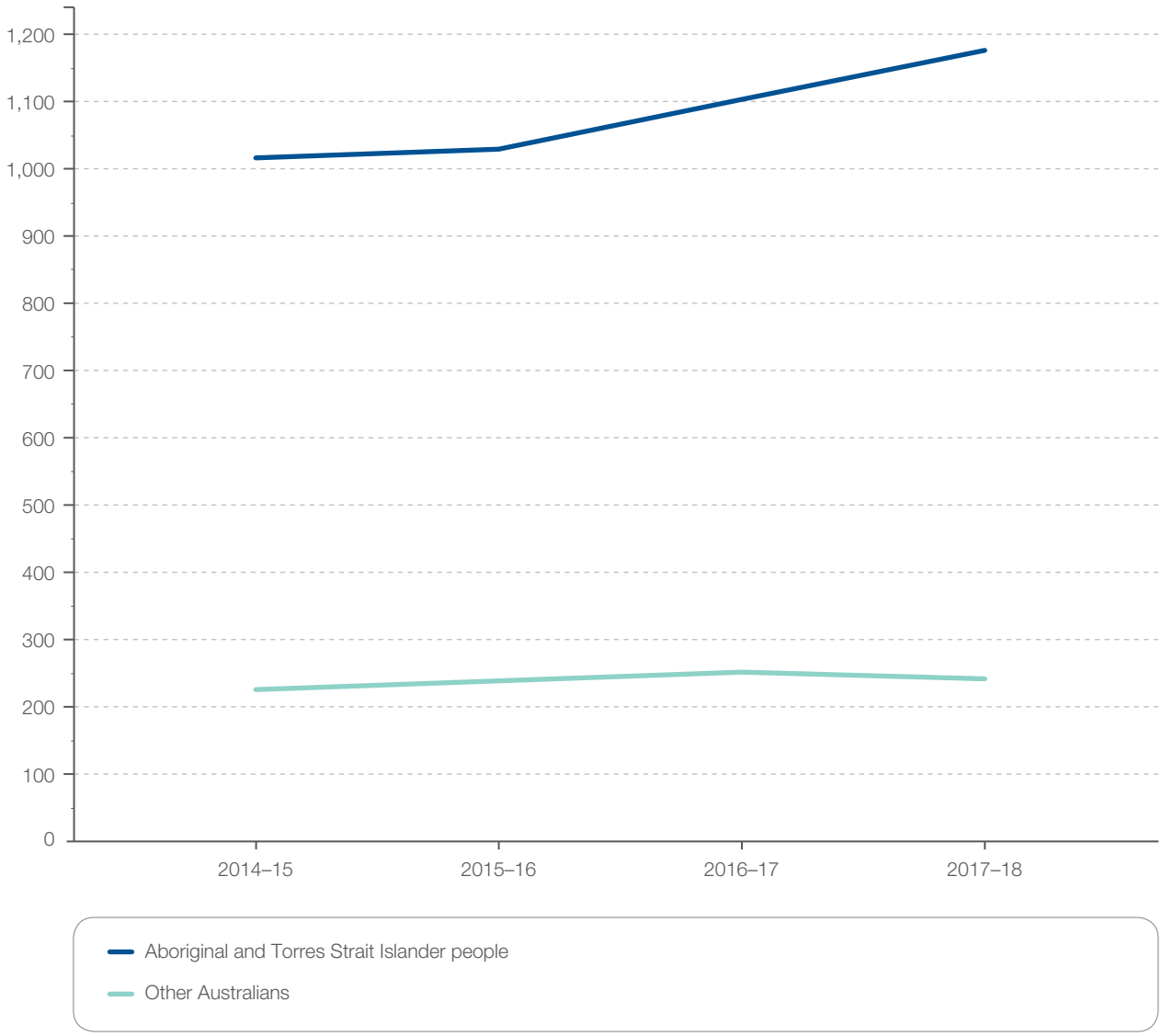
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	2,080*	2,556*	3,289*	2,587*
Australian rate	**241**	**255**	**268**	**260**
Lowest SA3 rate	64	77	75	56
Magnitude of variation	15.7	11.7	12.8	18.1
Magnitude of variation without top & bottom 10% SA3	3.3	3.0	3.6	3.3



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

Rates for Aboriginal and Torres Strait Islander people across years

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



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

Chronic obstructive pulmonary disease (COPD)

Resources

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

Australian initiatives

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

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

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

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

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2.2 Heart failure

Why is this important?

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

What did we find?

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

What can be done?

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

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

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

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

Heart failure

Context

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

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

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

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

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

Prevalence

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

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

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

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

Heart failure in Aboriginal and Torres Strait Islander people

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

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

Management

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

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

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

About the data

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

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

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

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

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

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

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

Heart failure

What do the data show?

Magnitude of variation

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

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

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

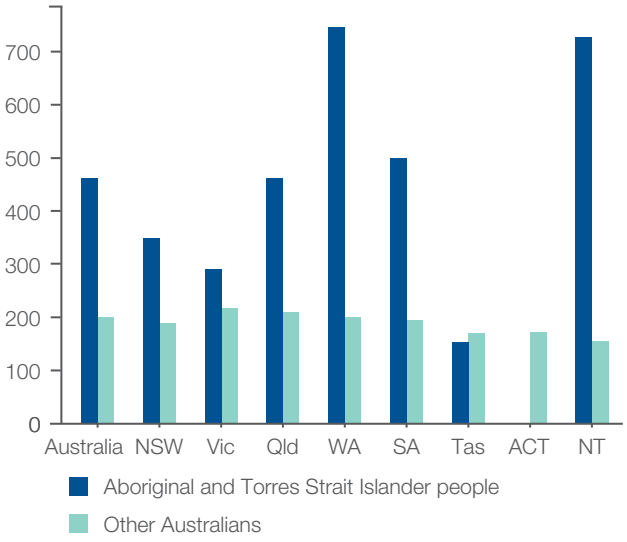
Analysis by remoteness and socioeconomic status

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

Analysis by Aboriginal and Torres Strait Islander status

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

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



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

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

Notes:

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

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

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

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

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

Trends over time

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

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

Interpretation

Potential reasons for the variation include differences in:

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

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

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

Heart failure

Non-concordance with guidelines

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

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

Readmissions

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

Addressing variation

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

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

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

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

Primary prevention

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

Primary care

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

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

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

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

Transition to community care

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

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

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

Integrated care

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

Consumer enablement

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

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

Heart failure

Improving use of medicines

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

Pharmacist-based interventions

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

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

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

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

Nurse-led titration clinics

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

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

Exercise and cardiac rehabilitation

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

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

Improving heart failure outcomes for Aboriginal and Torres Strait Islander people

Prevention

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

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

Management

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

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

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

Cultural safety and culturally appropriate care

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

Heart failure

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

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

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

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

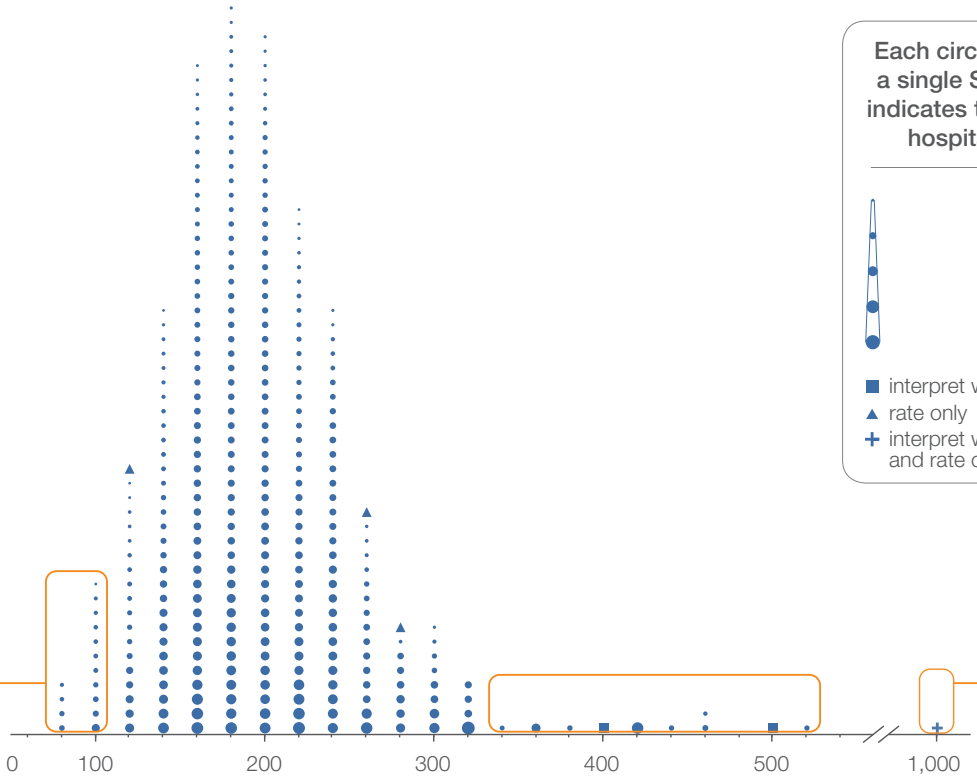
Participants achieved significant improvements in functional exercise capacity: six-minute walk distance increased by an average of 77 m. Reductions in waist and hip circumference were not significant in the group as a whole, but participants in the top tertile for waist circumference lost an average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

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

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

Rates by local area

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



Lowest rate areas

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

Highest rate areas

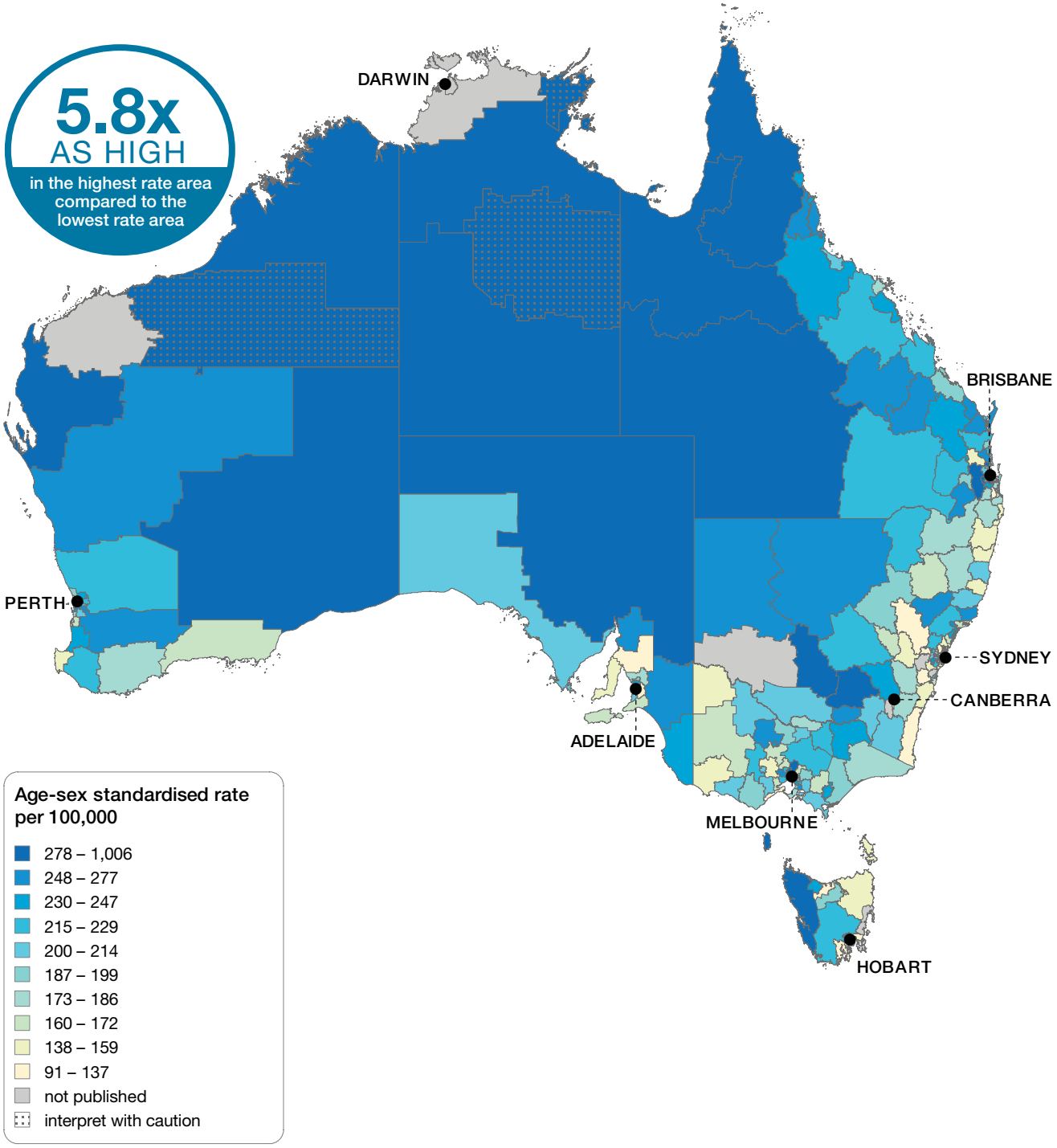
SA3	State	Rate	Hospitalisations
Barkly	NT	**1,006***	n.p.
Outback - North	Qld	**531**	113
East Arnhem	NT	**507***	54
Alice Springs	NT	**475**	144
Katherine	NT	**467**	80
Kimberley	WA	**457**	117
Tullamarine - Broadmeadows	Vic	**429**	536
East Pilbara	WA	**410***	52
Goldfields	WA	**398**	120
Mount Druitt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

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

Heart failure

Rates across Australia

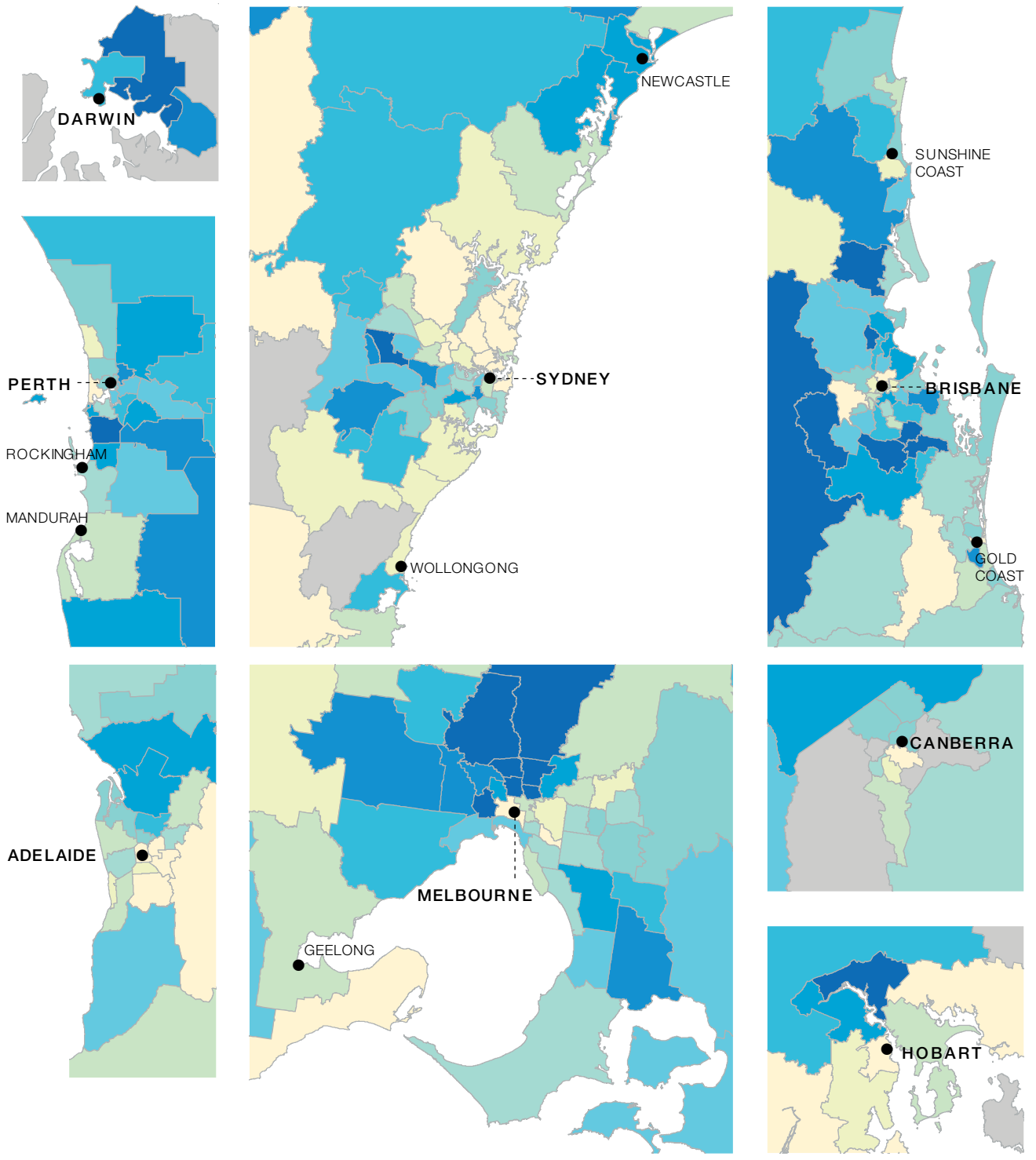
Figure 2.11: **Number of potentially preventable hospitalisations – heart failure per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18**



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

Rates across capital city areas

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



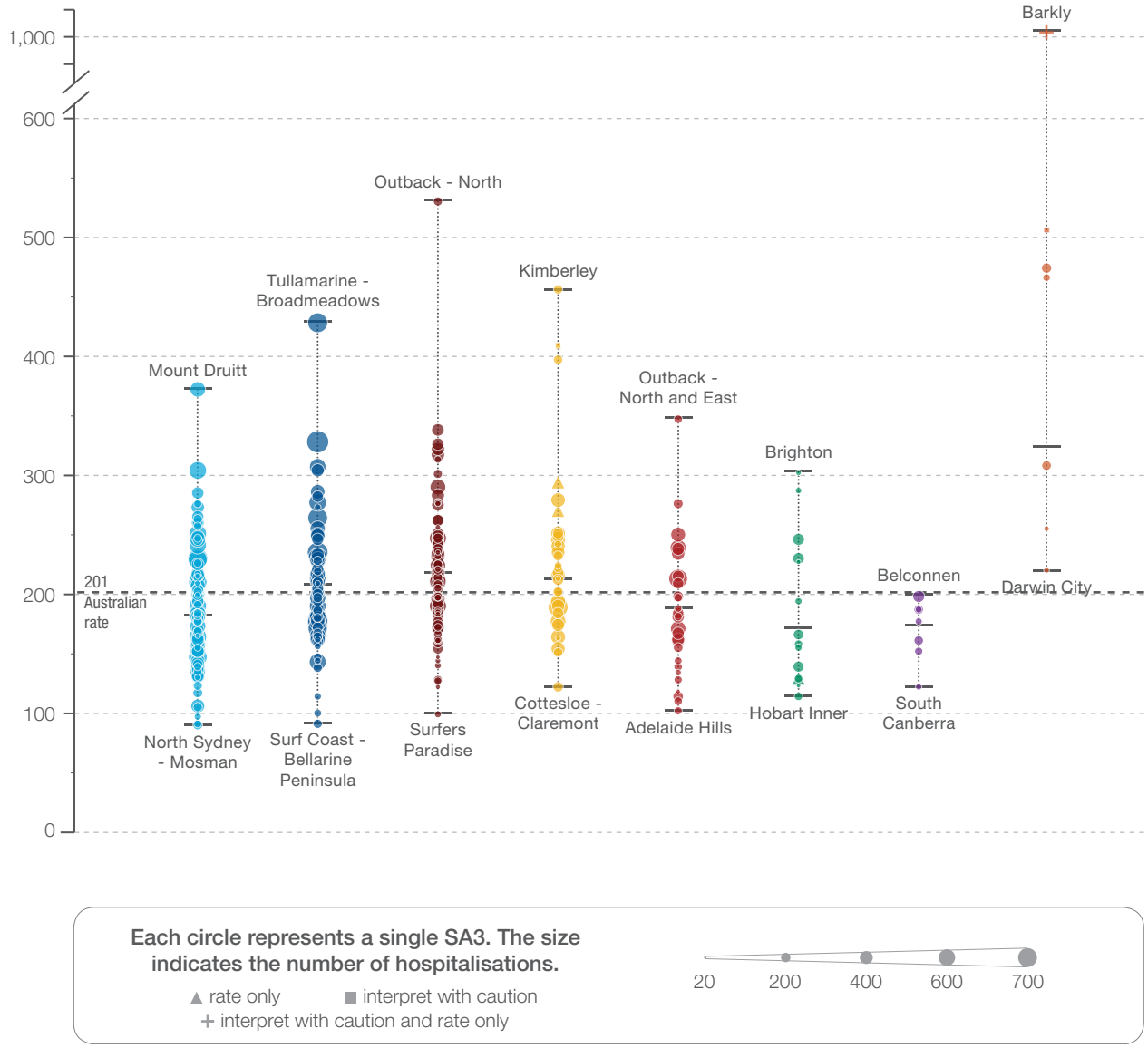
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please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

Heart failure

Rates by state and territory

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

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



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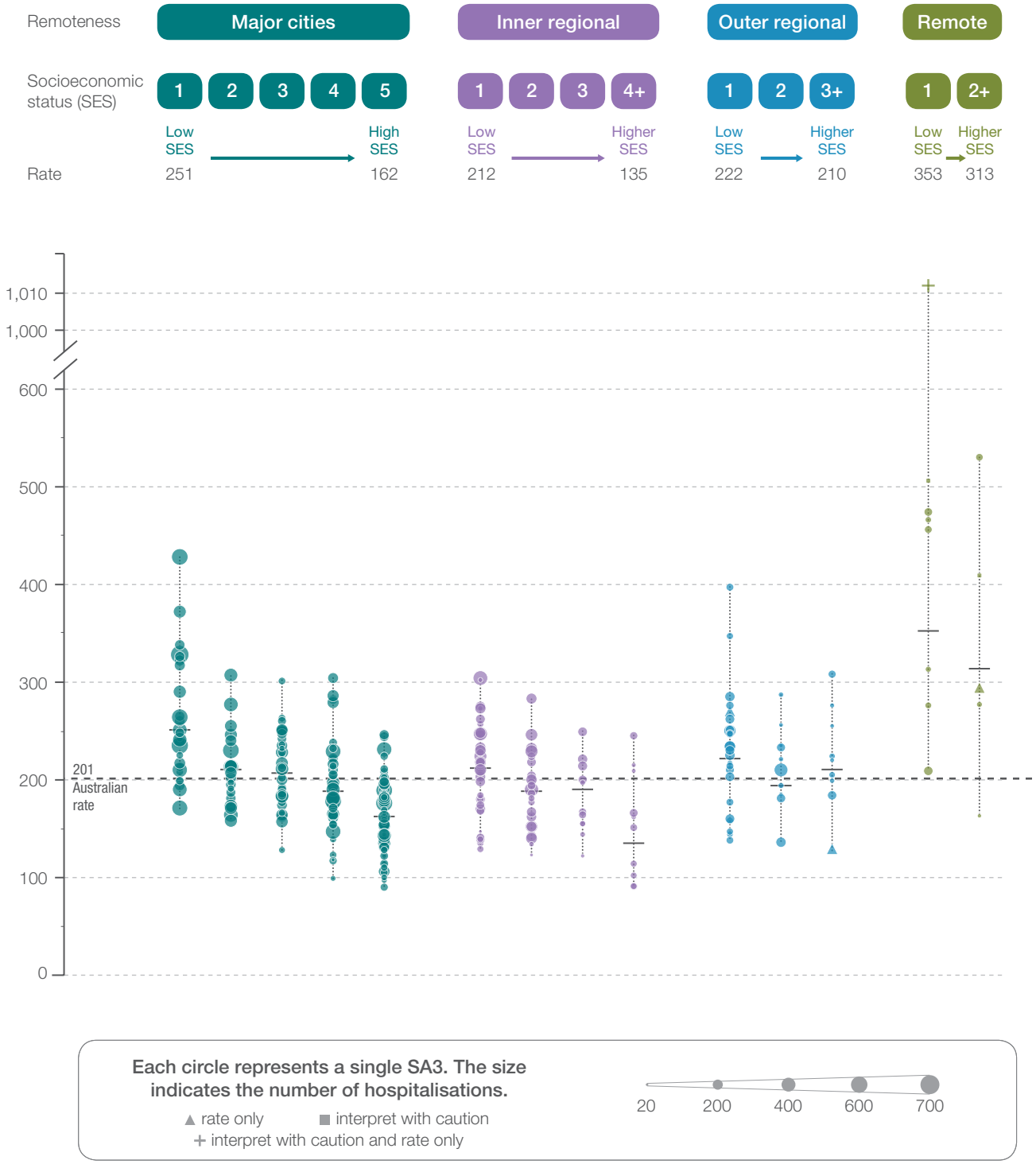
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Rates by remoteness and socioeconomic status

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



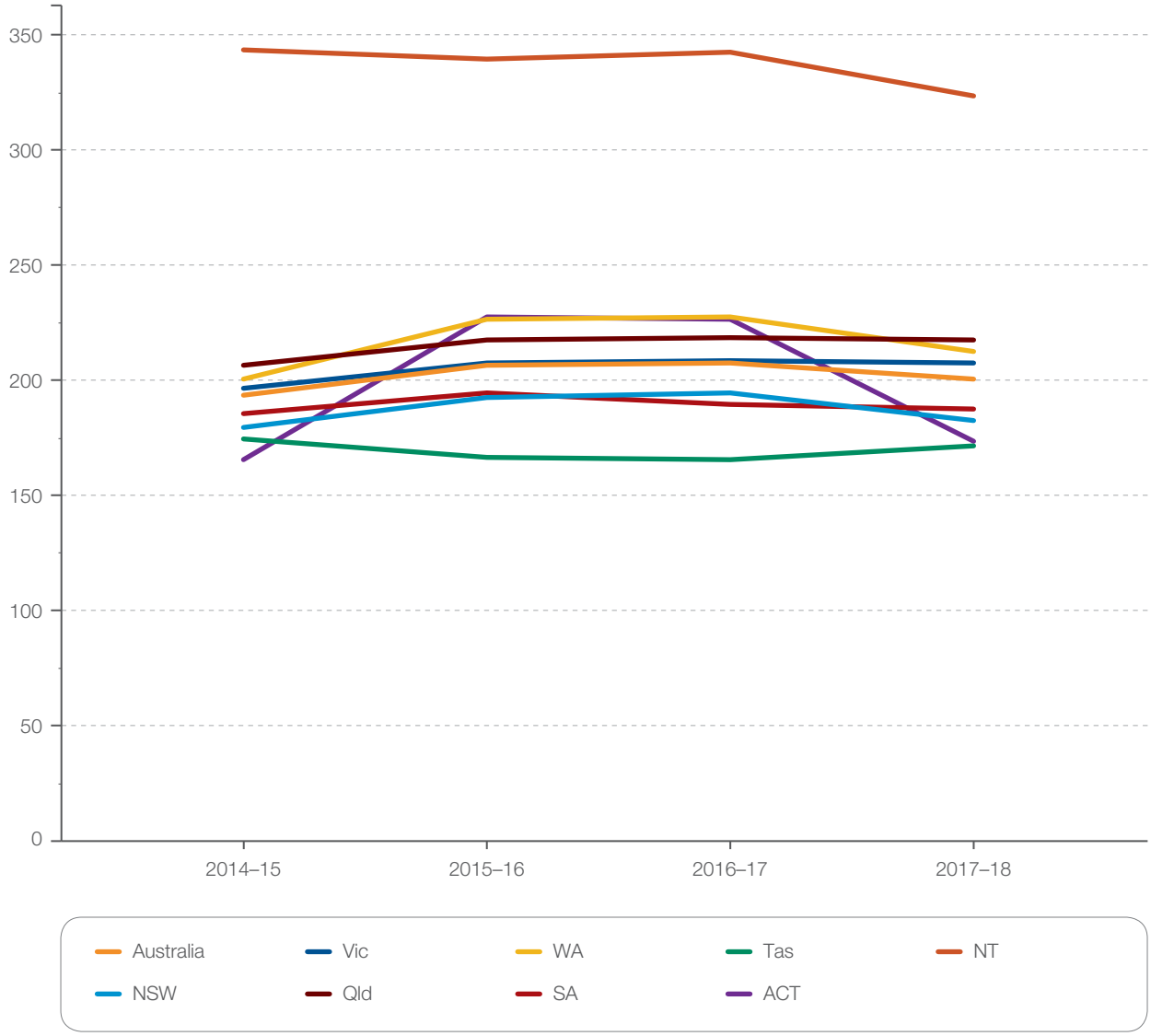
Notes:
Squares (■) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Crosses (+) indicate SA3s where rates should be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

Heart failure

Rates across years

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

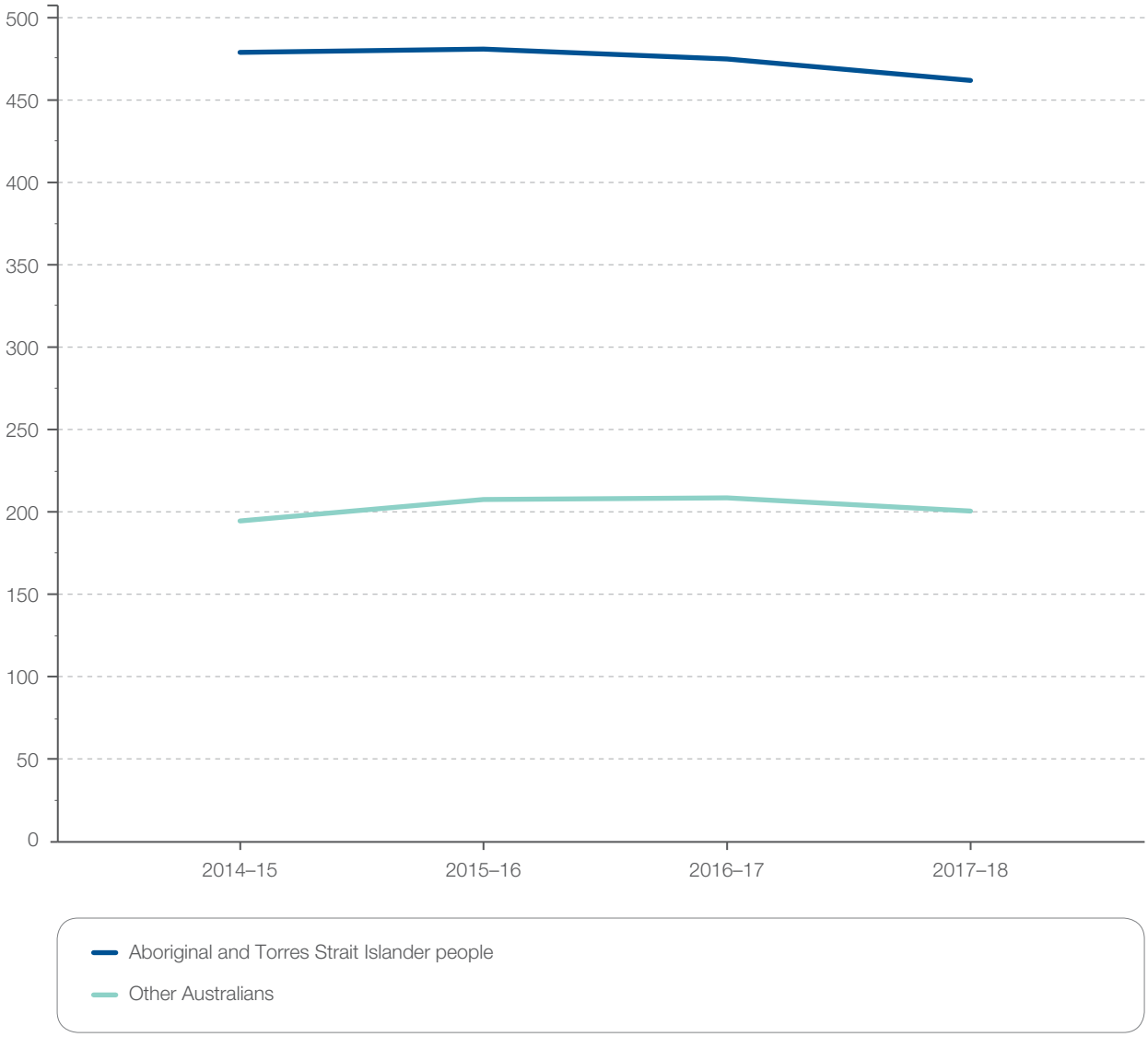
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	1,084*	1,104*	562*	1,006*
Australian rate	**194**	**207**	**208**	**201**
Lowest SA3 rate	86	94	85	91
Magnitude of variation	7.5	6.1	5.6	5.8
Magnitude of variation without top & bottom 10% SA3	2.1	2.0	2.1	2.0



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

Rates for Aboriginal and Torres Strait Islander people across years

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



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

Heart failure

Resources

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

Available at heartfoundation.org.au:

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

Australian initiatives

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

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

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

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

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

Heart failure

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2.3 Diabetes complications

Why is this important?

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

What did we find?

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

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

What can be done?

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

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

Diabetes complications

Context

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

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

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

Risk factors for type 2 diabetes

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

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

Preventing complications

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

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

About the data

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

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

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

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

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

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

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

What do the data show?

Magnitude of variation

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

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

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

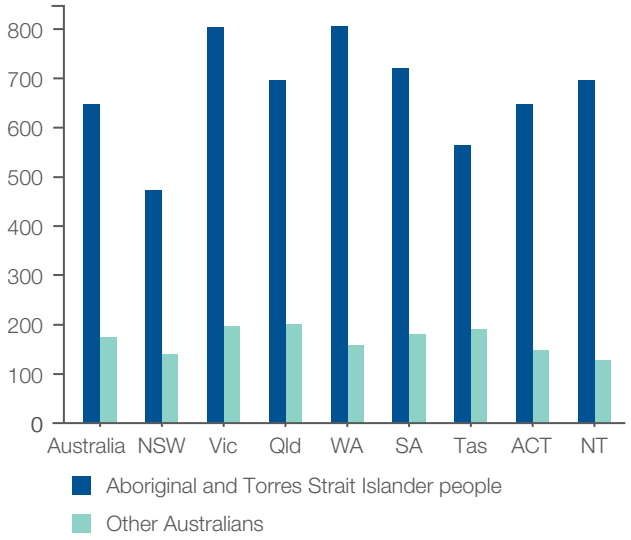
Analysis by remoteness and socioeconomic status

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

Analysis by Aboriginal and Torres Strait Islander status

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

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



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

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

Notes:

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

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

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

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

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

Diabetes complications

Trends over time

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

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

Interpretation

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

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

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

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

Socioeconomic and demographic factors

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

Variation in health care and self-care

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

Change in New South Wales coding

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

Reducing hospitalisations for people with diabetes

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

Integrated care models

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

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

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

Diabetes complications

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

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

Case study: Integrated primary and secondary care clinic for diabetes

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

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

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

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

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

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

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

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

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

Diabetes complications

Telehealth

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

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

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

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

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

Case study: Diabetes Telehealth Service for Regional WA

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

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

Consumer enablement

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

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

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

Advances in medical treatment

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

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

Preventing diabetic eye and kidney disease

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

Earlier diagnosis of diabetes

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

Improving care for inpatients with diabetes

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

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

Diabetes complications

Preventing type 2 diabetes

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

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

Case study: Telephone-based lifestyle coaching

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

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

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

Improving care for Aboriginal and Torres Strait Islander people

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

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

Cultural safety and culturally appropriate care

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

Holistic, integrated and multidisciplinary models of care

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

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

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

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

Diabetes complications

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

Food and nutrition

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

Eye care

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

Foot care

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

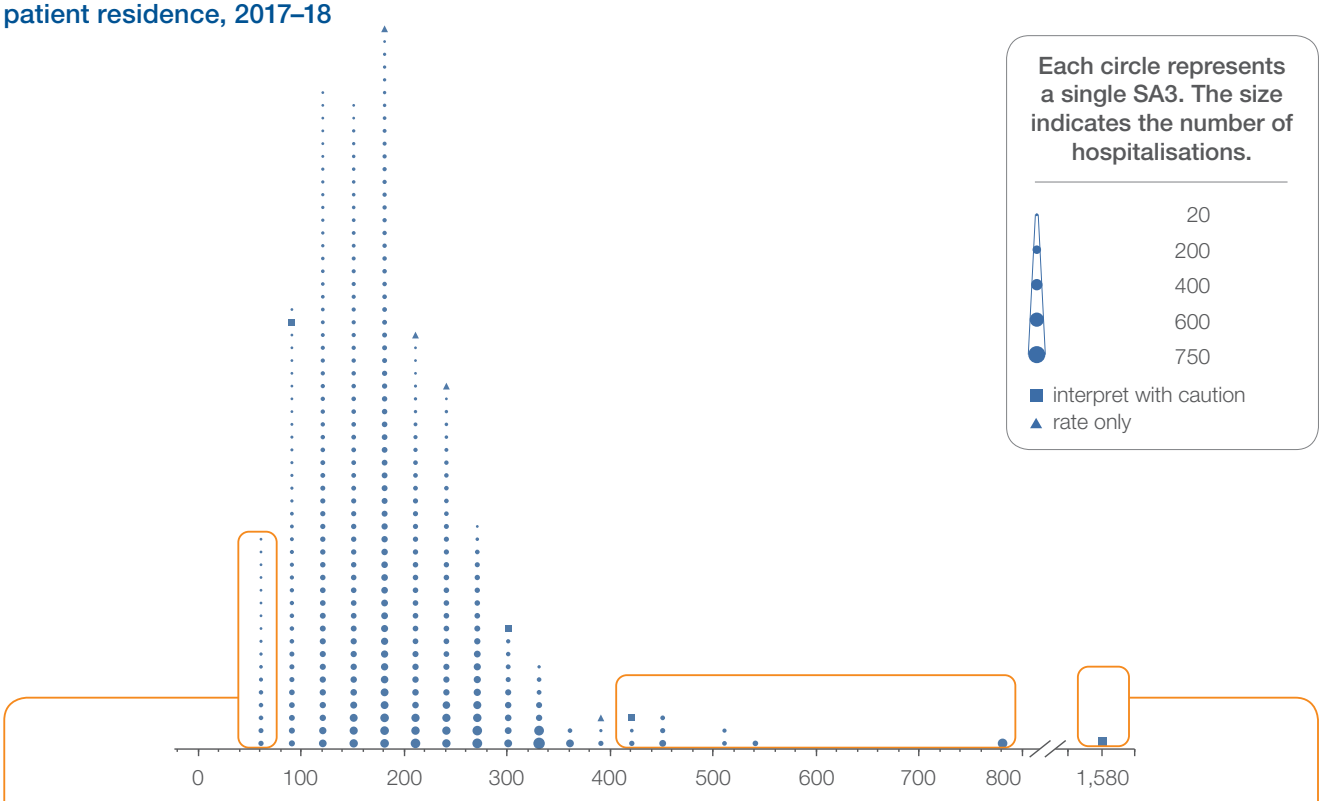
Medical-grade footwear and orthotics can help prevent diabetic foot complications, but are difficult to access for people in many rural and remote areas. Providing appropriate footwear for Aboriginal and Torres Strait Islander people with diabetes in remote areas could prevent a substantial number of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

End-stage kidney disease

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

Rates by local area

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



Lowest rate areas

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

Highest rate areas

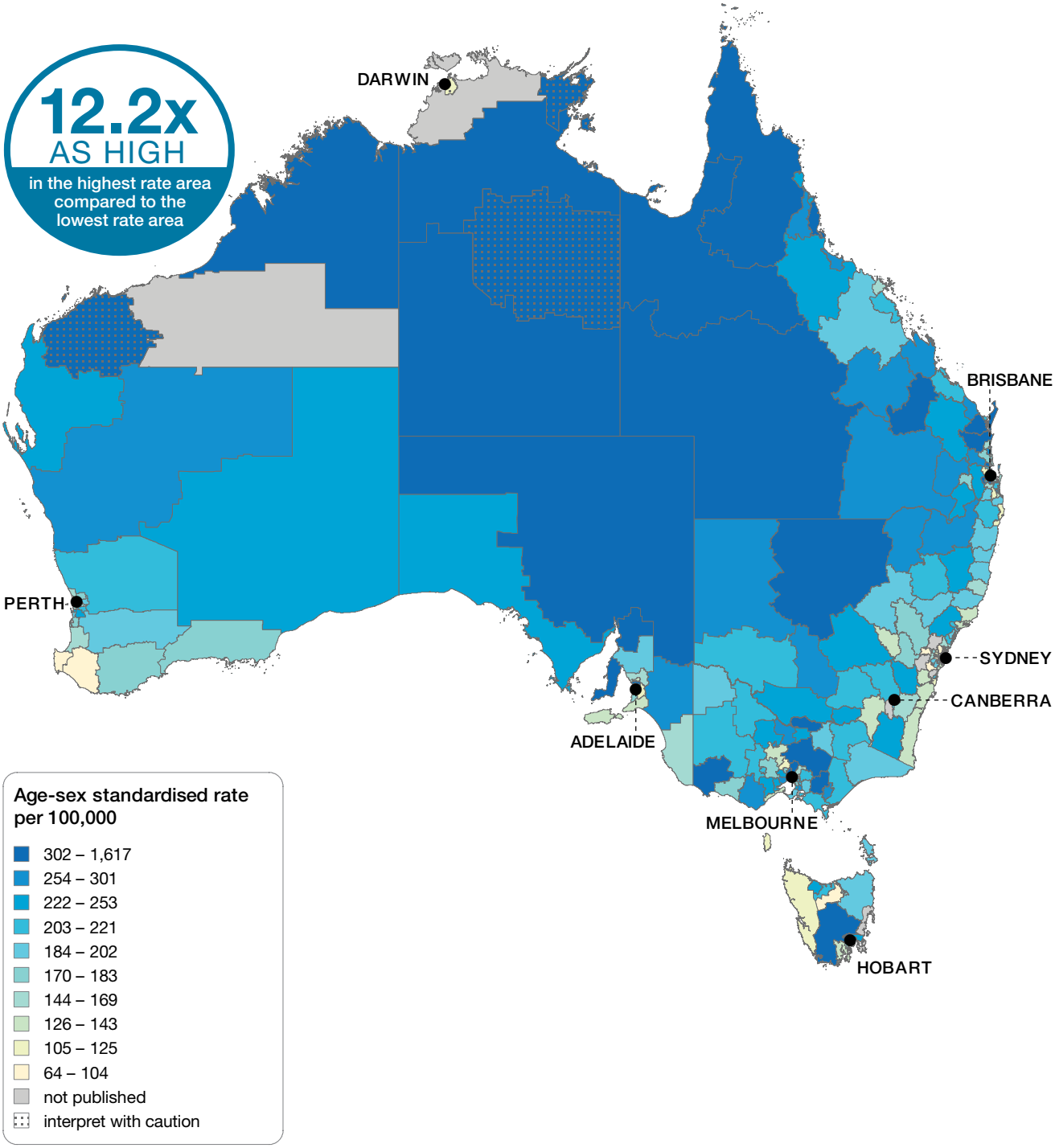
SA3	State	Rate	Hospitalisations
Barkly	NT	1,617*	83
Baw Baw	Vic	782	518
Kimberley	WA	556	175
Brighton	Tas	537	100
Outback - South	Qld	524	126
Outback - North	Qld	469	127
Maryborough	Qld	467	264
Far North	Qld	467	148
Strathpine	Qld	439	158
East Arnhem	NT	432*	51
Katherine	NT	420	78

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

Diabetes complications

Rates across Australia

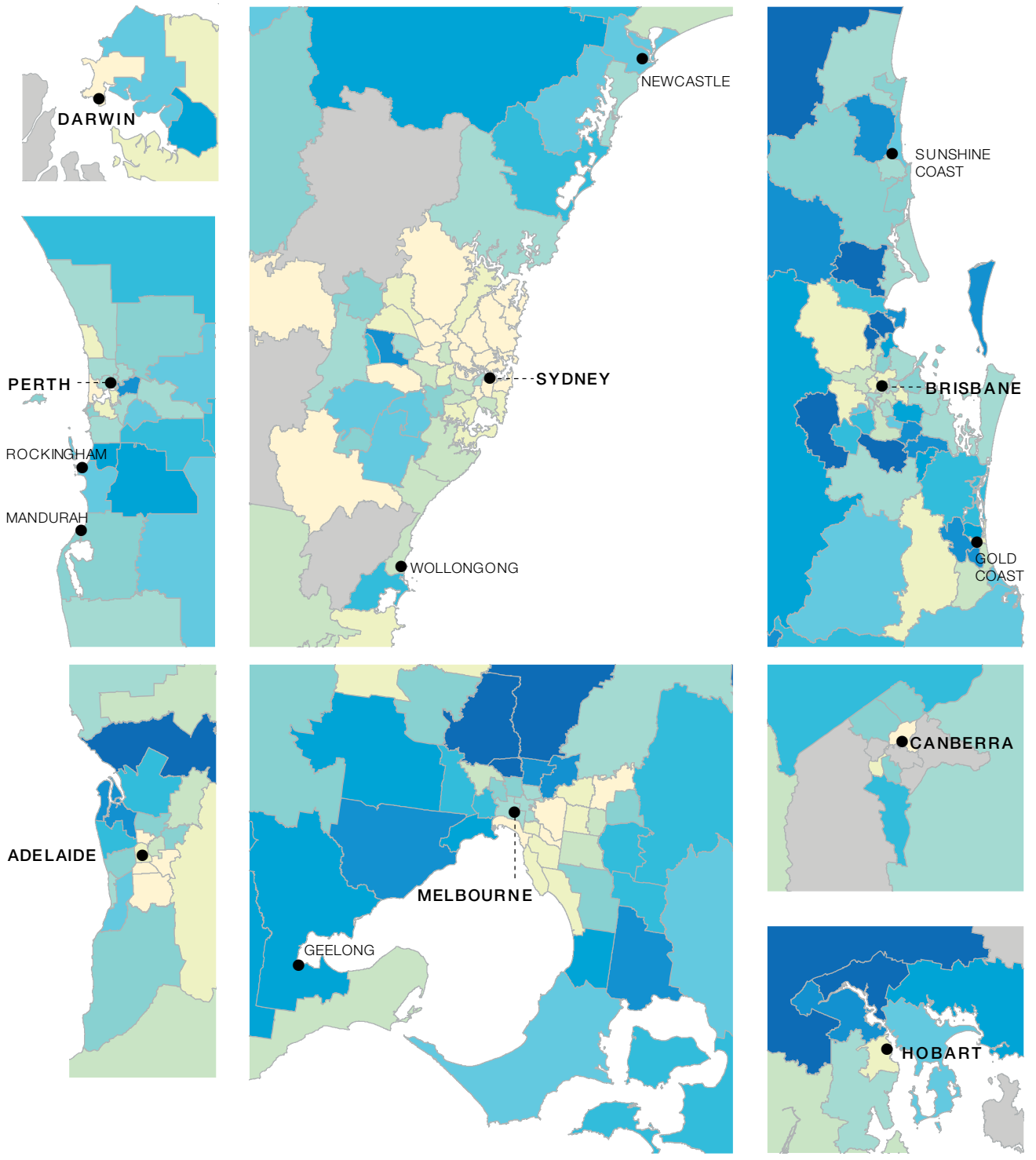
Figure 2.19: **Number of potentially preventable hospitalisations – diabetes complications per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18**



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

Rates across capital city areas

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



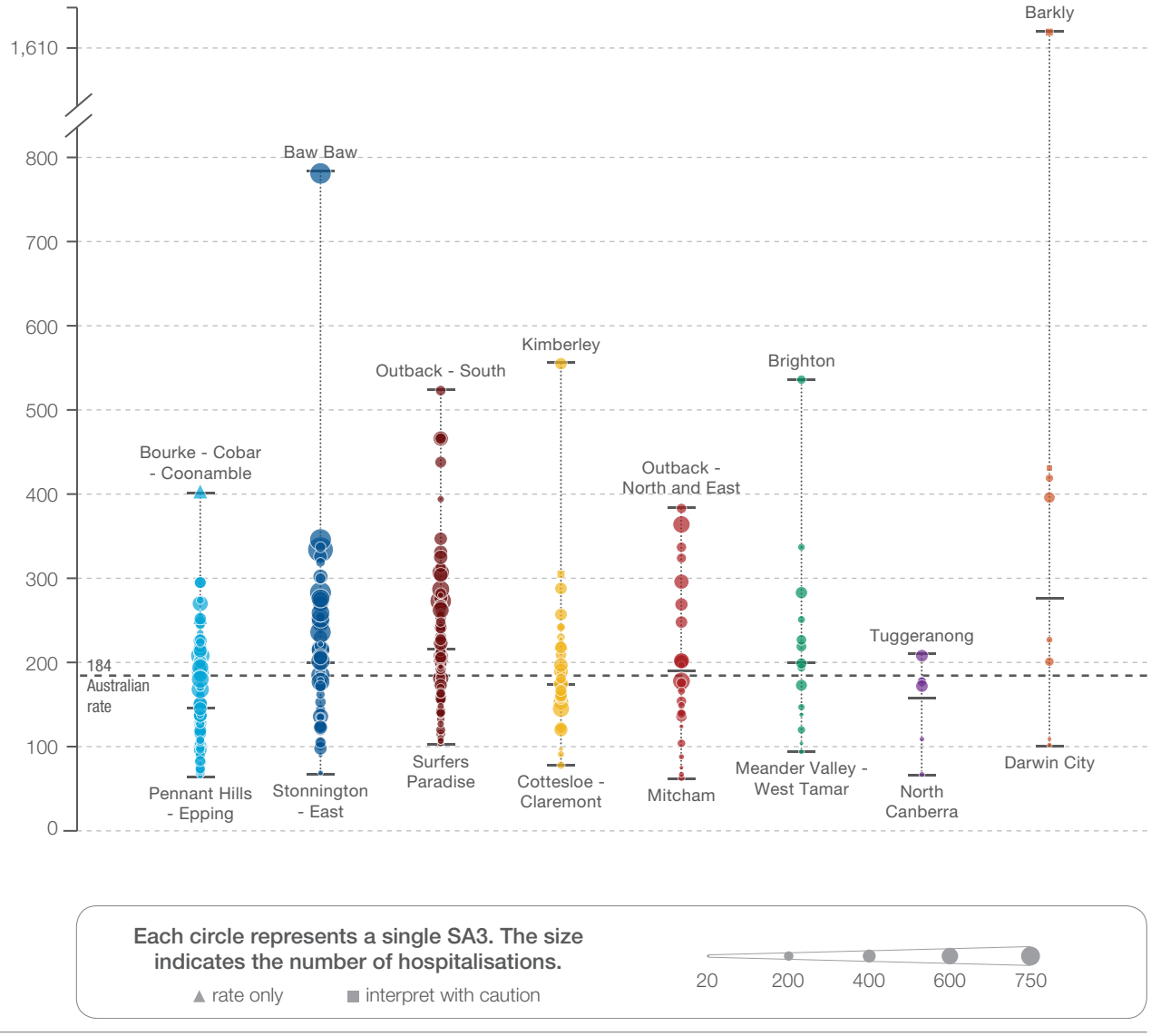
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please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

Diabetes complications

Rates by state and territory

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

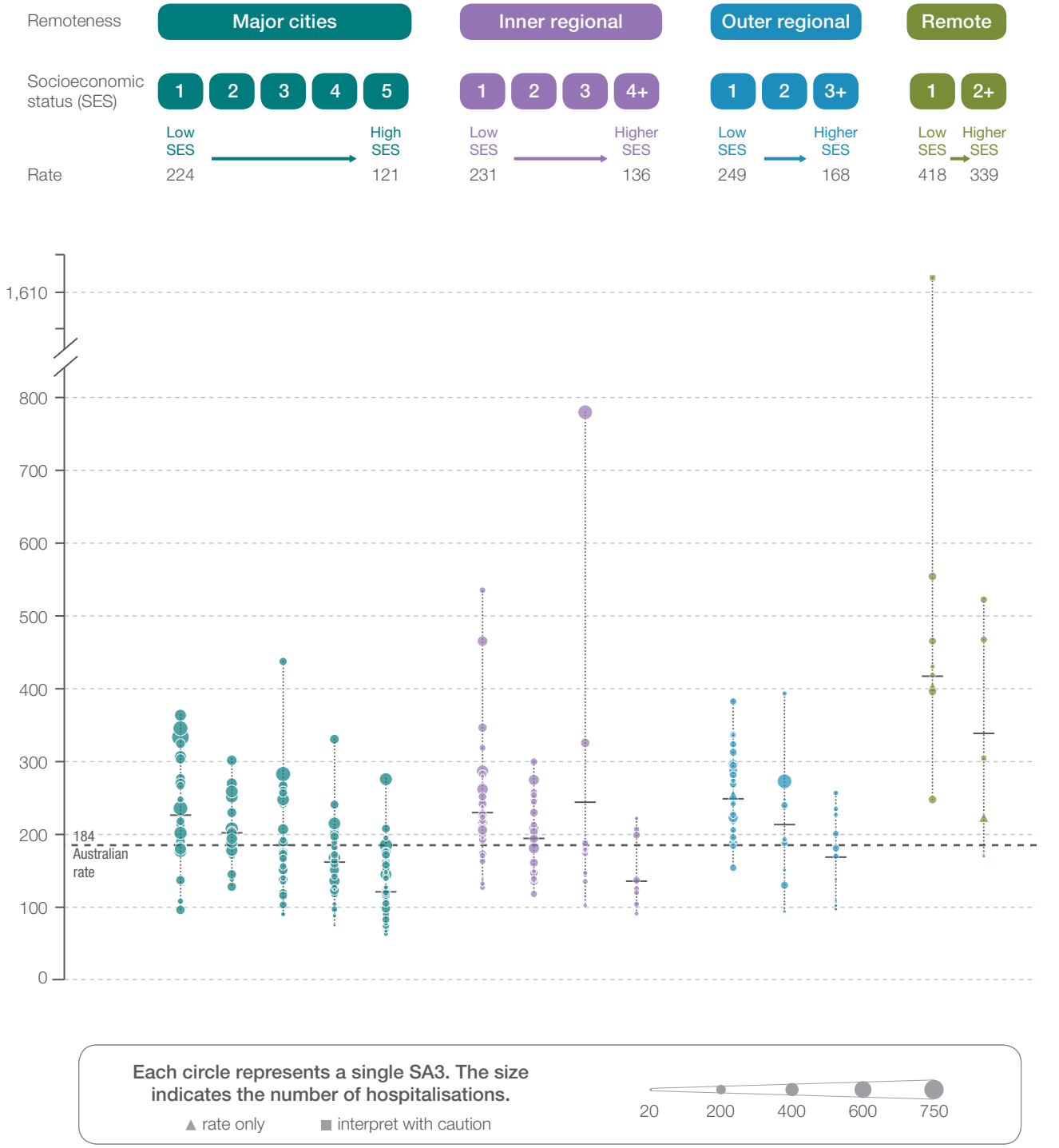
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	404	782	524	556	384	537	209	1,617*
State/territory	147	200	217	175	190	201	159	277
Lowest rate	66	70	105	79	64	95	68	103
No. hospitalisations	13,134	14,004	11,696	4,803	3,850	1,270	649	617



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

Rates by remoteness and socioeconomic status

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



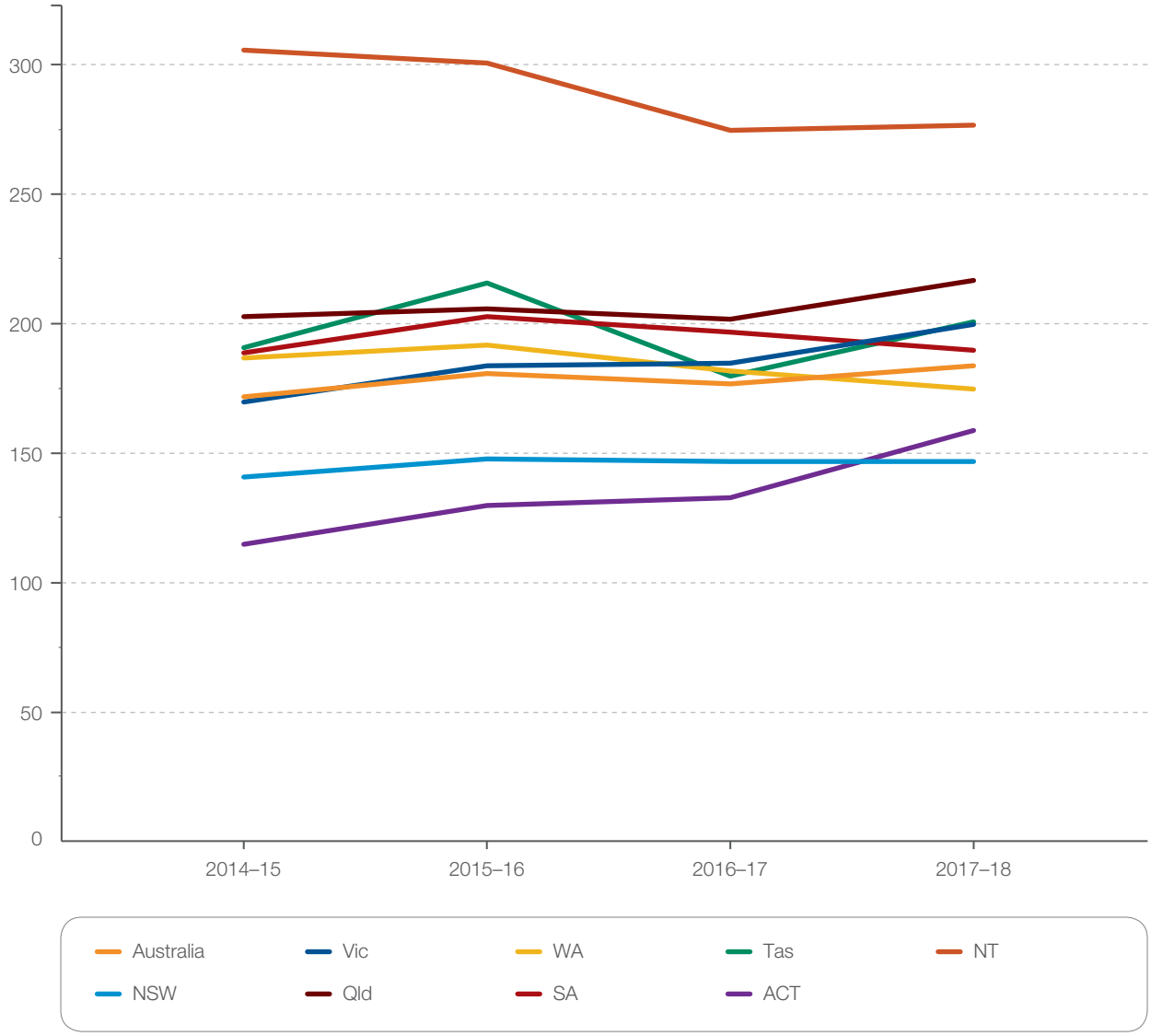
Notes:
Squares (■) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31 December 2017 are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

Diabetes complications

Rates across years

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

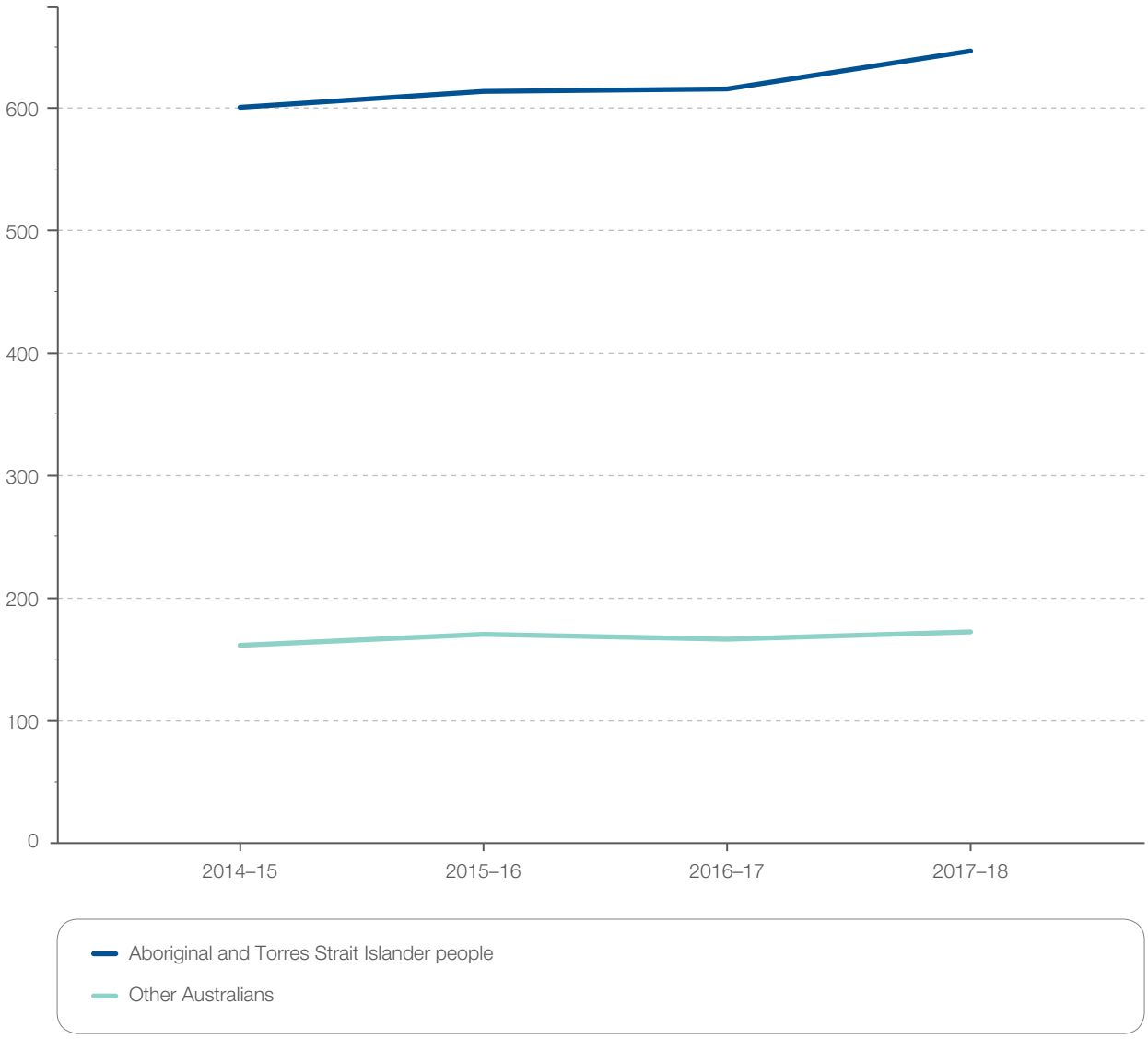
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	2,034*	1,600*	681	1,617*
Australian rate	**172**	**181**	**177**	**184**
Lowest SA3 rate	52	51	46	64
Magnitude of variation	11.8	12.7	14.8	12.2
Magnitude of variation without top & bottom 10% SA3	2.8	2.8	2.8	2.9



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

Rates for Aboriginal and Torres Strait Islander people across years

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



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

Diabetes complications

Resources

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

Australian initiatives

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

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

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

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

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

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2.4 Kidney infections and urinary tract infections

Why is this important?

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

What did we find?

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

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

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

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

What can be done?

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

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

Kidney infections and urinary tract infections

Context

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

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

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

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

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

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

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

Asymptomatic bacteriuria

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

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

Risk factors for kidney infections and UTIs include:

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

See page 141 for further discussion of risk factors.

Kidney infections and UTIs among Aboriginal and Torres Strait Islander people

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

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

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

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

Kidney infections and UTIs among older people

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

About the data

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

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

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

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

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

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

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

Kidney infections and urinary tract infections

What do the data show?

Magnitude of variation

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

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

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

Analysis by remoteness and socioeconomic status

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

Analysis by Aboriginal and Torres Strait Islander status

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

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

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

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

Notes:

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

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

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

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

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

Trends over time

Between 2014–15 and 2017–18, the rate of hospitalisations for kidney infections and UTIs per 100,000 people decreased by 1% in the population as a whole (Figure 2.32).

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

For Aboriginal and Torres Strait Islander people, the rate of hospitalisations for kidney infections and UTIs per 100,000 people nationally increased by 3.6% between 2014–15 and 2017–18 (Figure 2.33).

Interpretation

Potential reasons for the variation include geographical differences in

- Demographic and consumer factors
  - clustering of populations with a high risk of UTIs, such as residents of aged care homes[21], people with type 2 diabetes and people with socioeconomic disadvantage
  - populations with poor diabetes control
  - access to medicines, including affordability
  - incidence of infection with multidrug-resistant extended-spectrum β-lactamase-producing bacteria
  - rates of urological procedures, such as stent insertion
- Clinician factors
  - diagnostic error, leading to over- or under-diagnosis
  - adherence to evidence-based guidelines, including choice of antimicrobial and length of treatment
- Health system factors
  - use of emergency department short-stay units, where a patient stay is counted as a hospitalisation rather than an emergency department–only visit
  - implementation of hospital avoidance schemes
  - access to primary care, including availability, acceptability and affordability
  - access to community services
  - access to information about self-management at an appropriate health literacy level and in languages other than English
  - access to, and availability of, culturally appropriate health care for Aboriginal and Torres Strait Islander people
  - antimicrobial stewardship interventions.

Kidney infections and urinary tract infections

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

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

Low health literacy is also a barrier to seeking care and managing treatment effectively. Inability of people with cognitive impairment, such as some residents of aged care homes, to communicate symptoms may contribute to delays in obtaining care.

Addressing variation

UTI treatment with broad-spectrum antimicrobial agents contributes to bacterial resistance, making the management of subsequent UTIs more difficult.[2] Antimicrobials remain the recommended treatment for UTIs, but including other prevention measures could reduce the incidence of UTIs, the use of antimicrobials and the development of resistance.[2] Prevention should follow this order:

- Counselling about reducing modifiable risk factors (see below)
- Non-antimicrobial measures
- Antimicrobial prophylaxis.[2]

Identification and management of risk factors such as vaginal infections, use of spermicides and atrophic vaginitis due to oestrogen deficiency could reduce the rate of UTIs and the need for antimicrobials.[2] Increasing access to health care for people with anatomical abnormalities of the urinary tract could also reduce the rate of UTIs among this group of patients.

Over-diagnosis of UTI

Although elderly people are at higher risk of UTIs, over-diagnosis of UTIs is also common in this group.[22] Our ageing population, and misdiagnosis of asymptomatic bacteriuria as UTI in older people, are likely contributors to the high rates of hospitalisation reported in this chapter. An incorrect diagnosis of UTI in an elderly person has several negative consequences, including not identifying or treating the actual cause of their symptoms and increasing the risk of subsequent infection with antimicrobial-resistant organisms after treatment with an unnecessary antimicrobial. Difficulties in accurate diagnosis of UTIs in older people include:

- High rates of asymptomatic bacteriuria, which can lead to a positive urine dipstick result and misinterpretation as a UTI
- Lack of a fast, accurate test that distinguishes asymptomatic bacteriuria from active infection
- Comorbidities, such as cognitive impairment, that impede assessment.[23]

Review of patient notes in a United Kingdom (UK) hospital study found that 43% of patients over 75 years of age who were given a diagnosis of UTI did not meet diagnostic criteria.[22] Of the patients incorrectly diagnosed with UTI, 37% had asymptomatic bacteruria.[22] Guidelines recommend against treating asymptomatic bacteruria, except in pregnancy and before some urological procedures.[12] Asymptomatic bacteriuria affects approximately 19% of women and 9% of men over 80 years of age[24], and can lead to a positive urine dipstick result in the absence of a UTI. A positive urinalysis result is not a reliable method for identifying UTI in elderly emergency department patients.[25]

Time pressure in hospital emergency departments may contribute to over-diagnosis of UTIs in elderly people. UK emergency department staff interviewed for a qualitative study said that quickly diagnosing UTI by urine testing was a method of securing hospital admission.[26] One staff member commented that she needed 'to find a cause to admit somebody to hospital when we think they are not right to go home, we've only got so much time to make the decision … so that's what I'm going to come up with'.[26]

Reducing over-diagnosis in elderly people

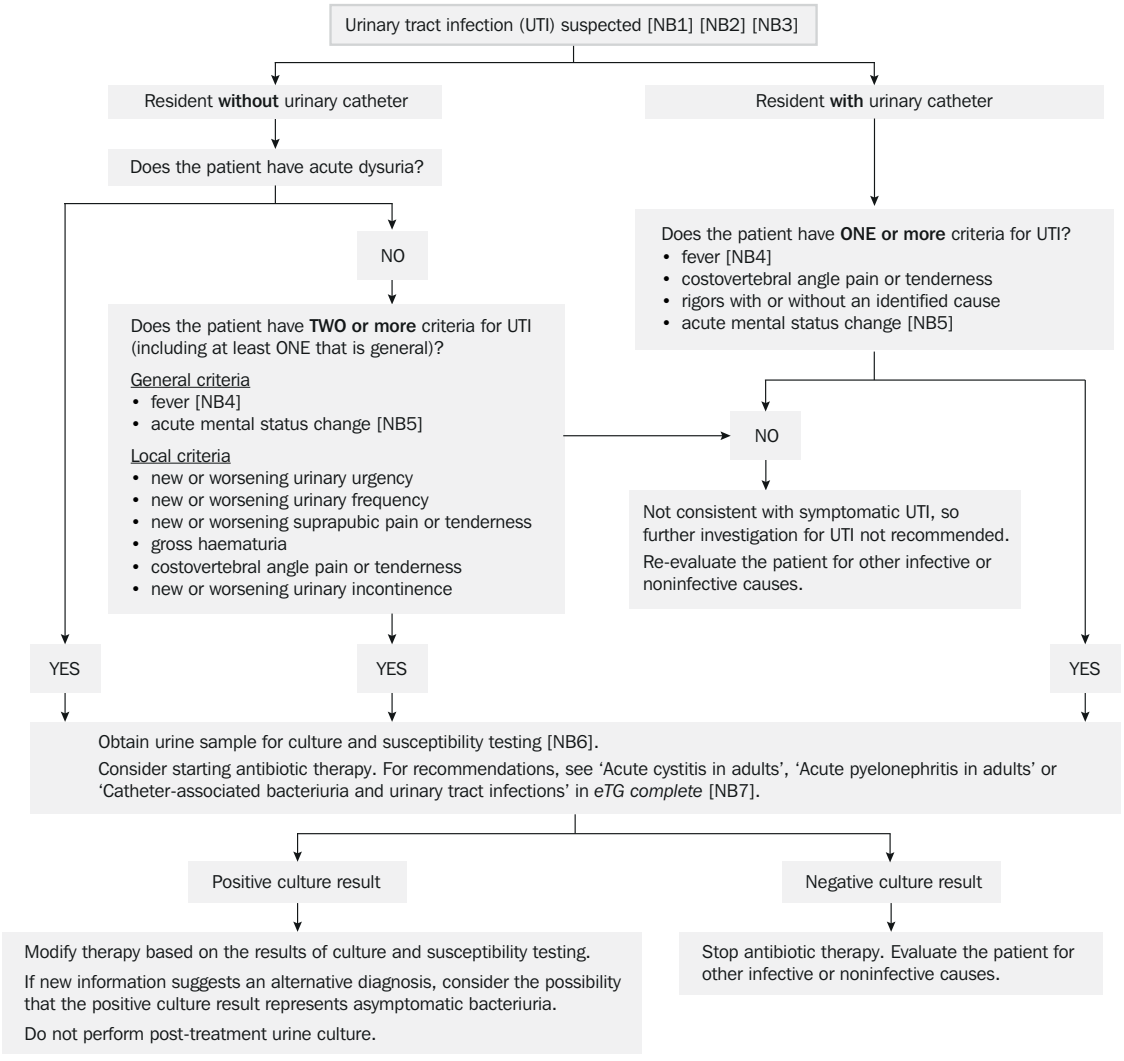
Strategies to reduce over-diagnosis of UTIs in elderly people include selective use of urine testing in emergency departments, and only after considering the probability of UTI based on history and examination.[23] Ensuring midstream clean-catch urine collection, or using an in/out catheter if necessary, will increase the accuracy of urine tests, as will removal of a long-term indwelling catheter and insertion of a fresh catheter before collecting urine samples.[23] Following Australian guidelines on assessment and treatment of residents of aged care homes with suspected UTI could also increase diagnostic accuracy in this group (see Figure 2.26 on page 140).[11,23]

Kidney infections and urinary tract infections

Figure 2.26: Flowchart on assessment and treatment of aged-care facility residents with suspected urinary tract infection[12]

Therapeutic Guidelines

Assessment and treatment of aged-care facility residents with suspected urinary tract infection



NB1: Do not investigate or treat cloudy or malodorous urine in aged-care facility residents who do not have other signs or symptoms of UTI.
NB2: Consider whether an alternative diagnosis is likely. Consider both infective (e.g. pneumonia) and non-infective (e.g. medication-related adverse events) causes.
NB3: Establish whether an advance care plan is in place as it may influence assessment and management (e.g. whether investigations are performed or antibiotics are given).
NB4: Fever is defined as a temperature higher than 38°C or an increase of more than 1.5°C above baseline temperature.
NB5: Acute mental status changes include new change in level of consciousness, periods of altered perception, disorganised speech and lethargy.
NB6: If the resident has an indwelling urinary catheter, see *eTG complete* for a guide to collecting urine samples in patients with indwelling urinary catheters.
NB7: The duration of therapy does not need to be modified for this patient group and should always be stated on the prescription.

Reproduced with permission from Urinary tract infection in aged-care facility residents [published 2019 Apr]. In: eTG complete [digital]. Melbourne: Therapeutic Guidelines Limited; 2020. tgldcdp.tg.org.au/searchAction?appendedInputButtons=Urinary%20tract%20infection%20in%20aged-care%20facility%20residents

Healthcare-associated UTIs

UTIs are a common healthcare-associated infection. Many are associated with indwelling urinary catheters.[27] Note that a UTI acquired during a hospital admission for another reason would not be counted in the data presented in this chapter, but a readmission to manage the UTI would be counted. In Australia in 2017–18, there were 5,362 unplanned readmissions for UTI within 28 days of discharge from a public hospital (excluding Western Australia).[28] This figure includes unplanned readmissions after initial admission for any reason, and includes readmissions to the same hospital only.

Approximately 1.7% of patients who were hospitalised for more than two days acquired a UTI, according to a study of eight Australian hospitals.[27] The estimated extra length of stay due to these healthcare-associated UTIs was four days.[27]

Contributing factors that must be considered include whether indwelling urethral catheterisation is necessary, duration of the indwelling catheter, and how the catheter is inserted.[7] Intermittent clean catheterisation should be considered in many people in both inpatient and outpatient settings to prevent catheter-associated UTIs. Reducing the proportion of patients with an indwelling catheter will reduce the incidence of UTIs and the likelihood of re-presentation to hospital with that UTI because of diagnostic failure or inadequate treatment before discharge.

Impact of antimicrobial-resistant bacteria

Increasing incidence of multidrug-resistant extended-spectrum β-lactamase-producing bacteria in Australia will contribute to increasing rates of hospitalisation for UTIs that do not respond to initial treatment, and longer hospital stays due to more complex treatment. Australian guidelines have been updated in light of growing antibiotic resistance.[12]

If possible, the susceptibility of organisms recently identified in patient samples should guide antimicrobial choice.[12] Trimethoprim continues to be recommended as empirical oral antimicrobial therapy for acute cystitis, but not for non-severe pyelonephritis because it is a more serious infection with a higher risk of adverse outcomes with treatment failure.[12] Amoxicillin–clavulanic acid has an unnecessarily broad spectrum of activity for empirical therapy of cystitis (that is, treatment before the responsible organism is known), and increases the risk of selecting for antimicrobial-resistant organisms.[12,29]

People with renal failure may be less likely to receive targeted antimicrobial agents because of concerns about renal function, and may receive antimicrobials that have less reliable effectiveness (for example, cefalexin, ceftriaxone). For patients in remote areas with renal failure, delays in receiving microbiology study results may add to the barriers to receiving effective treatment.

Risk factors for UTIs with multidrug-resistant bacteria include recent overseas travel, previous exposure to antimicrobials and living in an aged care home.[30] Urine culture before starting treatment is advisable for patients with any of these risk factors to guide antimicrobial choice.[30]

Kidney infections and urinary tract infections

Reducing UTIs among Aboriginal and Torres Strait Islander people

Developing culturally appropriate and accessible information in partnership with Aboriginal and Torres Strait Islander communities could reduce the impact of UTIs in these groups.[31] This should include information emphasising the importance of prompt medical attention for symptoms of UTI to minimise the risk of acute kidney injury and subsequent chronic kidney disease.[31]

Improving access to culturally safe care may increase the early detection and treatment of UTIs in Aboriginal and Torres Strait Islander people. Strengthening the capacity of the Aboriginal Community Controlled Health Service sector and improving the cultural safety of mainstream services are both important elements. Improving access for Aboriginal and Torres Strait Islander mothers to culturally safe models of maternity care may improve detection and treatment of UTIs in pregnancy in this group.[32] See page 60 for examples of successful strategies for improving antenatal care for Aboriginal and Torres Strait Islander mothers.

Reducing risk factors for diabetes could reduce the rate of UTIs among Aboriginal and Torres Strait Islander people, as diabetes increases the risk of UTI. Diabetes prevalence is strongly related to social disadvantage among Aboriginal and Torres Strait Islander people, and the underlying social determinants of health need to be considered to address the increasing rate of diabetes.[33] The logistical and financial barriers to accessing health care for Aboriginal and Torres Strait Islander people living in remote areas also need to be addressed.

Preventing recurrent UTIs

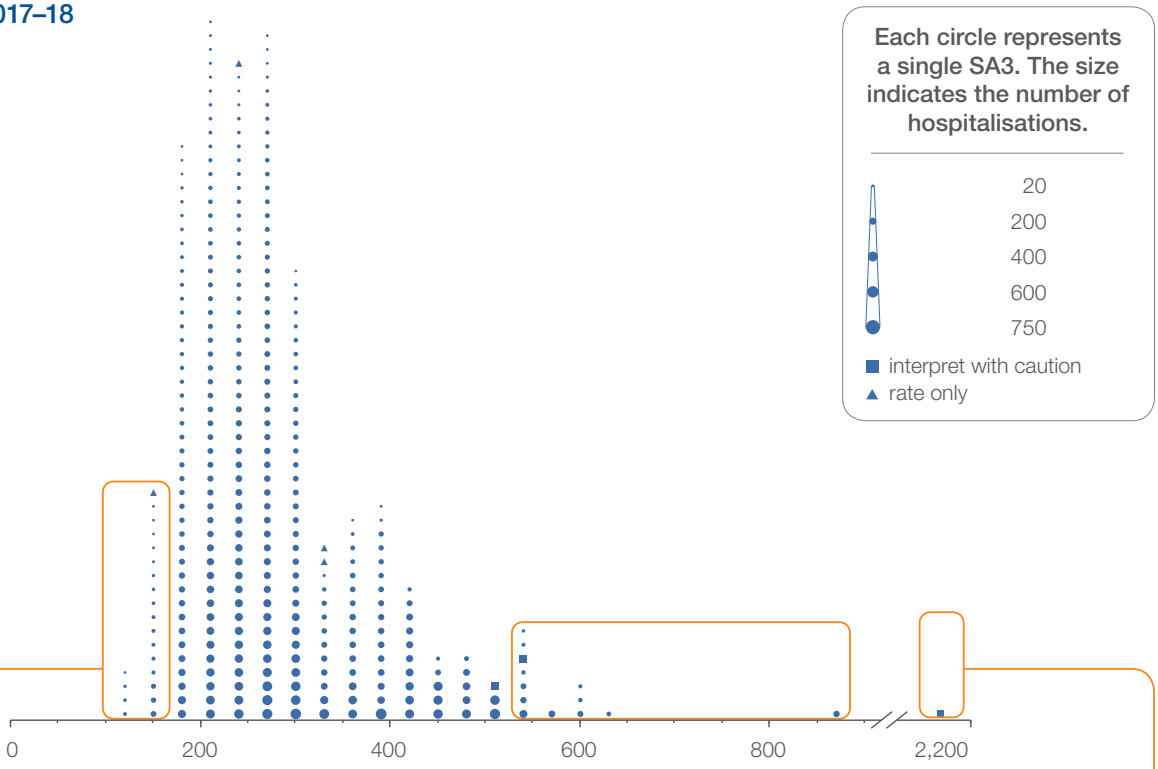
Recurrent UTIs account for a substantial number of infections, and prophylaxis may be appropriate for certain groups of patients after evaluation for contributing factors.[12] Patient-initiated treatment with antimicrobials at the onset of symptoms may also be appropriate for women who have frequent symptomatic UTIs, and this approach reduces overall antimicrobial use compared with prophylaxis.[12]

On discharging older patients from hospital with a diagnosis of UTI, communication to general practitioners emphasising recommendations to reduce the risk of recurrent UTIs may reduce the need for future hospitalisations.[23] In postmenopausal women, vaginal oestrogen may reduce recurrences of UTIs. Increasing water intake may reduce recurrences in premenopausal women.[12]

The evidence for cranberry products to prevent UTIs is conflicting. A meta-analysis published in 2017 concluded that cranberry products significantly reduce the risk of UTIs.[34] Another meta-analysis published in 2012 reported a non-significant trend to fewer UTIs; this review also commented that the high withdrawal rate in trials suggests that use of cranberry products may not be an acceptable intervention for some patients.[35] There is not enough high-quality evidence to determine whether probiotics are effective for preventing UTIs.[36]

Rates by local area

Figure 2.27: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Norwood - Payneham - St Peters	SA	141	77
Pennant Hills - Epping	NSW	142	86
Burnside	SA	148	100
Adelaide City	SA	148	38
Huon - Bruny Island	Tas	152	38
Manningham - West	Vic	158	224
Esperance	WA	158	n.p.
Port Stephens	NSW	161	165
Glenelg - Southern Grampians	Vic	164	74
Macedon Ranges	Vic	165	55
Hobart Inner	Tas	166	104
Augusta - Margaret River - Busselton	WA	168	102
Great Lakes	NSW	169	88
Kiama - Shellharbour	NSW	170	185
Queanbeyan	NSW	171	99
Hawkesbury	NSW	171	40
Heathcote - Castlemaine - Kyneton	Vic	175	109
Armidale	NSW	175	79
Taree - Gloucester	NSW	176	110
Sorell - Dodges Ferry	Tas	178	35
Dural - Wisemans Ferry	NSW	179	56

Highest rate areas

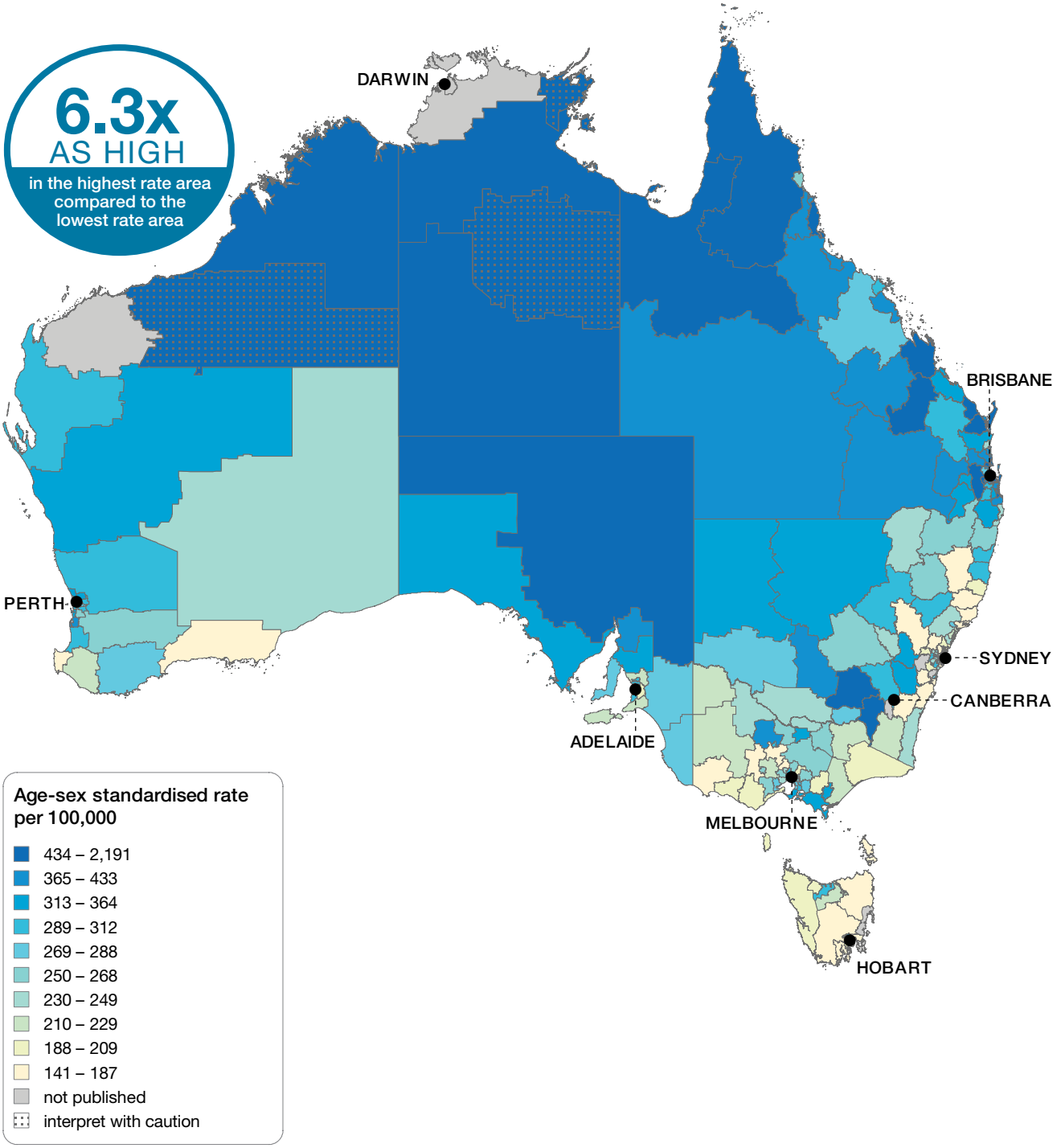
SA3	State	Rate	Hospitalisations
Barkly	NT	2,191*	65
Kimberley	WA	893	263
Palmerston	NT	655	145
Alice Springs	NT	620	232
Outback - North	Qld	606	131
Katherine	NT	604	109
Maryborough	Qld	583	301
Caboolture	Qld	565	411
Innisfail - Cassowary Coast	Qld	562	226
Darwin Suburbs	NT	561	265
East Pilbara	WA	559*	105
Biloela	Qld	552	79
Darwin City	NT	540	127
Tumut - Tumbarumba	NSW	540	104

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

Kidney infections and urinary tract infections

Rates across Australia

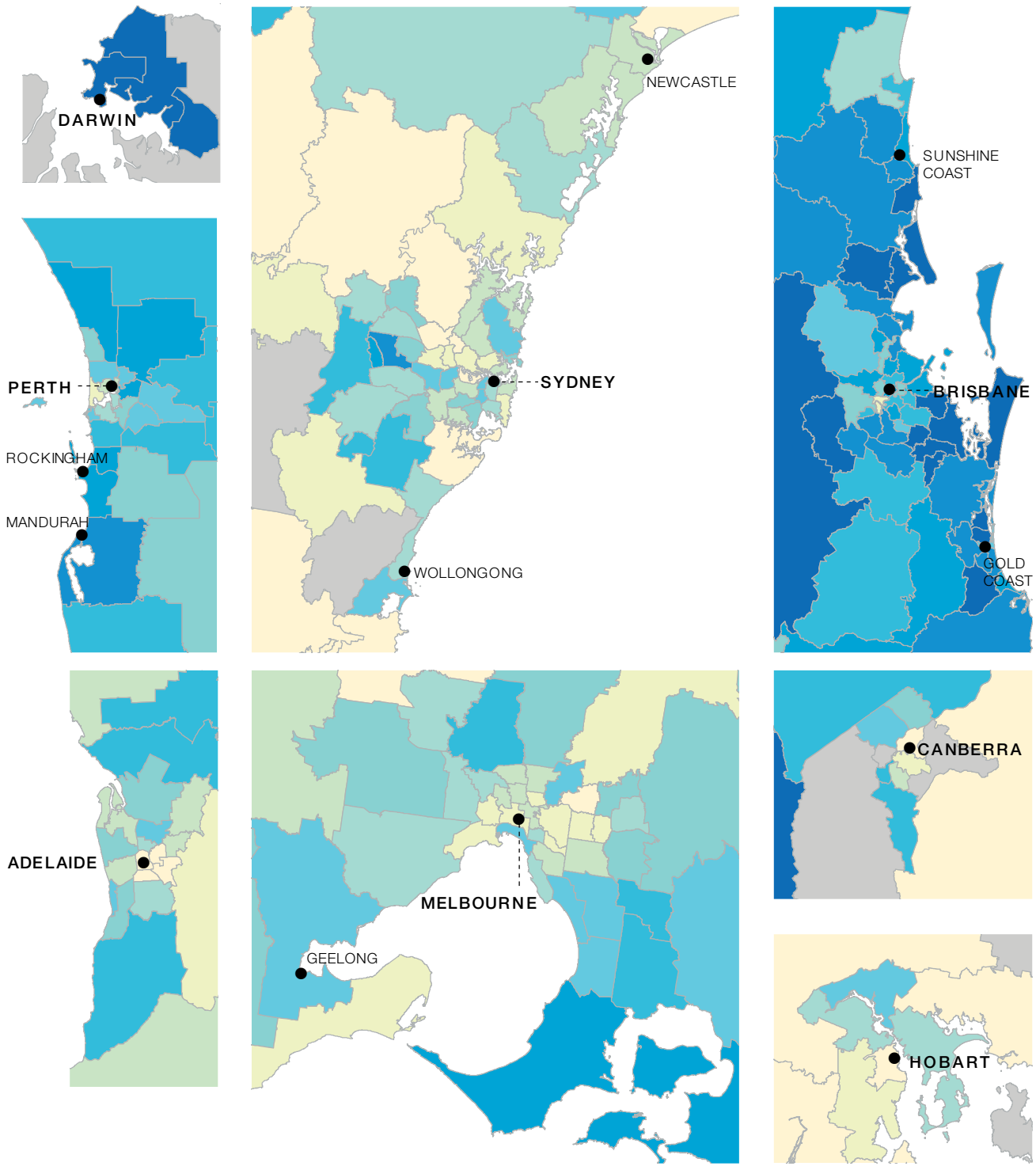
Figure 2.28: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



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

Rates across capital city areas

Figure 2.29: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



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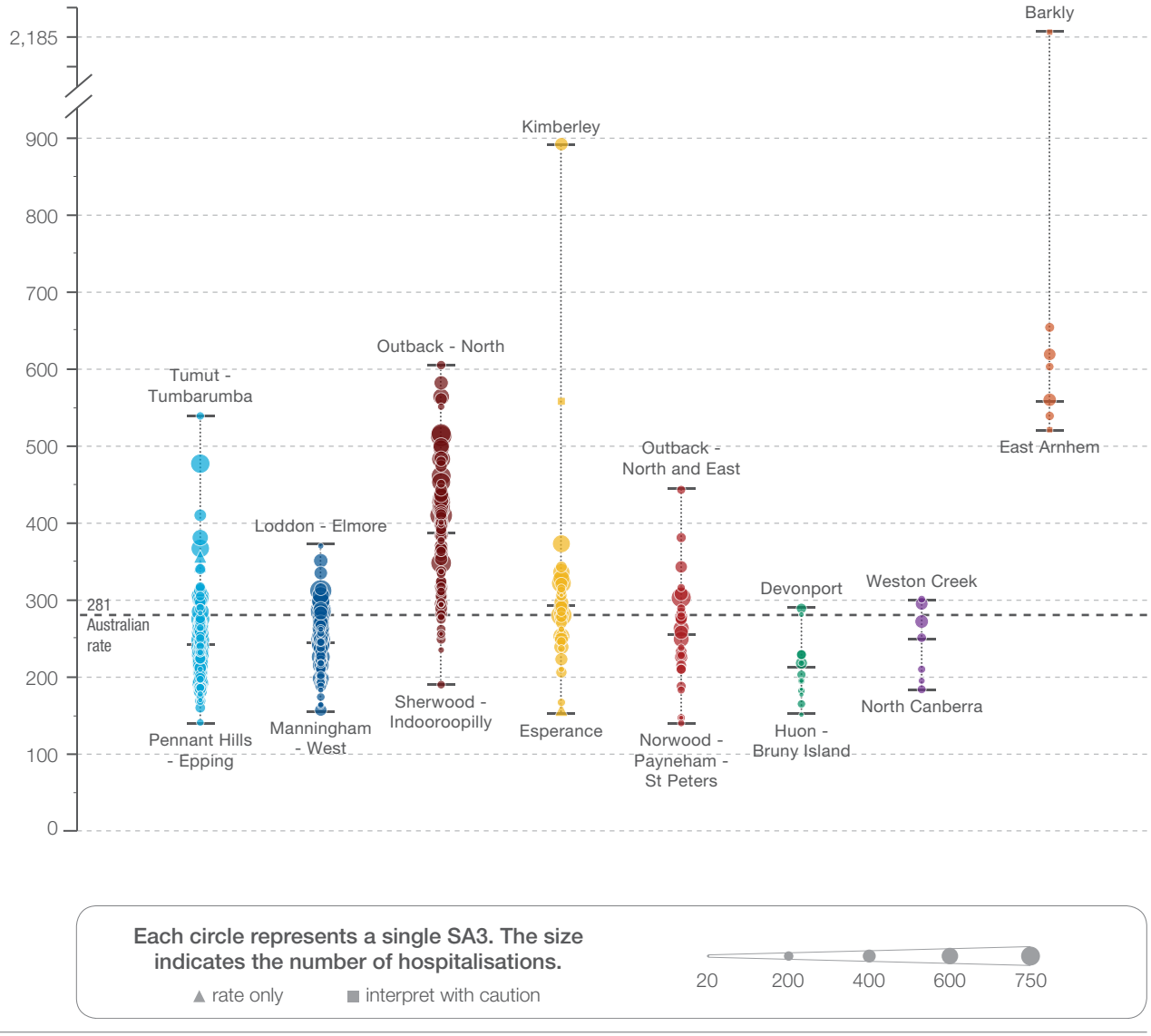
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Kidney infections and urinary tract infections

Rates by state and territory

Figure 2.30: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

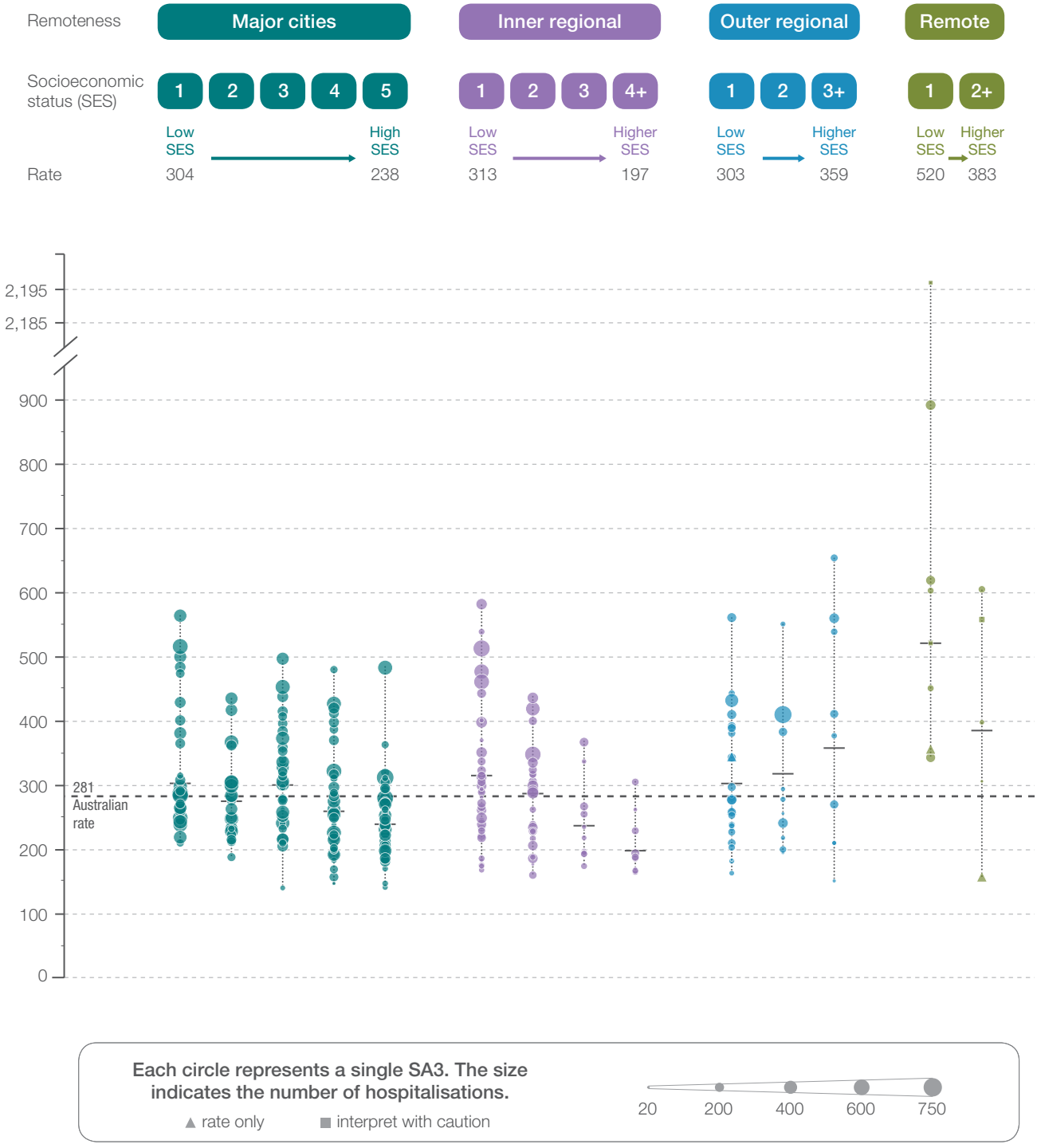
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	540	371	606	893	444	290	302	2,191*
State/territory	241	244	386	291	256	212	248	559
Lowest rate	142	158	191	158	141	152	185	522*
No. hospitalisations	21,738	17,215	20,603	7,867	5,417	1,300	1,034	1,108



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

Rates by remoteness and socioeconomic status

Figure 2.31: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



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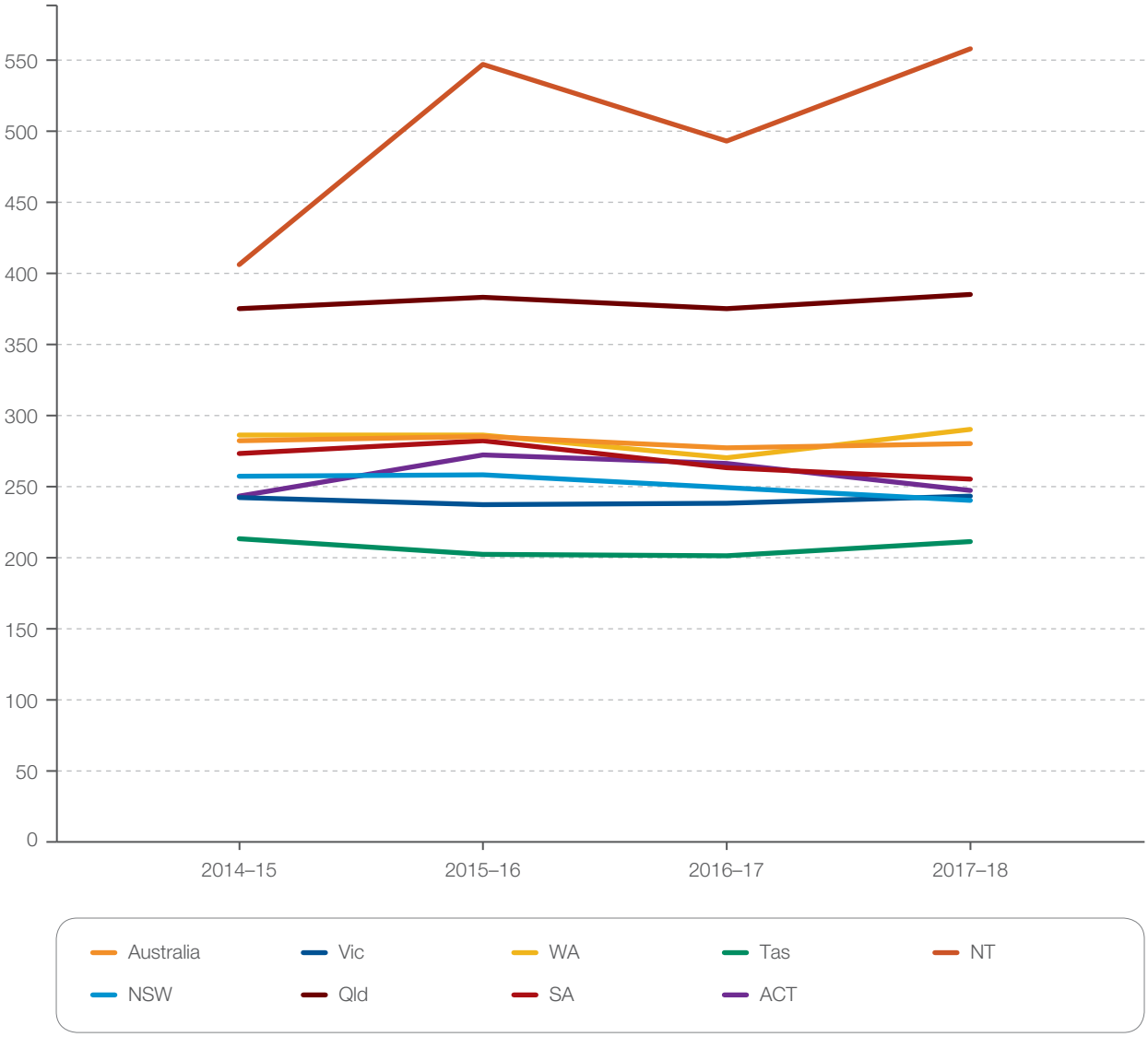
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Populations 30 June of 2017 and 2018.

Kidney infections and urinary tract infections

Rates across years

Figure 2.32: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, 2014–15 to 2017–18

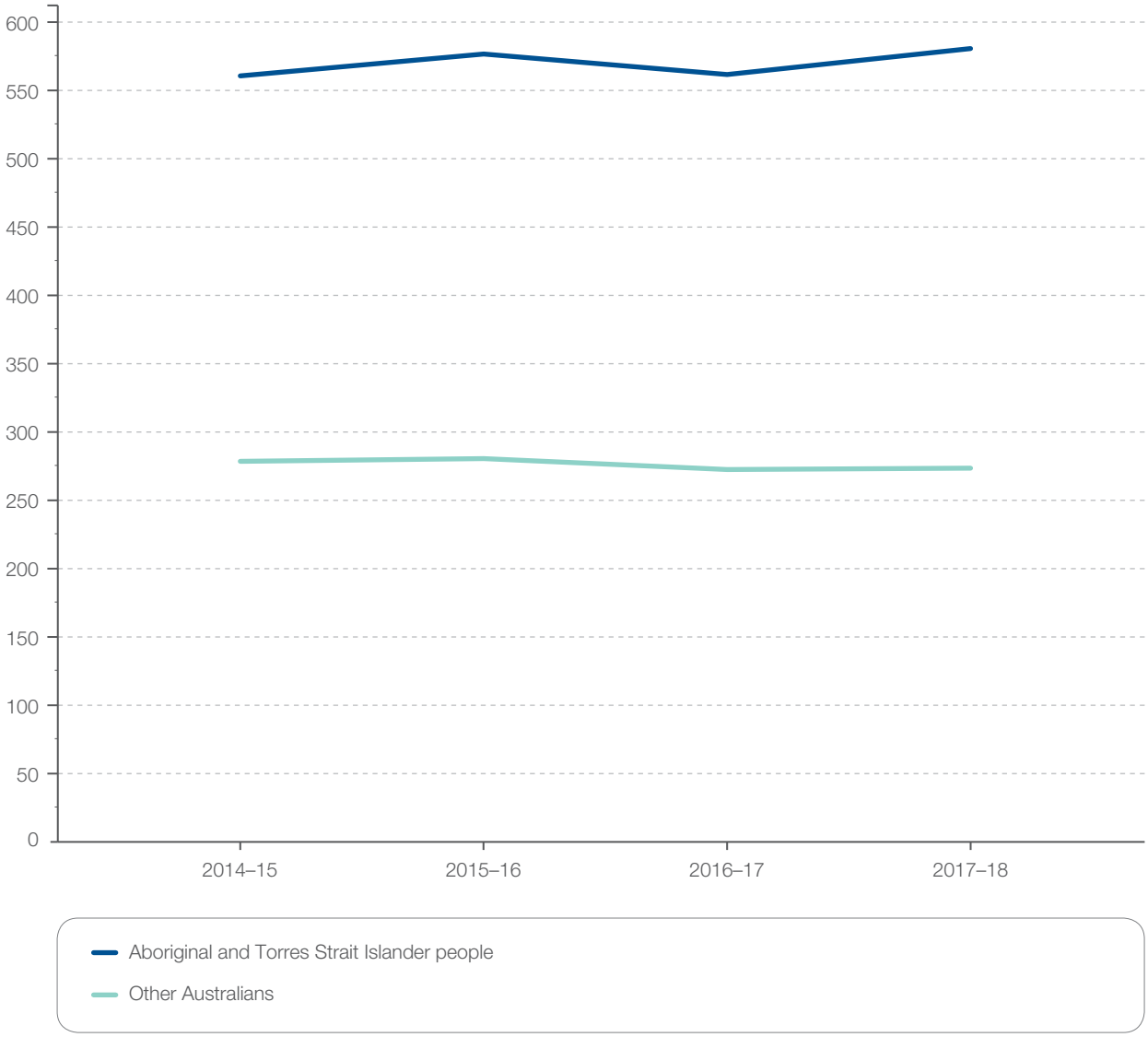
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	1,097*	1,445*	1,041*	2,191*
Australian rate	**283**	**286**	**278**	**281**
Lowest SA3 rate	135	113	104	141
Magnitude of variation	6.9	8.2	6.4	6.3
Magnitude of variation without top & bottom 10% SA3	2.2	2.2	2.2	2.3



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

Rates for Aboriginal and Torres Strait Islander people across years

Figure 2.33: Number of potentially preventable hospitalisations – kidney and urinary tract infections per 100,000 people of all ages, age and sex standardised, by Aboriginal and Torres Strait Islander status, 2014–15 to 2017–18



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

Kidney infections and urinary tract infections

Resources

- Antibiotic guidelines: urinary tract infections (in eTG complete)[12]
- Antibiotic guidelines: urinary tract infection in aged-care facility residents (in eTG complete)[12]
- *RACGP Aged Care Clinical Guide (Silver Book)*. Melbourne: Royal Australian College of General Practitioners
- *Asymptomatic Bacteriuria: Reducing inappropriate antimicrobial prescribing for aged care facility residents* (fact sheet)[11]
- Urinary tract infections, interactive flowchart, National Institute for Health and Care Excellence (UK), pathways.nice.org.uk/pathways/urinary-tract-infections#path=view%3A/pathways/urinary-tract-infections/urinary-tract-infections-in-people-aged-16-years-and-over.xml&content=view-index
- Non-antibiotic prevention and management of recurrent urinary tract infection[37]
- *Urinary Catheter Passport: A guide to looking after a urinary catheter for service users and healthcare workers*. Infection Prevention Control & National Health Service, UK
- Diagnosis of urinary tract infection in older persons in the emergency department: To pee or not to pee, that is the question[23]

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2.5 Cellulitis

Why is this important?

Cellulitis is an infection of the subcutaneous tissues. Crowded living conditions and socioeconomic disadvantage increase the risk of some bacterial causes of cellulitis.[1]

What did we find?

Between 2014–15 and 2017–18, the rate of cellulitis hospitalisations nationally increased by 9%. The rate increased by 18% among Aboriginal and Torres Strait Islander people. The rate for Aboriginal and Torres Strait Islander people was 3.0 times as high as the rate for other Australians.

Rates of hospitalisation for cellulitis were substantially higher in remote areas than in other areas. Hospital admission rates also increased with socioeconomic disadvantage, regardless of remoteness, except in outer regional areas.

What can be done?

The rates of hospitalisation for cellulitis reported in this chapter are unacceptably high, and more must be done to prevent these infections. Addressing the social determinants of skin health, such as housing conditions, is key to reducing skin infections and cellulitis among Aboriginal and Torres Strait Islander people.[2,3] More effective prevention and management of type 2 diabetes, an important risk factor for cellulitis, may also reduce rates of hospitalisation for cellulitis. Increasing availability of podiatry services that specialise in care of diabetic and ischaemic foot ulcers may help prevent infections and hospitalisations, particularly in rural and remote areas. Increasing availability of lymphoedema services and specific compression stockings may reduce rates of cellulitis in patients with chronic lymphoedema. Improving the accuracy of cellulitis diagnoses – for example, by early consultation with an infectious diseases specialist and/or a dermatologist – could reduce unnecessary hospitalisations and antibiotic use.

Cellulitis

Context

Cellulitis is an infection of the subcutaneous tissues. It occurs in a range of disparate conditions and circumstances, with different causes and management – for example, penetrating injuries, insect bites and wounds.[4] Risk factors for recurrent cellulitis include lymphoedema, obesity, diabetes and pre-existing skin infections such as tinea.[4,5] Crowded living conditions and socioeconomic disadvantage increase the risk of some infections associated with cellulitis.[1]

Cellulitis was the fourth most common cause of potentially preventable hospitalisation in Australia in 2017–18, after dental conditions, kidney infections and urinary tract infections combined, and chronic obstructive pulmonary disease.[6] Among Aboriginal and Torres Strait Islander people, cellulitis was the second most common cause of potentially preventable hospitalisation in 2017–18, after chronic obstructive pulmonary disease.[7] Hospitalisations for cellulitis accounted for 275,653 bed days in Australia in 2017–18.[6]

Older, frail people are particularly at risk of hospitalisation due to cellulitis because even minimal infection can mean that they are unable to manage at home. The rate of hospitalisation for cellulitis in Australia is 3.0 times higher among people aged 65 years and over compared with younger adults.[7]

Few international rates of hospitalisation for cellulitis are available for comparison. The rate of hospital discharge for treatment for infection of the skin or subcutaneous tissues was 359 per 100,000 in Australia, compared to 328 per 100,000 in New Zealand, in 2016.[8]

Cellulitis is caused by a variety of pathogens. Spontaneous, rapidly spreading cellulitis and non-purulent recurrent cellulitis (for example, associated with lymphoedema) are most commonly caused by *Streptococcus pyogenes* or other streptococci.[9]

Purulent cellulitis is usually caused by *Staphylococcus aureus (S. aureus)*.[9] Some community-acquired *S. aureus* infections in Australia are now due to methicillin-resistant organisms.[10] Cellulitis caused by *S. aureus* is less common than cellulitis caused by streptococci, and is often associated with an abscess, ulceration or penetrating injury.[9]

Oral antibiotics are recommended for cellulitis without systemic features of infection. Intravenous antibiotics are usually required for patients with two or more features of systemic infection.[9]

About the data

All hospitalisations with a principal diagnoses of cellulitis are included.

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

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

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

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

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

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

What do the data show?

Magnitude of variation

In 2017–18, there were 68,663 hospitalisations for cellulitis, representing 256 hospitalisations per 100,000 people of all ages (the Australian rate).

The number of hospitalisations for cellulitis across 330* local areas (Statistical Area Level 3 – SA3) ranged from 90 to 1,393 per 100,000 people. The rate was **15.5 times as high** in the area with the highest rate compared with the area with the lowest rate. The number of hospitalisations varied across states and territories, from 185 per 100,000 people in the Australian Capital Territory to 679 in the Northern Territory (Figures 2.35–2.38).

After the highest and lowest 10% of results were excluded and 264 SA3s remained, the number of hospitalisations per 100,000 people was 2.9 times as high in the area with the highest rate compared with the area with the lowest rate.

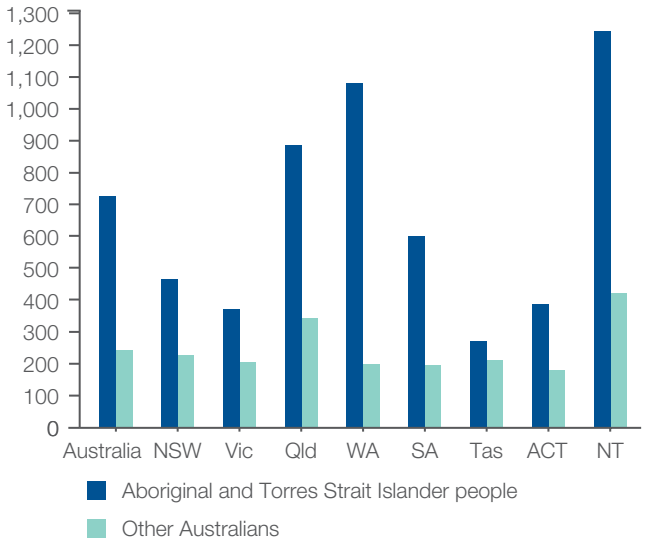
Analysis by remoteness and socioeconomic status

Rates of hospitalisation for cellulitis were substantially higher in remote areas than in other areas. Hospital admission rates also increased with socioeconomic disadvantage, regardless of remoteness category, except in outer regional areas (Figure 2.39).

Analysis by Aboriginal and Torres Strait Islander status

The rate for Aboriginal and Torres Strait Islander people (727 per 100,000 people) was 3.0 times as high as the rate for other Australians (242 per 100,000 people) (Figure 2.34).

Figure 2.34: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, by Aboriginal and Torres Strait Islander status, 2017–18†



The data for Figure 2.34, and the data and graphs for Analysis by Primary Health Network are available at safetyandquality.gov.au/atlas

* There are 340 SA3s. For this item, data were suppressed for 10 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:

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

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

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

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

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

Cellulitis

Trends over time

Between 2014–15 and 2017–18, the rate of cellulitis hospitalisations per 100,000 people nationally increased by 9% (Figure 2.40).

For Aboriginal and Torres Strait Islander people, the rate of cellulitis hospitalisations per 100,000 people nationally increased by 18% between 2014–15 and 2017–18 (Figure 2.41).

Interpretation

Potential reasons for the variation include geographical differences in:

- Clinician factors:
  - Diagnostic error, potentially leading to both under-diagnosis and over-diagnosis of cellulitis. Several other conditions can be mistaken for cellulitis, due to its non-specific features, and reported rates of misdiagnosis range from 30% to 74% in United States (US) hospitals.[11,12] In one US study where 30% of cellulitis diagnoses were later found to be incorrect, 85% of the misdiagnosed patients were unnecessarily hospitalised and 92% received unnecessary antibiotics due to the misdiagnosis[13] (see 'Improving diagnostic accuracy' on page 157).
- Demographic and consumer factors
  - prevalence of diabetes, and poorly managed diabetes, which increase the risk of skin disease; diabetes is more prevalent among Aboriginal and Torres Strait Islander people
  - prevalence of obesity, chronic venous stasis, immobility and lymphoedema, which increase the risk of oedema and cellulitis, and prevalence of heart failure with lymphoedema
  - prevalence of community-associated methicillin-resistant *Staphylococcus aureus* (MRSA), which is high in outer regional, remote and very remote areas compared with major cities and inner regional areas of Australia[14]
  - prevalence of streptococcal infections in some Aboriginal and Torres Strait Islander communities
  - overcrowded housing
  - swimming facilities (type, cleanliness and frequency of use); use of swimming pools may reduce skin infections[15]
  - occupational risk factors for skin injury
  - density of populations with a high risk of cellulitis, such as residents of aged care homes[16]
  - temperature and humidity, and associated effects (for example, open footwear, tinea).
- Health system factors
  - delayed or inadequate access to appropriate health care; poor health literacy may contribute to delays in seeking health care, resulting in increased need for hospitalisation
  - access to dermatologists for managing serious skin conditions and preventing progression to cellulitis
  - access to culturally appropriate health care for Aboriginal and Torres Strait Islander people
  - implementation of hospital avoidance schemes
  - availability of integrated care that connects patients with social services and programs
  - use of emergency department short-stay units, where a patient stay is coded as a hospitalisation rather than an emergency department–only visit.

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

Impact of MRSA

The prevalence of community-associated MRSA is higher in outer regional, remote and very remote areas than in major cities and inner regional areas of Australia.[14] In 2017, 41% of *S. aureus* infections in remote areas were methicillin resistant, compared with 20% in major cities of Australia.[14] Prevalence of MRSA increased in Australia overall between 2015 and 2017, but to a larger extent in remote and very remote areas than in major cities.[14] Higher prevalence of MRSA is likely to contribute to higher rates of hospitalisation for cellulitis for several reasons:

- Ineffectiveness of antibiotics used for empirical treatment can result in progression of the infection
- MRSA infections require surgical drainage, which is more likely to require hospital care
- Higher prevalence of MRSA may cause an increase in rates of skin abscesses, furuncles and boils, which can progress to cellulitis.

In addition, longer waiting times for the results of microbiological investigations in remote areas lead to longer periods before a change in antibiotic if there is a mismatch in susceptibility, and greater opportunity for progression of infection.

Addressing variation

The rates of hospitalisation for cellulitis reported in this chapter are unacceptably high, and more must be done to prevent these severe infections. The 9% increase in cellulitis hospitalisations overall, and the 18% increase among Aboriginal and Torres Strait Islander people, between 2014–15 and 2017–18 underscore this need. Suitable strategies to reduce potentially preventable hospitalisations for cellulitis will depend on the specific underlying causes in local areas and their accurate diagnosis.

Improving diagnostic accuracy

Several other conditions can be mistaken for cellulitis, due to its non-specific features. Reported rates of misdiagnosis range from 30% to 74% in US hospitals.[11,12] In one US study where 30% of cellulitis diagnoses were later found to be incorrect, 85% of the misdiagnosed patients were unnecessarily hospitalised, and 92% received unnecessary antibiotics as a result of the misdiagnosis.[13]

Early consultation with an infectious diseases specialist or a dermatologist can improve outcomes for patients with a presumed diagnosis of cellulitis, and so reduce antibiotic use.[11] In a US trial, patients who were assessed by a dermatologist within 24 hours of admission had significantly better clinical improvement after two weeks, and had significantly lower duration of antibiotic treatment, than patients treated by the usual medical team.[11]

Ambulatory Care

Many patients with cellulitis are treated in ambulatory settings, community health, specialist outpatient clinics, general practice and Hospital in the home. Ambulatory settings may be preferable for selected older patients, to reduce the risk of geriatric complications such as delirium.[17]

Cellulitis

Managing predisposing conditions and recurrent cellulitis

More effective prevention and management of type 2 diabetes, an important risk factor for cellulitis, may contribute to reducing rates of hospitalisation for cellulitis. Access to information about self-management at an appropriate health literacy level, and in languages other than English, is fundamental to enabling consumers to prevent future episodes of cellulitis. Improved self-management of skin diseases such as eczema, and encouraging early action to prevent worsening of infections, may reduce hospitalisations for cellulitis.

Increasing availability of podiatry services that specialise in care of diabetic and ischaemic foot ulcers may help prevent infections and hospitalisations, particularly in rural and remote areas. Similarly, increasing availability of lymphoedema services and specific compression stockings may reduce rates of cellulitis in patients with chronic oedema. In a small Australian trial, leg compression therapy halved the rate of hospitalisation for cellulitis among patients with chronic oedema of the leg and recurrent cellulitis.[18]

Other factors that increase the risk of recurrent cellulitis include tinea of the feet, lymphoedema and lymphatic malformation.[9] In addition to managing these risk factors, giving patients with recurrent cellulitis a prescription for antibiotic treatment so that they can start treatment as soon as symptoms appear may prevent rapid progression of infection.[9]

Antibiotic prophylaxis is recommended for some people with frequent recurrences.[9,19] Recommended prophylaxis is phenoxymethylpenicillin 250 mg orally, twice daily for up to six months initially, followed by regular review.[9]

Individualising treatment

Using better-tolerated treatments for impetigo (also known as school sores) in primary care may encourage earlier presentation. Delays in presentation due to the pain of treatment with penicillin G injection may contribute to treatment failure in the primary healthcare setting. Previous experience of ineffective treatment with flucloxacillin or other β-lactam antibiotics for MRSA infections may also contribute to treatment failure in the primary healthcare setting.

Treatment for patients with suspected MRSA or risk factors

For patients with purulent cellulitis (or suspected *S. aureus* infection) and risk factors for MRSA infection, intravenous vancomycin is recommended.[20] In some areas, clindamycin or lincomycin is a suitable alternative, based on local community-associated MRSA susceptibility patterns.[20]

Risk factors for infection with MRSA include:

- Living in an area with a high prevalence of MRSA (for example, the Northern Territory, remote communities in northern Queensland, regions north of metropolitan Perth in Western Australia – especially the Pilbara and Kimberley)
- Previous colonisation or infection with MRSA, particularly if recent (this also applies to neonates exposed to caregivers colonised or infected with MRSA)
- Residence in an aged care home with a high prevalence of MRSA, particularly if the patient has had several courses of antibiotics
- Frequent stays, or a current prolonged stay, in a hospital with high MRSA prevalence, particularly if the patient has had antibiotic treatment or recent surgery.[20]

Promoting skin health among Aboriginal and Torres Strait Islander people

The burden of bacterial skin infections and parasitic skin infestations among Aboriginal and Torres Strait Islander people is highest in remote communities.[21] These conditions can lead to impetigo and cellulitis.[21] The risk of skin infections is reduced by adequate housing conditions, including adequate space for the number of people living in the house.[22]

The Housing for Health Program involves repairs and maintenance of housing items required for healthy living practices. The program has significantly reduced the rate of hospitalisations for skin infections, and led to other benefits for people living in Aboriginal community housing (see 'Case study: Housing for health' on this page).[23]

Children in remote Aboriginal and Torres Strait Islander communities in northern Australian have the highest rates of impetigo in the world.[24] Prevention programs for skin infections can increase protective factors against cellulitis in these settings.[25,26] Public swimming pools have also been associated with a lower prevalence and severity of skin sores in remote Aboriginal and Torres Strait Islander communities, and may decrease the burden of infections and staphylococcal diseases in particular.[15,27]

In areas with very high rates of skin infections in children, such as the Kimberley and Pilbara, skin infections may become normalised, meaning that clinicians may not offer treatment unless asked, and patients may not seek treatment.[3] However, in settings with a high burden of skin infections, individual treatment without community-level interventions is likely to be ineffective, partly because of extensive community-level transmission of impetigo.[2] Addressing the normalisation of skin infections and the social determinants of skin health is key to increasing protective factors against skin infections among Aboriginal and Torres Strait Islander children.[2,3]

Strengthening the capacity of the Aboriginal Community Controlled Health Service sector and improving the cultural safety of mainstream services are important for improving access to care for Aboriginal and Torres Strait Islander people. Strengthening the Aboriginal and Torres Strait Islander health workforce is also fundamental to improving access to culturally safe health care.

Case study: Housing for health

The risk of skin infections is increased by poor housing conditions, including inadequate facilities for healthy living practices.[22] The Housing for Health Program involves repairs and maintenance of housing items required for healthy living practices. The program has significantly reduced the rate of hospitalisations for skin infections, and led to other benefits for people living in Aboriginal community housing.[23]

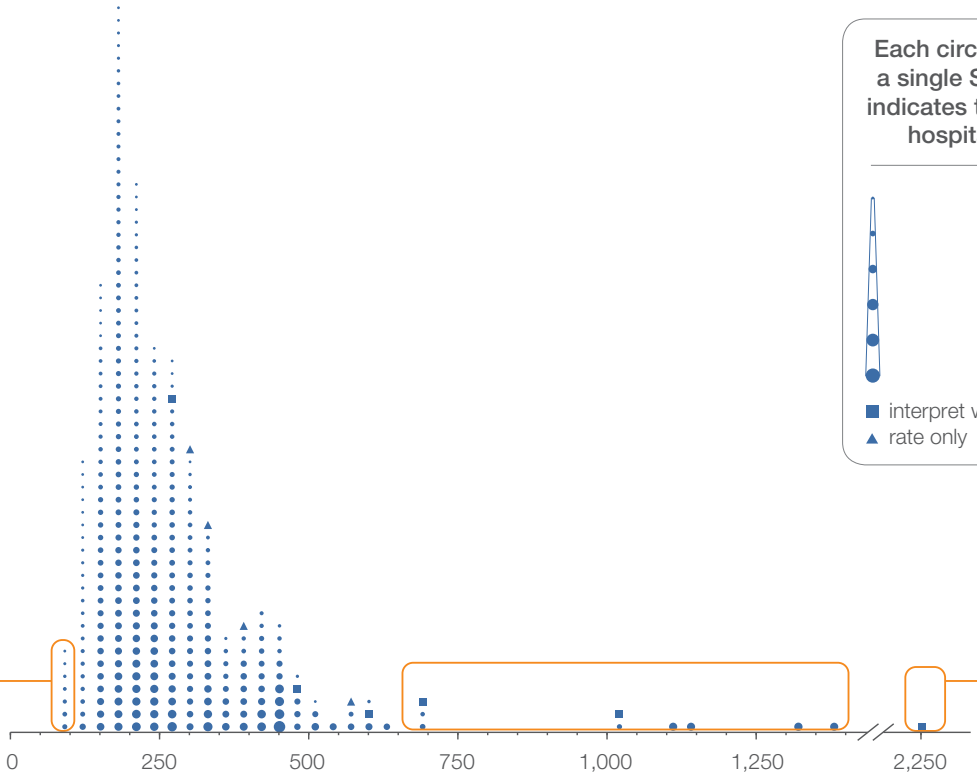
Over the 10-year evaluation period, repairs were made to 2,230 houses in 71 communities around New South Wales. Repairs included fixing hot water systems, showers, washing machines, toilets and insect screens. Repairs to improve safety, temperature control, and the ability to store and prepare food were also carried out. The proportion of houses with adequate facilities for residents to wash themselves, their clothes and their bedding doubled after the intervention.

The rate of hospitalisations for skin infections was 19% lower in the intervention group than in the non-intervention group. Hospitalisations were also reduced by 42% for respiratory conditions and by 43% for intestinal infections. The program had broader benefits in building goodwill through timely repairs (either the same day or the day after houses were surveyed), and employing local Aboriginal and Torres Strait Islander tradespeople to carry out repairs, where possible.[23]

Cellulitis

Rates by local area

Figure 2.35: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



Lowest rate areas

SA3	State	Rate	Hospitalisations
Burnside	SA	**90**	60
Southern Highlands	NSW	**96**	77
Stonnington - East	Vic	**105**	53
Cronulla - Miranda - Caringbah	NSW	**110**	168
Cottesloe - Claremont	WA	**111**	96
Sutherland - Menai - Heathcote	NSW	**113**	148
Launceston	Tas	**118**	116

Highest rate areas

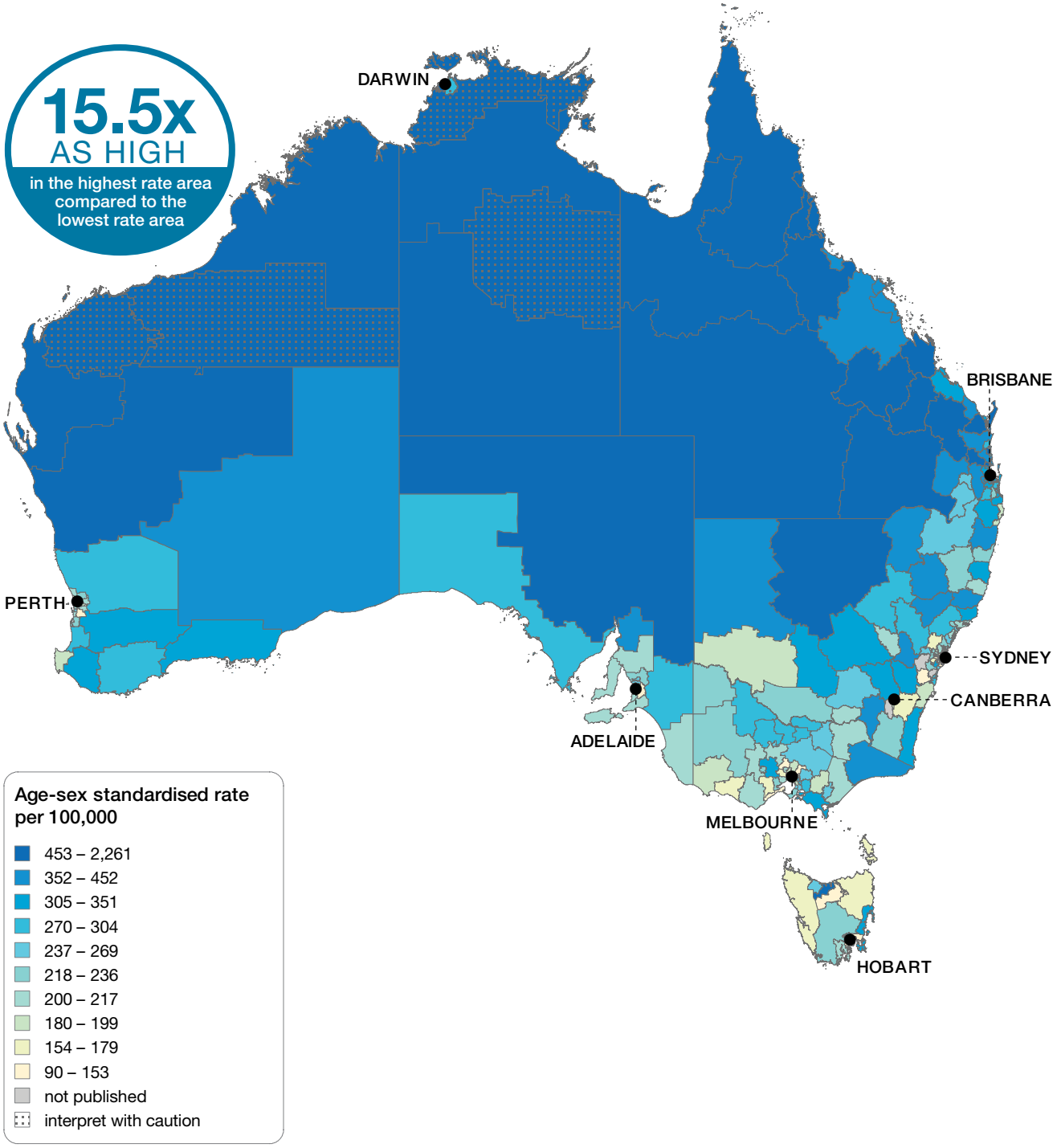
SA3	State	Rate	Hospitalisations
Barkly	NT	**2,261***	130
Far North	Qld	**1,393**	431
Kimberley	WA	**1,339**	449
Innisfail - Cassowary Coast	Qld	**1,146**	431
Alice Springs	NT	**1,123**	437
Katherine	NT	**1,028**	177
East Arnhem	NT	**1,025***	125
Outback - South	Qld	**717**	136
East Pilbara	WA	**703***	134
Outback - North	Qld	**691**	209

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

Cellulitis

Rates across Australia

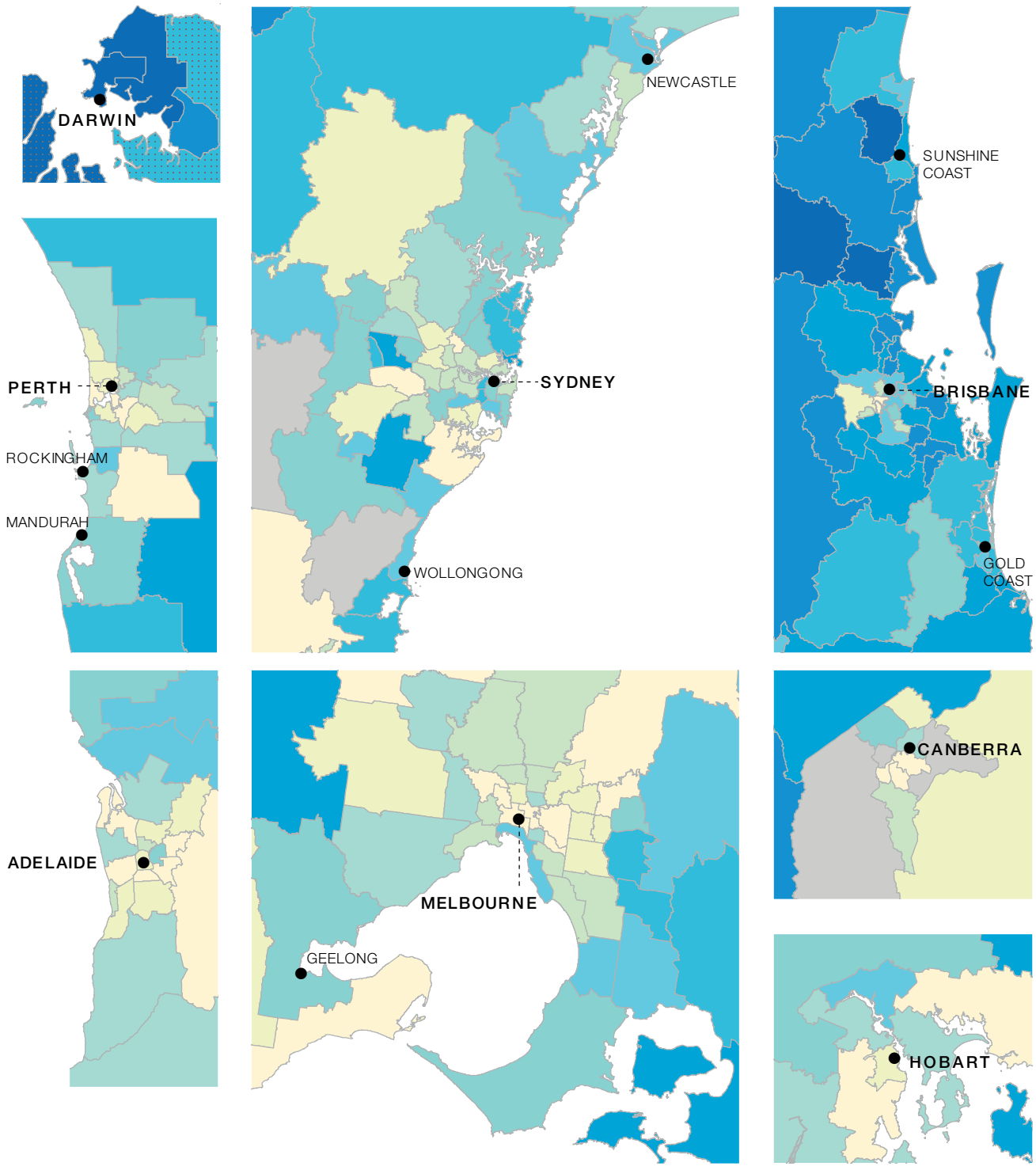
Figure 2.36: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



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

Rates across capital city areas

Figure 2.37: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



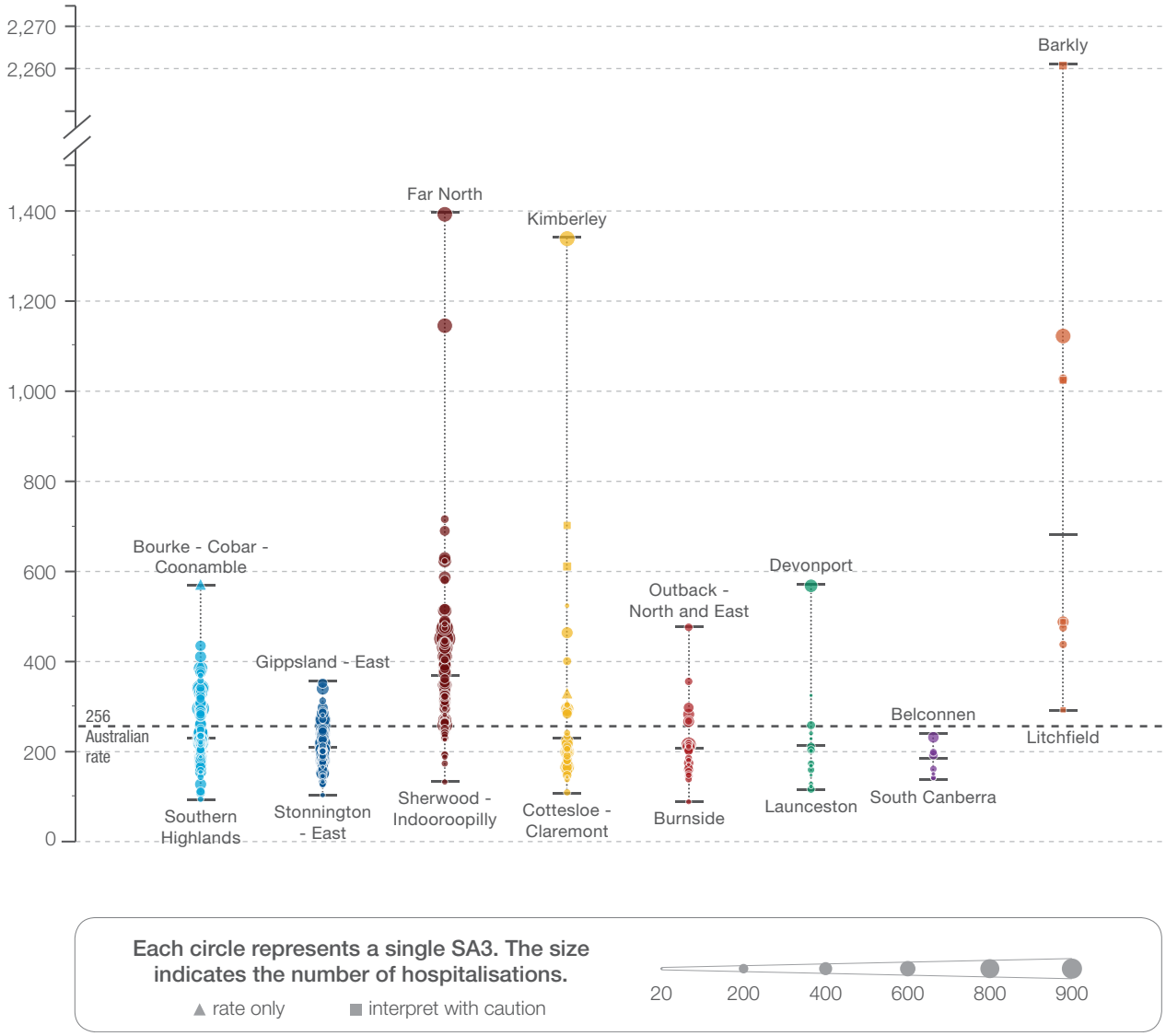
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Population estimates as at 31 December 2017 are calculated as the average of the 30 June populations in 2017 and 2018.
For further detail about the methods used, please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

Cellulitis

Rates by state and territory

Figure 2.38: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18

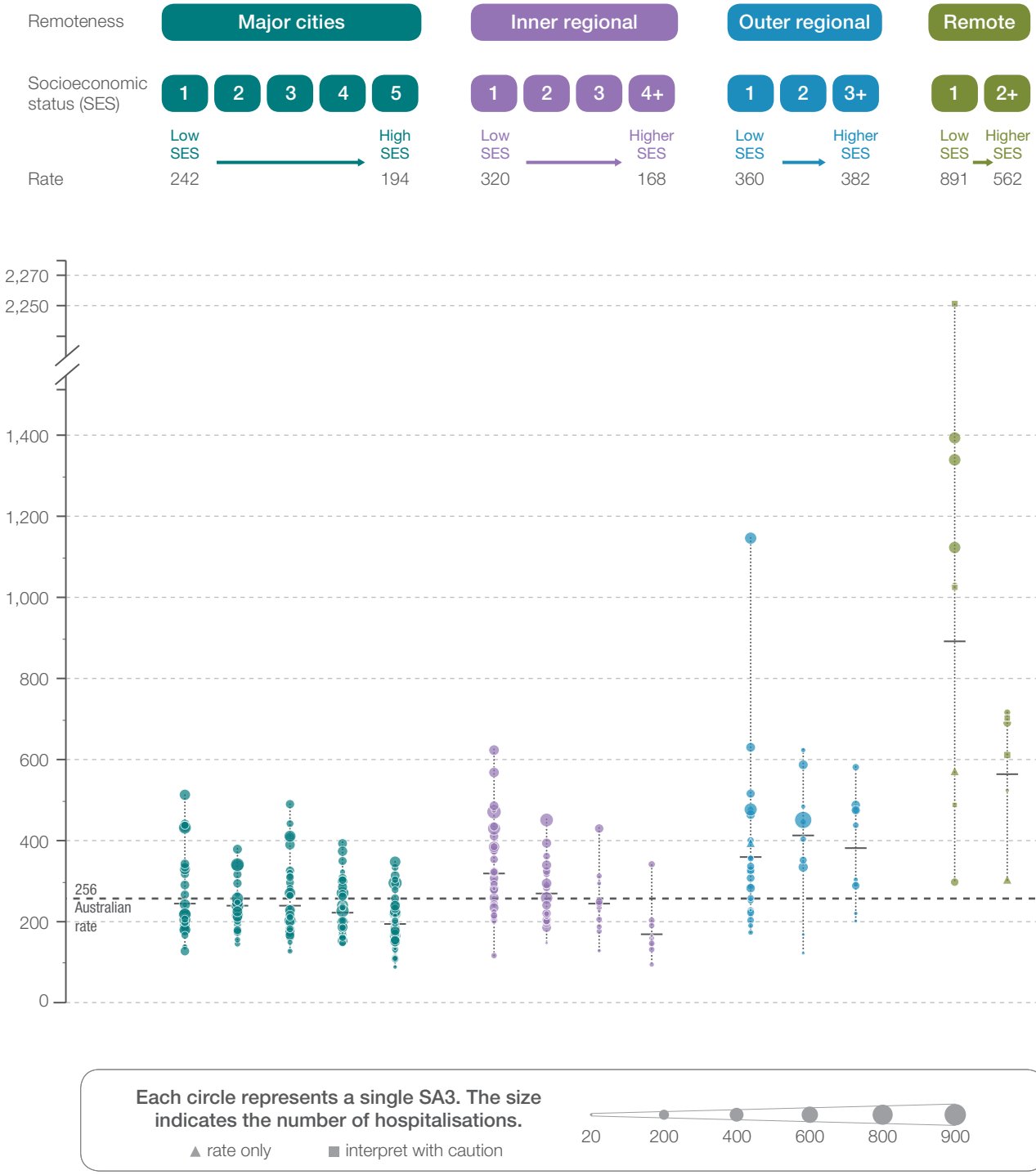
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	572	353	1,393	1,339	477	569	233	2,261*
State/territory	231	205	368	231	205	215	185	679
Lowest rate	96	105	134	111	90	118	143	294*
No. hospitalisations	20,407	14,148	19,307	6,221	4,204	1,328	770	1,570



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

Rates by remoteness and socioeconomic status

Figure 2.39: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2017–18



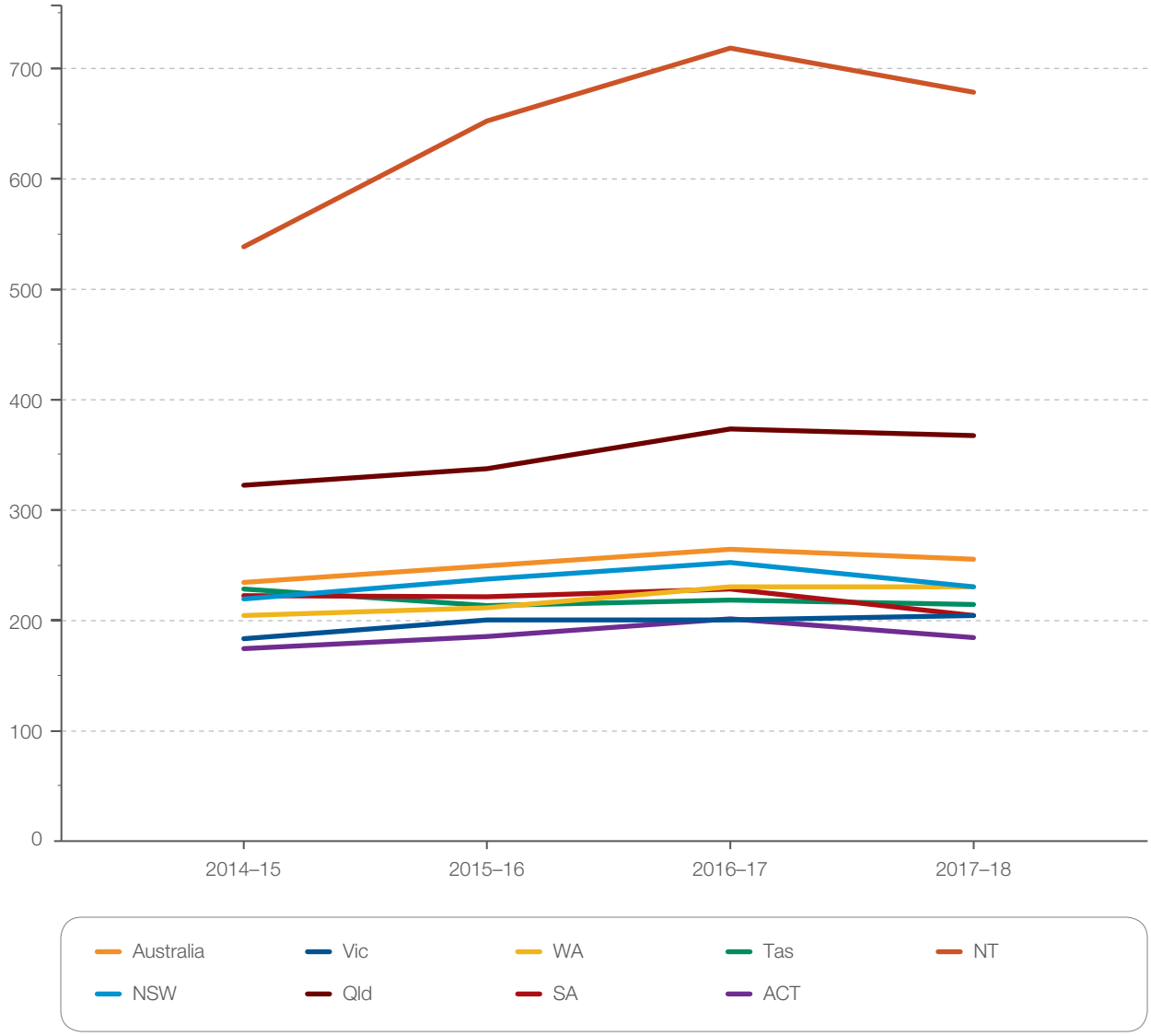
Notes:
Squares (■) and asterisks (*) indicate rates that are more volatile than other rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of hospitalisations are not published for confidentiality reasons.
Population estimates as at 31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

Cellulitis

Rates across years

Figure 2.40: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by state and territory of patient residence, 2014–15 to 2017–18

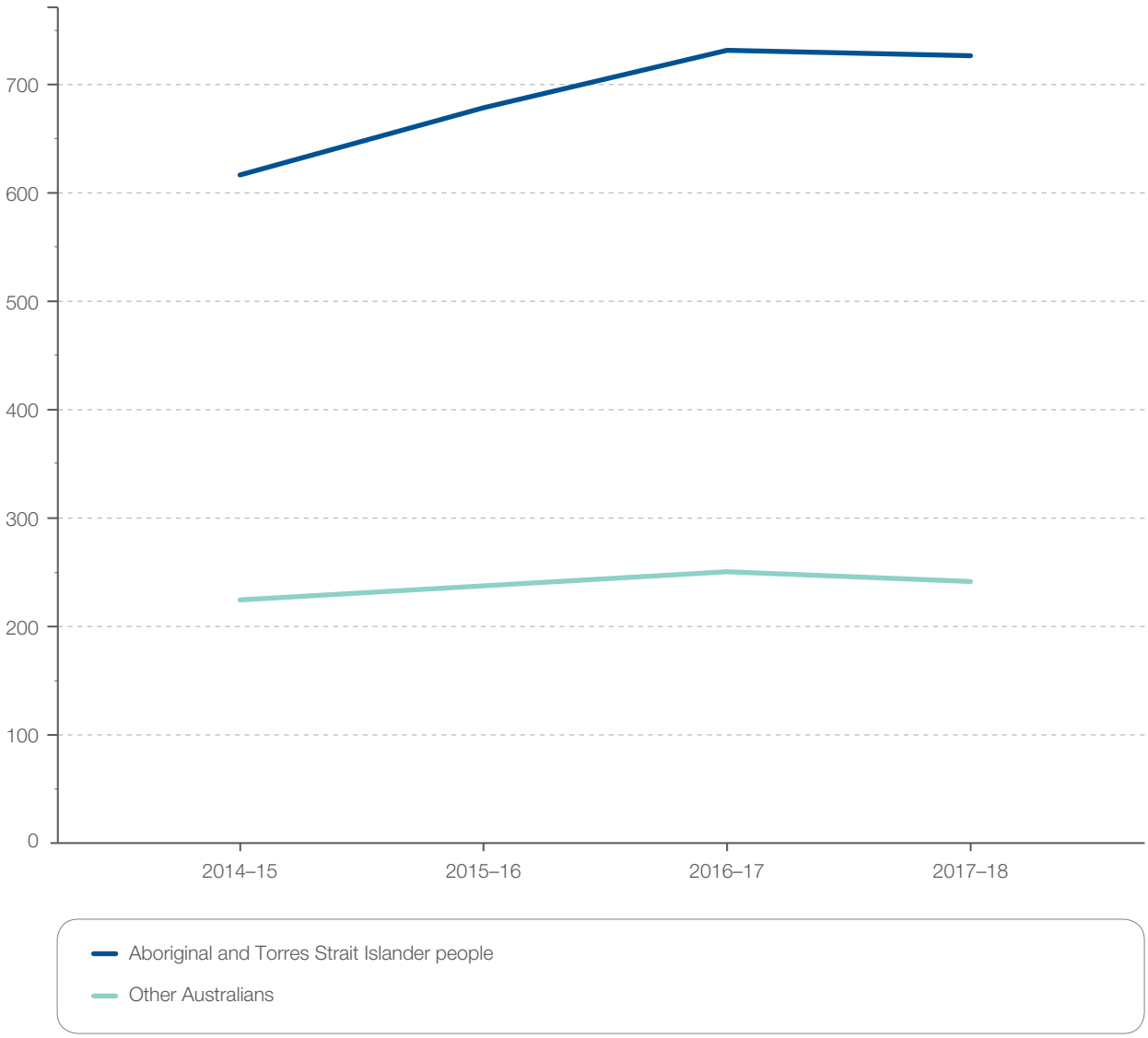
	2014–15	2015–16	2016–17	2017–18
Highest SA3 rate	2,620*	3,238*	1,543	2,261*
Australian rate	**235**	**250**	**265**	**256**
Lowest SA3 rate	99	92	82	90
Magnitude of variation	13.3	13.9	18.8	15.5
Magnitude of variation without top & bottom 10% SA3	2.9	2.8	3.0	2.9



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

Rates for Aboriginal and Torres Strait Islander people across years

Figure 2.41: Number of potentially preventable hospitalisations – cellulitis per 100,000 people of all ages, age and sex standardised, by Aboriginal and Torres Strait Islander status, 2014–15 to 2017–18



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

Cellulitis

Resources

- Cellulitis and erysipelas (Antibiotic Guidelines, in eTG complete)[9]
- Cellulitis and other bacterial skin infections, clinical practice guidelines, Royal Children's Hospital Melbourne, rch.org.au/clinicalguide/guideline_index/cellulitis_and_skin_infections
- *Healthy Skin Program: Guidelines for community control of scabies, skin sores, tinea and crusted scabies in the Northern Territory*. Darwin: Northern Territory Department of Health; 2015
- *Housing Strategies that Improve Indigenous Health Outcomes*[28]
- *CARPA Standard Treatment Manual*, 7th ed. Alice Springs: Remote Primary Health Care Manuals; 2017
- *National Healthy Skin Guideline: For the prevention, treatment and public health control of impetigo, scabies, crusted scabies and tinea for Indigenous populations and communities in Australia*[21]
- Penicillin to prevent recurrent leg cellulitis[19]
- Top 10 myths regarding the diagnosis and treatment of cellulitis[29]
- Community packages to support independence at home, available in some states and territories
- *Cellulitis* (patient fact sheet)[30]

Australian initiatives

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

- National Partnership Agreement on Remote Indigenous Housing, Council of Australian Governments
- HotNorth collaborative skin health projects, hotnorth.org.au/projects

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

- Housing for Health in the Aboriginal community, New South Wales
- Integrated Care initiatives, New South Wales
- *Cellulitis* patient fact sheet, Victoria[30]
- Delivering Connected Care for Complex Patients with Multiple Chronic Needs, Tasmania
- Aboriginal Environmental Health Program, Western Australia.

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