3.2 Neck ultrasound and thyroidectomy

Why is this important?

Neck ultrasound can be used to investigate suspected disease of the thyroid gland, including the examination of thyroid nodules (or lumps) for possible cancer. Nodules found to be malignant are usually treated with thyroidectomy (removal of the thyroid) with a combination of other treatments, depending on the characteristics of the cancer.[1] Some small thyroid cancers (thyroid papillary microcarcinomas) have a very low risk of harm if left untreated.[1] The benefit to patients of detecting and managing these is unclear.[2]

Australia and other developed countries have seen a substantial rise in thyroid cancer incidence in the past three decades.[3-5] In some developed countries, the incidence rise has been clearly driven by increased use of ultrasound and investigation of small low-risk thyroid cancers, which has led to a rise in thyroidectomy.[4] While detection of more small, low-risk thyroid cancers does not fully explain the rising incidence of thyroid cancer in Australia[6], experiences from other countries highlight the importance of ensuring appropriate use of ultrasound for investigating the thyroid, and thyroidectomy.[4,5]

Mapping use of ultrasound for thyroid cancer is not currently possible in Australia because of limitations with the national data sources. For example, the Medicare Benefits Schedule (MBS) dataset does not have a specific item for ultrasound for thyroid investigation. As a first step, the Atlas maps rates of neck ultrasound and thyroidectomy to identify potential unwarranted variation and to highlight opportunities for improving data collection on thyroid cancer investigations and treatments.

What did we find?

The Atlas found the rate of neck ultrasound varies up to six-fold and the rate of thyroidectomy varies up to five-fold between local areas across Australia. Underlying patterns of disease are unlikely to fully explain the size of the variations seen.

Neck ultrasound and thyroidectomy

What can be done?

Strategies to improve the use of thyroid investigations include:

- Ensuring that ultrasounds for investigation of the thyroid are requested only when a patient has clinically detected, visible or palpable thyroid nodules or goitre (enlarged thyroid gland), is otherwise known to be at risk of thyroid cancer (such as a strong family history or radiation exposure), or requires active surveillance of a known thyroid cancer, could reduce unnecessary imaging[1,7]
- Having MBS items that require the reason for neck ultrasound to be specified, including differentiation between initial investigation of thyroid abnormalities and follow-up for active surveillance would provide better information on the appropriateness of ultrasound use
- Improving information on general practitioner (GP) referrals for thyroid ultrasound, such as specifying the reason for the imaging, could help improve the benefit gained from the ultrasound
- Implementing an agreed nationally consistent approach to providing high-quality thyroid ultrasound reports, such as using the ATA (American Thyroid Association) guidelines or the TI-RADS (Thyroid Imaging Reporting and Data System) score, could help reduce unnecessary repeat ultrasounds[1]
- Giving patients clear information that allows them to make informed choices about their management options, including active surveillance by specialists as an option for some low-risk thyroid cancers[8,9]
- Ensuring that thyroid cancer is included in datasets such as the New South Wales Cancer Institute Reporting for Better Cancer Outcomes Program[10], could help reduce unwarranted variation and improve quality of care; establishment of the Australian and New Zealand Thyroid Cancer Registry also aims to help surgeons follow best practice for patients having thyroid surgery.[11]

Context

This section includes data on neck ultrasound and thyroidectomy. These procedures are both central to the diagnosis and treatment of thyroid cancer, but are also used to investigate and treat other conditions.

Australia and other developed countries have seen a substantial rise in thyroid cancer incidence in the past three decades, but with little change in mortality.[3-5] In 2018, an estimated 3,300 people will be diagnosed with thyroid cancer in Australia. Thyroid cancer occurs three times more often in women than in men and is the seventh most common cancer affecting Australian women.[3] Aboriginal and Torres Strait Islander Australians have a similar incidence of diagnosis of thyroid cancer as other Australians but are 3.1 times as likely to die from it.[12]

There are different types of thyroid cancer: papillary, follicular, medullary and anaplastic. The papillary subtype is the most commonly diagnosed, accounting for 75% of thyroid cancers in women and 65% of thyroid cancers in men.[6] The increase in thyroid cancer diagnoses in other countries has been mainly attributed to increased detection of small papillary thyroid cancers.[4,5]

Neck ultrasound

Neck ultrasound includes ultrasound of the thyroid gland, which is indicated for assessment of palpable goitre and thyroid nodules. Results of thyroid ultrasound are used by clinicians to determine the need for fine needle aspiration biopsy of nodules (FNAB). FNAB involves collecting a small sample of tissue for cytology (cell) testing, guided by a further thyroid ultrasound. FNAB is used for diagnostic assessment and to exclude malignancy for nodules ≥1 cm in size.[1,7]

MBS data do not differentiate between neck ultrasound for thyroid examination and neck ultrasound for other investigations. The proportion of neck ultrasound performed for thyroid examinations compared with that for other indications is not clear, but thyroid examination appears to account for the majority.[13] Neck ultrasound is also used to investigate cervical lymphadenopathy (enlargement of cervical lymph nodes) and to assess other structures in the neck, such as the salivary glands and carotid arteries. Carotid duplex imaging has separate MBS item numbers and is not included in this data item.

Guidelines recommend that everyone being investigated for possible thyroid cancer, such as people with throat symptoms, lumps or swelling in the neck, has a neck ultrasound.[1] Neck ultrasound is also recommended for active surveillance of small, low-risk thyroid cancers and to monitor disease status after thyroidectomy.[1] Neck ultrasound is not recommended for screening asymptomatic people for thyroid cancer unless the person is otherwise known to be at risk of thyroid cancer (such as having a strong family history or radiation exposure). Neck ultrasound is also not recommended for routine investigation of people with abnormal thyroid function tests if there is no palpable abnormality of the thyroid gland, or for routine follow-up of nodules that are benign.[14-16]

The crude rate of neck ultrasound in Australia quadrupled between 1997 and 2017.[17] International comparisons of neck ultrasound rates are not available.

Thyroidectomy

Thyroidectomy involves full or partial removal of the thyroid gland. It is used to treat thyroid cancer, suspicious nodules and uncontrollable overactive thyroid gland such as in Graves' disease.[18]

Thyroidectomy carries a 2–6% risk of permanent hypoparathyroidism (dysfunction of the parathyroid glands, resulting in low blood calcium levels) and a 1–2% risk of laryngeal nerve injury (resulting in a hoarse or weak voice).[19] Most patients require lifelong thyroid hormone replacement therapy after thyroidectomy.[4]

Guidelines recommend total thyroidectomy for patients with large thyroid cancer tumours, or tumours of any size with additional risk factors.[14] Surgery for thyroid papillary microcarcinomas (cancers 10 millimetres or less in size) is a controversial issue because the risks for some individuals may outweigh the benefits.[14]

A study of New South Wales data showed that both thyroidectomy rates and thyroid cancer incidence doubled between 2003 and 2012, with no change in mortality.[20] The estimated thyroidectomy rate for 2012 in this study was 18.8 per 100,000 women and 6.0 per 100,000 men. Few international comparisons of thyroidectomy rates are available. In 2012, the age-standardised rate of thyroidectomy in Switzerland was 11.6 per 100,000 women and 4.0 per 100,000 men.[21]

Radioiodine (I-131) therapy (nuclear medicine) is also used in the postoperative treatment of thyroid cancer.[14] Ultrasound and nuclear medicine can be used to assess post-surgery thyroid cancer patients. Radioiodine has a whole-body surveillance role in patients after their initial therapy.[14]

Thyroid cancer management in Australia

Most patients diagnosed with thyroid cancer have a very good prognosis. The five-year survival rate for thyroid cancer in Australia is 97%[3] and 92% for Aboriginal and Torres Strait Islander Australians.[12] While neck ultrasound is an important investigation for detecting thyroid cancer, there is increased awareness that the harm associated with detection of small, low-risk cancers, such as the psychological burden of a cancer diagnosis and the side effects of some treatments, may outweigh the risk these cancers pose.[7]

Neck ultrasound and thyroidectomy

The introduction of neck ultrasonography in the late 1980s allowed the detection of thyroid nodules only a few millimetres in size, and large increases in diagnoses of thyroid cancer were subsequently seen in many high-income countries.[2,22] For example, a study in the United States reported a two-fold increase between 2000 and 2012, and the most extreme example was a 15-fold increase in South Korea between 1993 and 2011.[4,23] Despite these increases in diagnoses, mortality rates did not change substantially in either country.[4,5]

Similarly, the rate of thyroid cancer diagnoses in Australia increased between 1997 and 2017: 2.6-fold in women (from 7.0 to 18.0 per 100,000) and 2.5-fold in men (from 2.6 to 6.6 per 100,000).[24] The mortality rate over this period stayed at 0.4 per 100,000 in men, and rose from 0.4 to 0.5 per 100,000 in women.[24]

One reason for an increased incidence of cancer without an accompanying increase in mortality may be the greater detection of thyroid papillary microcarcinomas – cancers not likely to cause symptoms or death in a patient's lifetime.[4,19,25] Epidemiological modelling estimated that detection of these cancers was responsible for an estimated 10,301 extra cases of thyroid cancer in women, and 2,148 in men, between 1988 and 2007 in Australia.[22]

Greater detection of low-risk papillary cancers appears to explain most of the rise in thyroid cancer in Australia, but there is evidence that a true increase in disease has also contributed. Analysis of Queensland thyroid cancer data from 1982 to 2008 showed that the greatest increase occurred in diagnosis of early-stage cancers, but a significant increase in the incidence of advanced cancers was also found.[6] In a similar study of Tasmanian data from 1988 to 1998, thyroid papillary microcarcinoma accounted for most of the rising thyroid cancer incidence, but the rate of larger papillary thyroid cancers also increased.[26] The fact that the incidence of high-grade thyroid disease has increased without an increase in mortality suggests that advanced thyroid cancer is being appropriately identified and successfully treated.

Suggested causes for the increase in thyroid cancer incidence beyond increased testing include radiation exposure in children due to medical imaging, rising rates of diabetes and obesity, and iodine deficiency and excess.[5] Radiation exposure due to computed tomography (CT) scans in children is likely to account for less than 1% of the increased incidence of thyroid cancer, according to an analysis from the United States.[5] The evidence is conflicting or weak at this stage for an association between thyroid cancer and diabetes or iodine intake.[5] Whether there is a causal relationship between increased prevalence of obesity and increasing thyroid cancer rates is also unclear.[27,28]

Neck ultrasound

About the data

Data are sourced from the MBS dataset.

This dataset includes information on MBS claims processed by the Australian Government Department of Human Services. It covers a wide range of services (attendances, procedures, tests) provided across primary care and hospital settings.

The dataset does not include:

- Services for publicly funded patients in hospitals
- Services for patients in hospital outpatient clinics where claims are not made to the MBS
- Services covered under Department of Veterans' Affairs arrangements.

Rates are based on the number of MBS-subsidised services for neck ultrasound per 100,000 people aged 18 years and over in 2016–17.

Because an MBS claim is included for each service rather than for each patient, patients who receive a service more than once in the financial year will have more than one MBS claim counted.

The analysis and maps are based on the residential address of the patient recorded in the MBS claim and not the location of the service.

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

Data were not analysed by Aboriginal and Torres Strait Islander status as this information was not available for the MBS data at the time of publication.

What do the data show?

Magnitude of variation

In 2016–17, there were 308,247 MBS-subsidised services for neck ultrasound, representing 1,606 services per 100,000 people aged 18 years and over (the Australian rate).

The number of MBS-subsidised services for neck ultrasound across 329* local areas (Statistical Area Level 3 – SA3), ranged from 513 to 2,893 per 100,000 people aged 18 years and over. The rate was **5.6 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of services varied across states and territories, from 983 per 100,000 people aged 18 years and over in the Northern Territory to 1,946 in New South Wales (Figures 3.17–3.20).

After the highest and lowest 10% of results were excluded and 265 SA3s remained, the number of services per 100,000 people aged 18 years and over was 2.1 times as high in the area with the highest rate compared to the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates of neck ultrasound were higher in major cities than in other areas. Rates were higher in areas with lower socioeconomic status in major cities and remote areas. However, there was no clear pattern according to socioeconomic status in other remoteness categories (Figure 3.21).

* There are 340 SA3s. For this item, data were suppressed for 11 SA3s due to one or more of a small number of services or population in an area, or potential identification of individual patients, practitioners or business entities.

Notes:

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

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

Neck ultrasound

Interpretation

Variation in rates of neck ultrasound is likely to be due to geographical differences in the factors discussed below.

Access to services

Access to ultrasound services, and medical and surgical specialists (for example, specialist endocrine surgeons, and head and neck surgeons) could explain higher rates in major cities. Rates of neck ultrasound were also markedly higher in the most populous states (New South Wales, Victoria and Queensland) than elsewhere, which may also reflect differences in access to ultrasound and specialist services.

It is likely that having greater access to medical care increases investigations for thyroid abnormalities. About 60% of patients in a New South Wales study were diagnosed with thyroid cancer in the absence of symptoms.[29] Compared with people living in rural areas, people living in metropolitan areas were more likely to be diagnosed as a result of surgery for benign thyroid disease or diagnostic imaging for another health problem, or after a thyroid lump was first noticed by a doctor.[29]

Higher rates of neck ultrasound in major cities could also reflect more intensive monitoring following thyroidectomy because it is easier for patients to access ultrasound services.[1] As well, more patients in major cities may opt for active surveillance of low-risk papillary cancers compared to patients elsewhere because of better access with specialist services. However, rates of thyroidectomy were also found to be higher in major cities and inner regional areas (see ‘Thyroidectomy’), suggesting that access to health services generally may contribute more to variation than having treatment choices.

Use of other imaging tests

Referrals arising from incidental findings of thyroid nodules following diagnostic imaging for other health problems may be a source of variation. This may include referrals from Doppler carotid artery assessment, CT scans, magnetic resonance imaging (MRI) and positron emission tomography (PET) scans.[2,29]

Clinical decision-making

Clinical decision-making about whether to actively search for thyroid nodules during physical examination may influence the rate of neck ultrasound.[28] Differences in adherence to guidelines on use of ultrasound for suspected thyroid disease are likely to account for some variation. For example, higher rates could be associated with either inappropriate use of neck ultrasound for screening or appropriate use for active surveillance of small, low-risk cancers.

Numbers of repeat ultrasounds

Differences in the quality of ultrasound reports and cytology reports are likely to affect numbers of repeat ultrasounds. Higher rates of indeterminate findings following an FNAB may also lead to higher rates of repeat ultrasound.[1]

Rates of underlying disease

Prevalence of underlying diseases, and of symptoms or history that would prompt testing for thyroid disease, could also affect rates.

Rates of neck ultrasound were higher in areas with low socioeconomic status in major cities and remote areas. This finding contrasts with research from the United States that showed a higher incidence of thyroid cancer in areas with high socioeconomic status[25], which was considered to reflect greater access to diagnostic services.[30] Reasons for the pattern in Australia are unclear.

Thyroidectomy

Funding models

The data for this item exclude services that are free of charge to public patients in hospitals, such as neck ultrasound done for public patients in public hospital outpatient clinics or emergency departments. This means that the funding models for neck ultrasound services available in an area, and the relative accessibility of services to patients, may influence the variation seen. For example, the rates of neck ultrasound seen in remote Western Australia, South Australia and the Northern Territory may be low because a higher proportion of ultrasounds in these areas is done for public patients in hospital outpatient clinics (which are not counted in this data item). In contrast, the rates in New South Wales may be high because there are many locations in New South Wales where services and investigations undertaken in public hospital outpatient clinics are claimed through the MBS under specialist medical practitioner rights of private practice.

Because MBS data do not differentiate between neck ultrasound and thyroid ultrasound, variations in rates of neck ultrasound performed for reasons other than thyroid investigation will also affect the rates reported here.

About the data

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

Rates are based on the number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, over the three-year period 2014–15 to 2016–17. Data are aggregated over three years to provide sufficient numbers to support reporting at the local level. The number of hospitalisations and the summed population over three years are used to provide an average rate. This is comparable to a rate based on data collected over one year.

Because a record is included for each hospitalisation for the procedure, rather than for each patient, patients hospitalised for the procedure more than once in the three financial years 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.

Aboriginal and Torres Strait Islander identification

The identification of Aboriginal and Torres Strait Islander patients may not be accurate for all admissions, and processes for seeking and recording identification may vary among states and territories. The data shown may under-count the number of Aboriginal and Torres Strait Islander Australians hospitalised for thyroidectomy.

Thyroidectomy

What do the data show?

Magnitude of variation

Over the three-year period 2014–15 to 2016–17, there were 35,166 hospitalisations for thyroidectomy, representing an average rate of 62 hospitalisations per 100,000 people aged 18 years and over (the Australian rate).

The number of hospitalisations for thyroidectomy across 327† local areas (Statistical Area Level 3 – SA3), ranged from 28 to 130 per 100,000 people aged 18 years and over. The rate was **4.6 times as high** in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 42 per 100,000 people aged 18 years and over in the Australian Capital Territory to 68 in New South Wales (Figures 3.22–3.25).

After the highest and lowest 10% of results were excluded and 266 SA3s remained, the number of hospitalisations per 100,000 people aged 18 years and over was 2.0 times as high in the area with the highest rate compared to the area with the lowest rate.

Analysis by remoteness and socioeconomic status

Rates of hospitalisations for thyroidectomy were higher in major cities and inner regional areas than in outer regional and remote areas. Rates were higher in areas with lower socioeconomic status in major cities and in inner regional areas. However, there was no clear pattern according to socioeconomic status in other remoteness categories (Figure 3.26).

Analysis by Aboriginal and Torres Strait Islander status

The rate of hospitalisations for Aboriginal and Torres Strait Islander Australians (54 per 100,000 people) was 13% lower than the rate for other Australians (62 per 100,000 people) (Figure 3.14).

Figure 3.14: Number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, age and sex standardised, by Aboriginal and Torres Strait Islander status, 2014–15 to 2016–17

The data for Figure 3.14 are available at www.safetyandquality.gov.au/atlas

† There are 340 SA3s. For this item, data were suppressed for 13 SA3s due to a small number of hospitalisations and/or population in an area.

Notes:
Data by Indigenous status should be interpreted with caution as hospitalisations for Aboriginal and Torres Strait Islander patients are under-enumerated and there is variation in the under-enumeration among states and territories.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Population 30 June 2014 to 2016.

Analysis by patient funding status

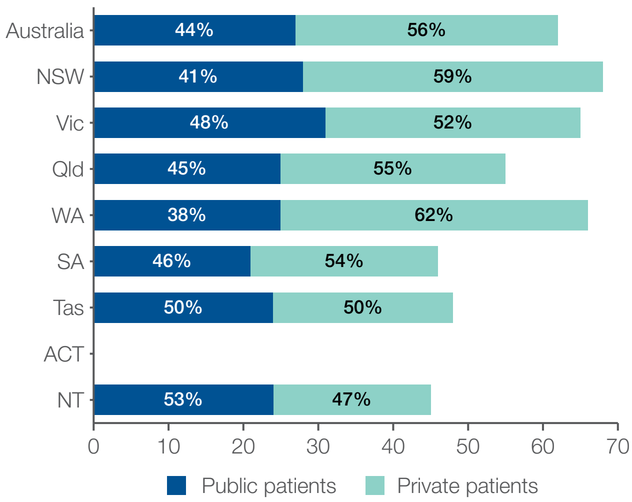
Overall, 56% of hospitalisations for thyroidectomy were for privately funded patients. This proportion varied from 47% in the Northern Territory to 62% in Western Australia (Figure 3.15).

The median age at operation was 53 years for publicly funded patients and 56 years for privately funded patients.

Analysis by principal diagnosis

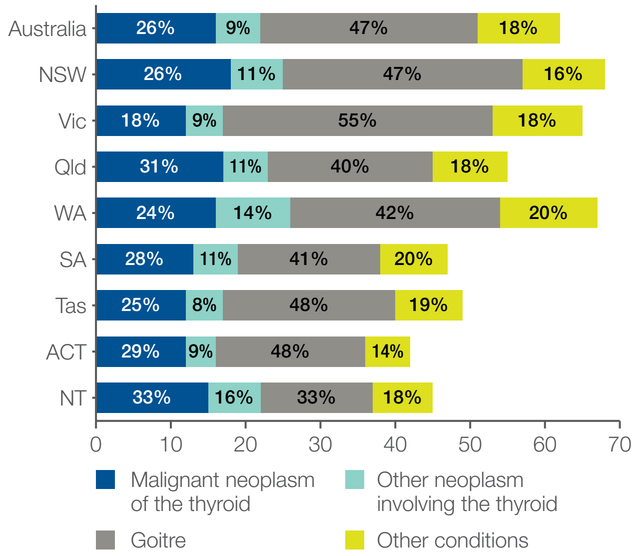
The number of hospitalisations for thyroidectomy for patients with malignant neoplasms varied across states and territories, from 12 per 100,000 people in the Australian Capital Territory, Victoria and Tasmania to 18 in New South Wales. The number of hospitalisations for thyroidectomy for patients with goitre varied from 15 per 100,000 people in the Northern Territory to 36 in Victoria (Figure 3.16).

Figure 3.15: Number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, age and sex standardised, by state and territory of patient residence, by patient funding status, 2014–15 to 2016–17



The data for Figures 3.15 and 3.16 are available at www.safetyandquality.gov.au/atlas

Figure 3.16: Number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, age and sex standardised, by state and territory of patient residence, by principal diagnosis, 2014–15 to 2016–17



Notes:
Hospitalisations for public patients do not incur a charge to the patient or a third-party payer (for example, a private health insurance fund), unlike hospitalisations for private patients.
For 2016–17, there were data quality issues related to the recording of patient funding source for patients admitted to ACT private hospitals. For this reason, 2016–17 data for ACT private hospitals are excluded from the analysis and data for the ACT are not published.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Population 30 June 2014 to 2016.

Thyroidectomy

Interpretation

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

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

Variation in rates of thyroidectomy is likely to follow on from the pattern of variation in neck ultrasound, as well as geographical differences in the factors discussed below.

Underlying disease

Goitre was the most common reason for thyroidectomy hospitalisation in Australia. The rate of thyroidectomy for goitre was higher in Victoria than elsewhere. People in Victoria's Latrobe Valley, an area of low socioeconomic status, had a markedly higher rate of thyroidectomy hospitalisations than people living in other areas of Australia. Iodine deficiency has been a problem in some areas of Victoria in the past, but this does not appear to explain the current thyroidectomy rates seen in this area. It is possible that the history of goitre from earlier generations has sensitised clinicians to look for thyroid problems in people from this area and to refer them more readily for investigations if nodules are detected. However, such a legacy effect was not seen in Tasmania. Despite a high degree of community awareness of thyroid disease and the history of goitre in Tasmania, ultrasound and thyroidectomy rates were lower in this state than Australian averages.

Clinical decision-making

Clinical decision-making on whether to perform thyroidectomy for low-risk thyroid papillary microcarcinomas may influence local rates. There are differences of opinion about progression to surgery for these cancers. Some guidelines recommend that active surveillance be considered rather than immediate surgery for these low-risk cancers.[1] Decisions to stage total thyroidectomy may also affect rates. Two-stage operations for the one individual would result in two hospitalisations for thyroidectomy.

Access to services

Under-diagnosis of thyroid disease could be a contributor to the lower rates seen for Aboriginal and Torres Strait Islander Australians compared to other Australians. Poor access to services in remote areas may also disproportionately affect thyroidectomy rates for Aboriginal and Torres Strait Islander Australians because they make up proportionally more of the population in remote areas.

Patient preference

Patient preferences about options for managing low-risk thyroid papillary microcarcinomas may differ.[31] People with better access to health care will have greater ability to opt for active surveillance, which requires regular physical examinations and ultrasounds. However, greater ability to choose treatments does not appear to explain the variation in rates seen between remoteness areas because rates of thyroidectomy were higher in major cities and inner regional areas than elsewhere.

Neck ultrasound and thyroidectomy

Promoting appropriate care

Understanding how much of the variation in rates of neck ultrasound represents unwarranted variation is difficult given current data capture of the MBS dataset. Strategies to ensure appropriate use of neck ultrasound and thyroidectomy in the management of thyroid cancer include:

- Improving adherence to guidelines for requesting thyroid ultrasounds
- Better capture of information on reasons for requesting neck ultrasound
- Standardised reporting of thyroid abnormalities observed at ultrasound
- Improved information for both clinicians and consumers on the relative benefits and harms of active surveillance versus immediate surgery for low-risk papillary cancers
- Improved monitoring and feedback to clinicians of information on investigation, management and outcomes of thyroid cancer.

Improved adherence to guidelines for ultrasound requests

Optimising GP adherence to guidelines on the assessment of thyroid disease will improve the appropriateness of referrals for neck ultrasound.[7] One such initiative is the Endocrine Society of Australia's 'Do not do' recommendation for clinicians: 'Don't routinely order a thyroid ultrasound in patients with abnormal thyroid function tests if there is no palpable abnormality of the thyroid gland'.[16] As well, better GP referrals for neck ultrasound that include the reason for the imaging will aid the quality of ultrasound reporting and, in turn, guide clinical decision-making.

Better capture of information on ultrasound requests

This Atlas has highlighted a number of limitations of current data collections for ensuring the appropriateness of thyroid investigations and management across Australia. The data showed lower rates of neck ultrasound and thyroidectomy in rural areas than in urban areas, but the significance of this on patient outcomes is unclear. Linking thyroid ultrasound use with thyroid cancer incidence and mortality data reported at a local area level would help ensure the appropriate use of thyroid ultrasound. However, this analysis is not possible currently without improvements to data capture for thyroid ultrasound.

Improving information on GP referrals for thyroid ultrasound, such as specifying the reason for the imaging, would help improve reporting and, in turn, better guide management. As well, revising MBS items to require the reason for neck ultrasound to be specified, including differentiation between initial investigation of thyroid abnormalities and follow-up for active surveillance, would vastly improve reporting and help ensure appropriate use of neck ultrasound.

Standardised reporting of thyroid abnormalities on ultrasound

Over the past decade, a number of standardised criteria for thyroid ultrasound reporting have been developed to support clinical decision-making and help determine the need for FNAB.[1] Examples include the American College of Radiology's Thyroid Imaging, Reporting and Data System (TI-RADS) and the European system, EU-TIRADs.[32] It is not yet known if use of these criteria reduces over-diagnosis and over-treatment of thyroid cancer.

Neck ultrasound and thyroidectomy

Improved information for clinicians and consumers on treatment options for low-risk papillary cancers

There is evidence that adverse effects are lower among patients who choose active surveillance over immediate surgery for low-risk thyroid papillary microcarcinomas.[33] However, Australian qualitative research found that a sample of clinicians were generally not comfortable offering active surveillance, as they did not feel that the evidence was strong enough to support this approach.[34] A sample of Australian patients diagnosed with thyroid papillary microcarcinomas were also not comfortable with the idea of active surveillance, preferring surgery in order to remove their anxiety about the cancer diagnosis.[31] Further research to identify which thyroid cancers are not likely to cause harm may increase the acceptability of active surveillance.

Patients with low-risk thyroid papillary microcarcinomas should be given clear information about all their options for management, including the option of active surveillance by a specialist (for example, having regular ultrasounds and physical examinations), so that they can choose the management approach best for them.[8,9]

Improved data for clinicians on their management and outcomes of thyroid cancer

Initiatives to provide clinicians and health services with regular data and feedback on their practice and on outcomes of investigation and management of thyroid disease would enable undesirable variations in care to be monitored. Further investigation is needed to examine the appropriateness of neck ultrasound use across Australia for thyroid cancer management. Investigating the correlation between rates of neck ultrasound and the incidence of thyroid cancer and goitre may shed light on whether rates reflect patient need.

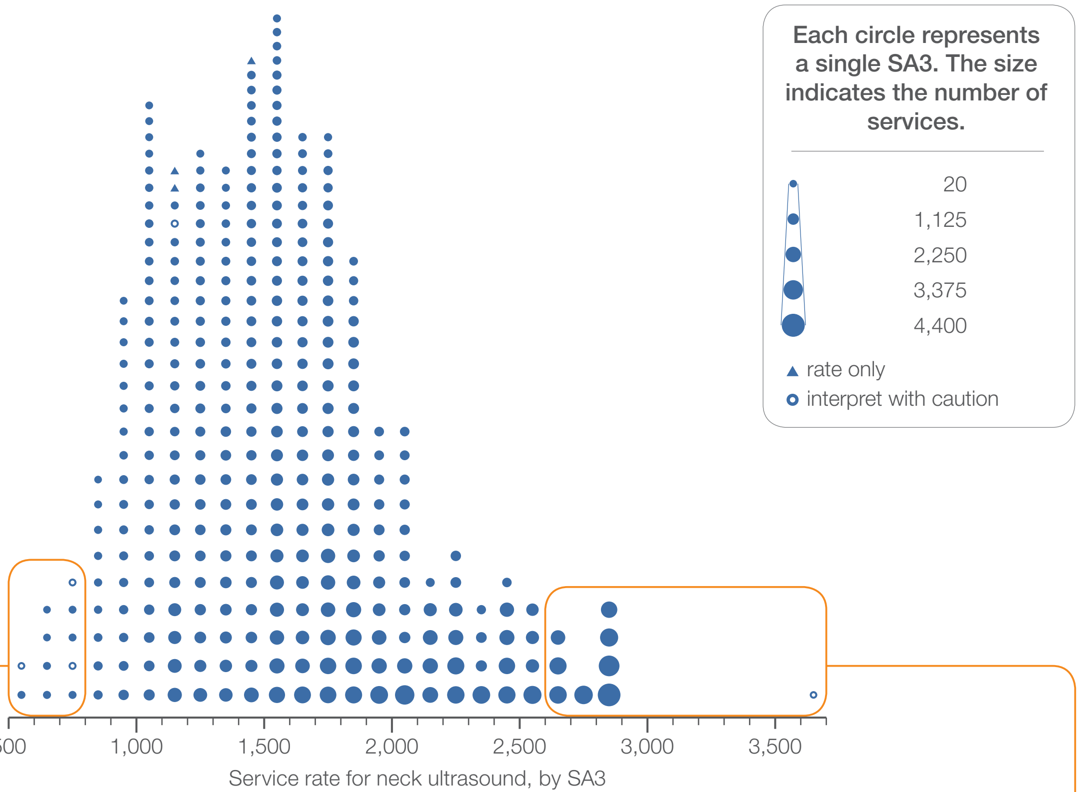
Other strategies

A change in nomenclature to better reflect the natural history and risks of these abnormalities may also be helpful. This strategy has been used overseas in an effort to reduce the impact of diagnosis of low-risk thyroid cancers. The United States Endocrine Pathology Society changed the name of a subtype of papillary thyroid cancer in 2015, to reduce its over-treatment and psychological impact.[35] The non-invasive encapsulated follicular variant of papillary thyroid cancer was renamed 'non-invasive follicular thyroid neoplasm with papillary-like nuclear features' (NIFTP).[35] Patients with NIFTP are unlikely to benefit from total thyroidectomy and radioactive iodine therapy, and can be treated less aggressively.[35] This type of thyroid tumour has increased two- to three-fold in the past 20–30 years, and accounts for 10–20% of all thyroid cancers diagnosed in North America and Europe.[35]

Neck ultrasound

Rates by local area

Figure 3.17: Number of MBS-subsidised services for neck ultrasound per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2016–17



Lowest rate areas

SA3	State	Rate	Services
Alice Springs	NT	513	143
Daly - Tiwi - West Arnhem	NT	543*	61
Esperance	WA	618	78
Outback - North and East	SA	682	139
Mid North	SA	684	166
Gascoyne	WA	687	52
Wheat Belt - South	WA	708	128
West Pilbara	WA	738*	143
Lower North	SA	740	153
East Pilbara	WA	751*	117
West Coast	Tas	798	118

Highest rate areas

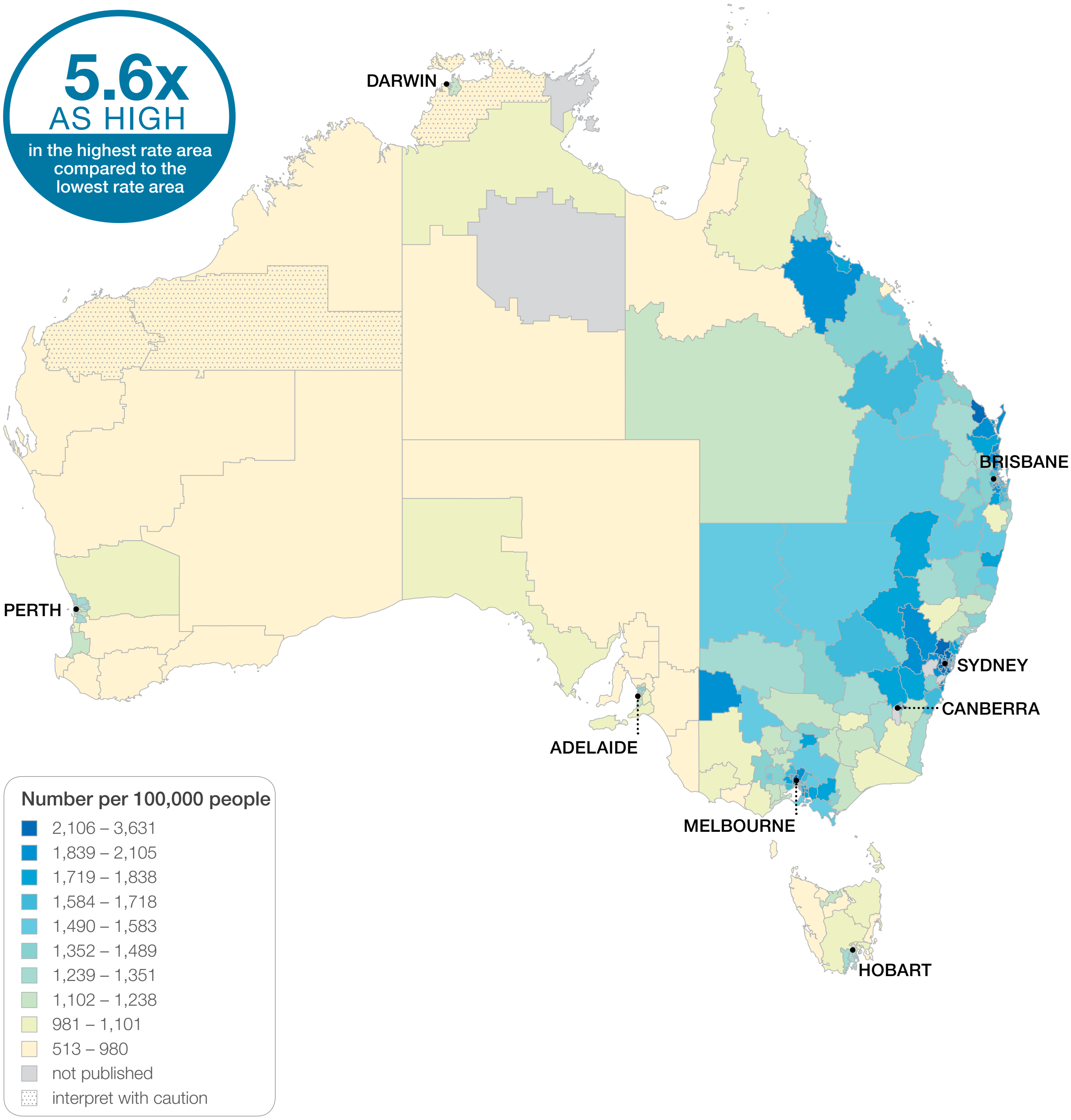
SA3	State	Rate	Services
Canberra East	ACT	3,631*	27
Fairfield	NSW	2,893	4,315
Canterbury	NSW	2,861	3,020
Liverpool	NSW	2,858	2,525
Bankstown	NSW	2,835	3,753
Merrylands - Guildford	NSW	2,765	3,127
Bringelly - Green Valley	NSW	2,685	2,001
Hurstville	NSW	2,662	2,851
Blacktown	NSW	2,637	2,745

Notes:
Hollow circles (○) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2016.

Neck ultrasound

Rates across Australia

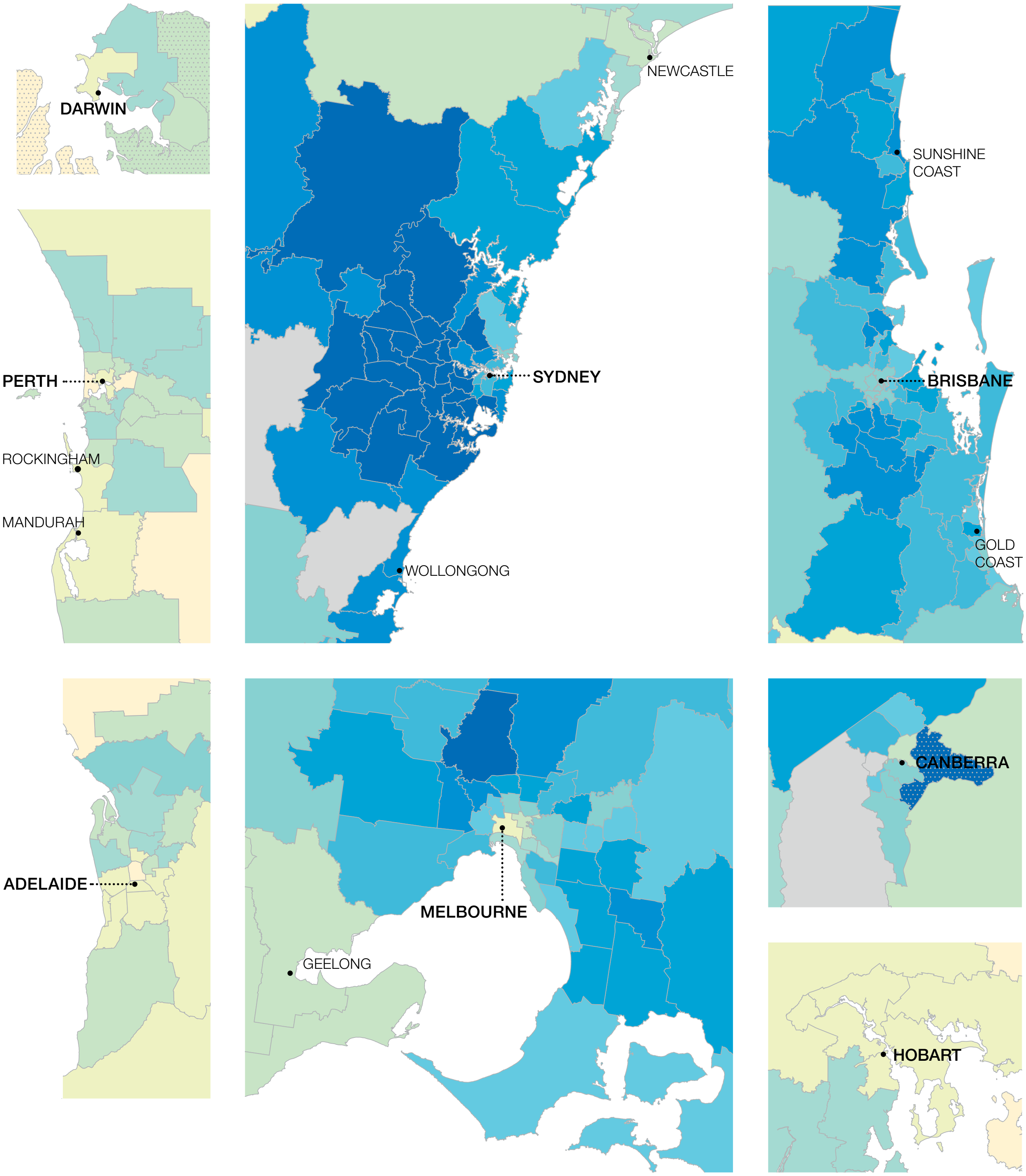
Figure 3.18: **Number of MBS-subsidised services for neck ultrasound per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2016–17**



Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution. These rates are excluded from the calculation of the difference between the highest and lowest SA3 rates in Australia.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2016.

Rates across capital city areas

Figure 3.19: Number of MBS-subsidised services for neck ultrasound per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2016–17



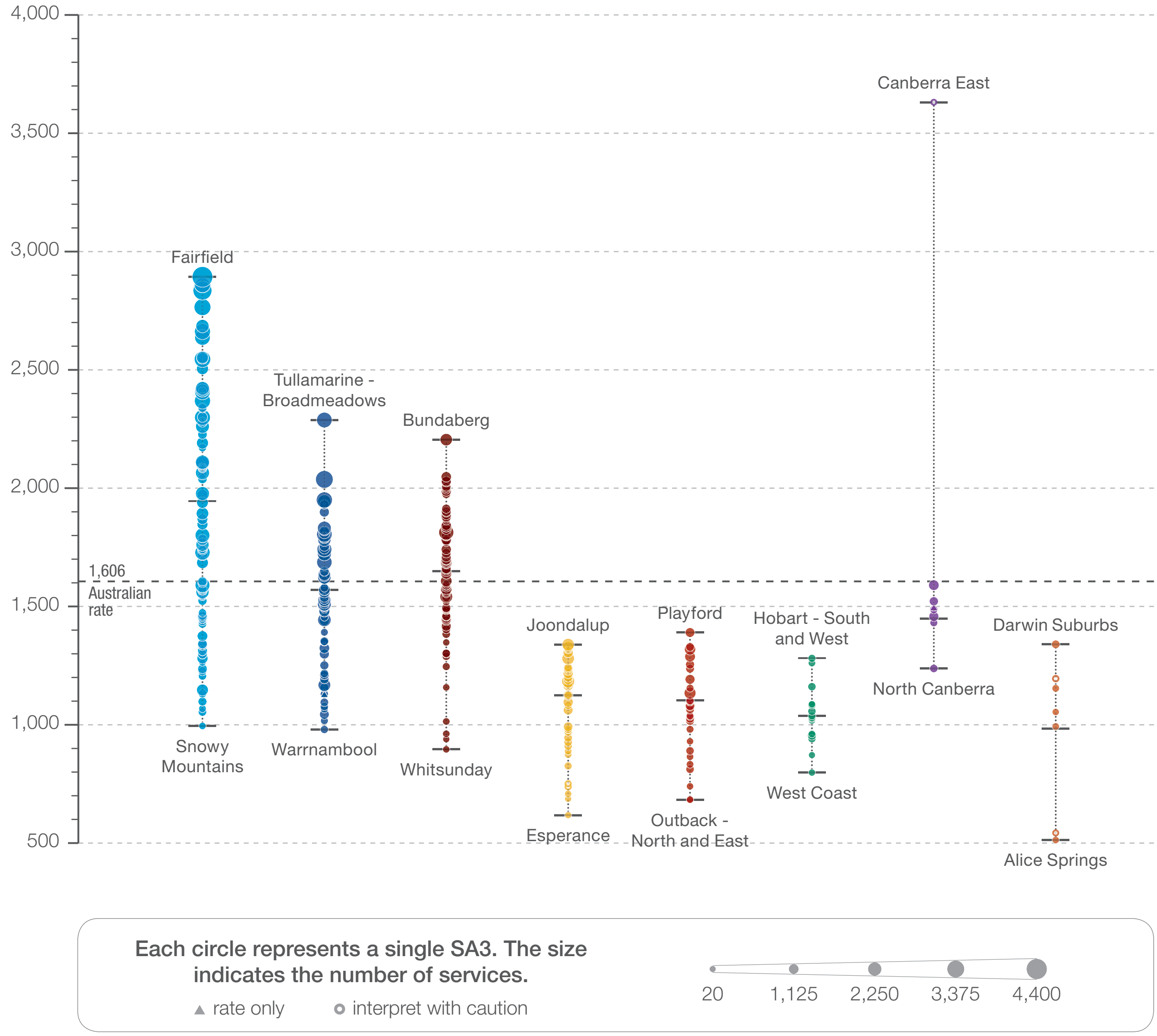
Notes:
Dotted areas indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2016.

Neck ultrasound

Rates by state and territory

Figure 3.20: Number of MBS-subsidised services for neck ultrasound per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2016–17

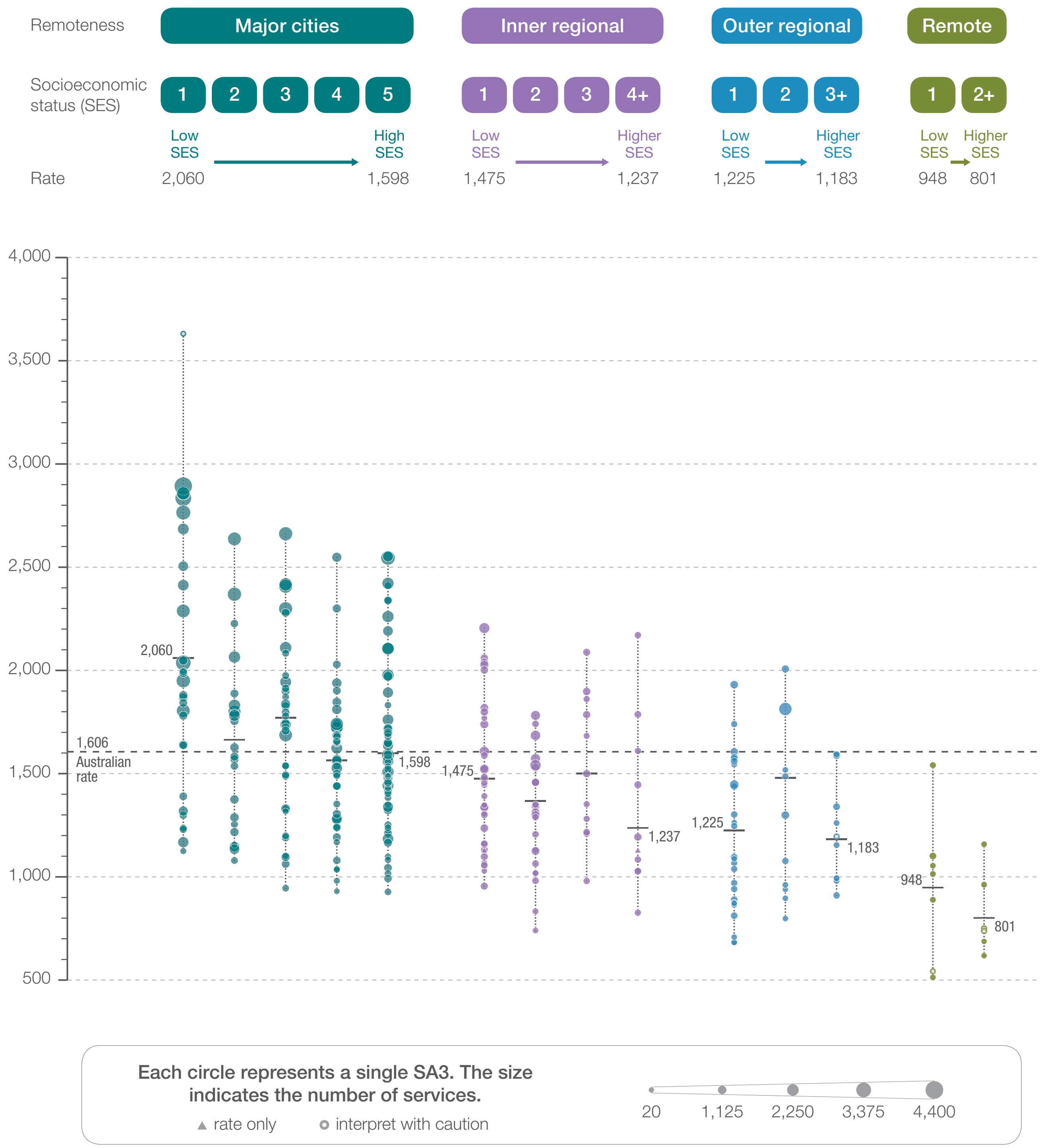
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	2,893	2,288	2,205	1,339	1,390	1,281	3,631*	1,340
State/territory	1,946	1,570	1,650	1,125	1,103	1,037	1,449	983
Lowest rate	995	980	896	618	682	798	1,238	513
No. services	120,072	76,831	63,006	22,211	15,501	4,547	4,444	1,615



Notes:
Hollow circles (○) and asterisks (*) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2016.

Rates by remoteness and socioeconomic status

Figure 3.21: Number of MBS-subsidised services for neck ultrasound per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2016–17



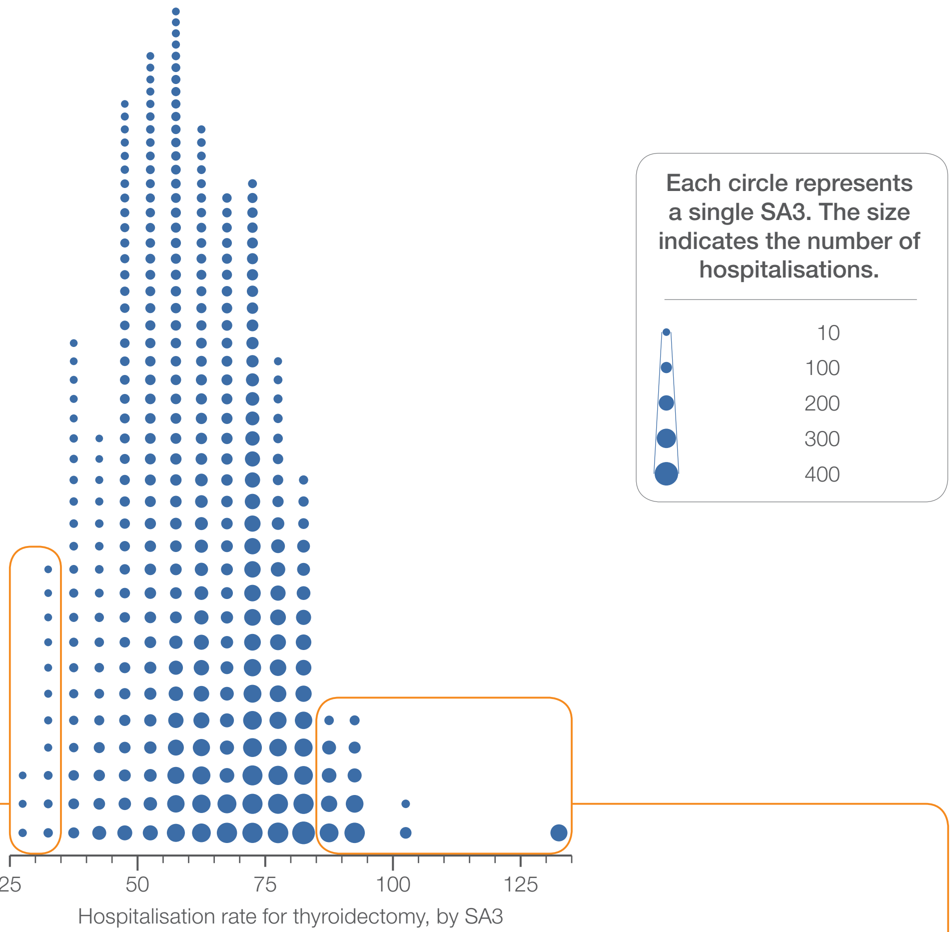
Notes:
Hollow circles (○) indicate rates that are considered more volatile than other published rates and should be interpreted with caution.
Triangles (▲) indicate SA3s where only rates are published. The numbers of services are not published for confidentiality reasons.
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of Medicare Benefits Schedule data and ABS Estimated Resident Population 30 June 2016.

Neck ultrasound and thyroidectomy

Thyroidectomy

Rates by local area

Figure 3.22: Number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2014–15 to 2016–17



Lowest rate areas

SA3	State	Rate	Hospitalisations
Outback - South	Qld	28	14
Great Lakes	NSW	29	30
Yorke Peninsula	SA	29	20
Mid North	SA	30	24
Darwin City	NT	31	19
Whitsunday	Qld	32	17
West Coast	Tas	32	14
Robina	Qld	33	41
South Canberra	ACT	33	22
Weston Creek	ACT	33	19
Katherine	NT	33	12
Broadbeach - Burleigh	Qld	34	55
Hobart Inner	Tas	34	43
Upper Hunter	NSW	34	24

Highest rate areas

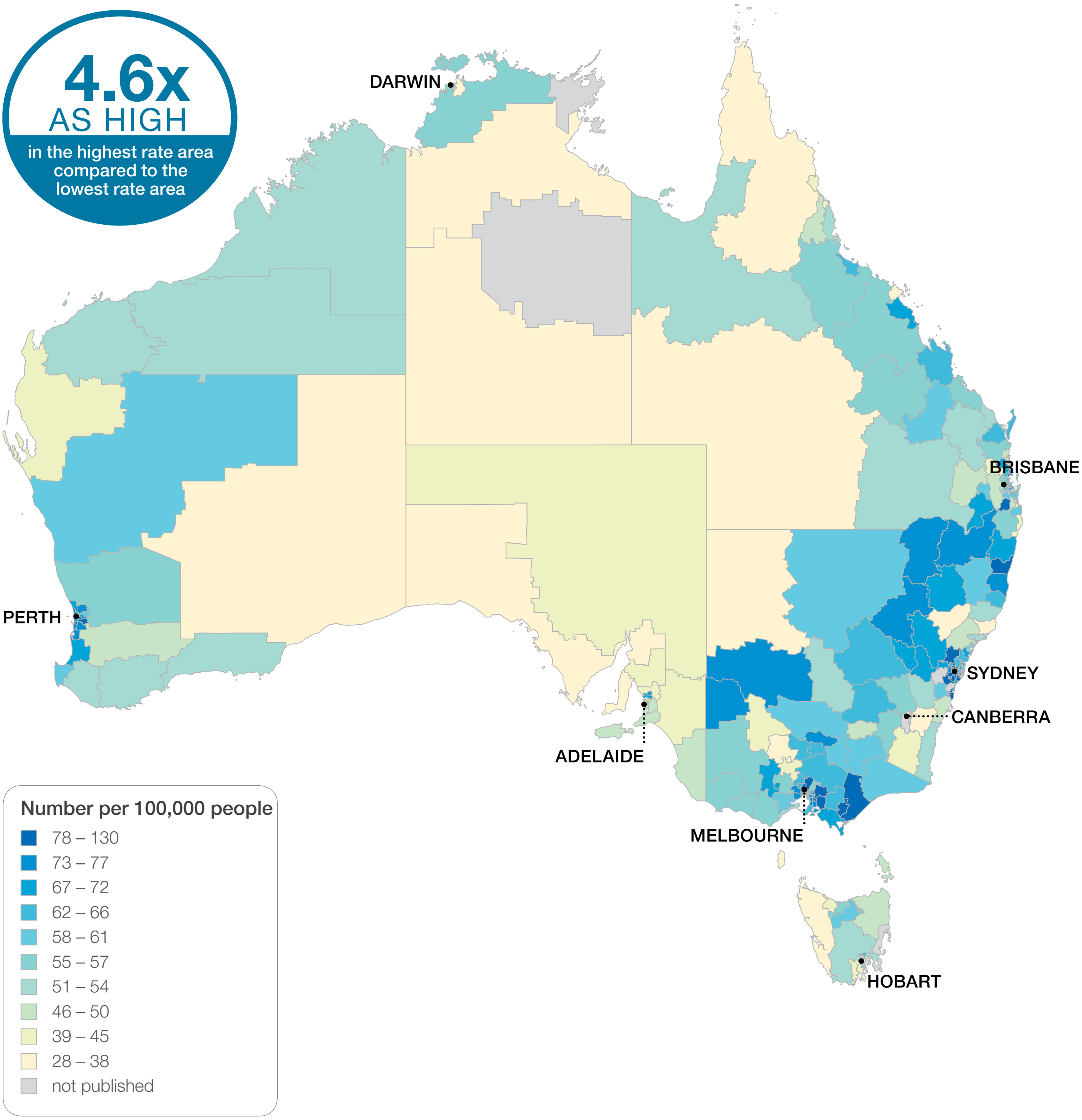
SA3	State	Rate	Hospitalisations
Latrobe Valley	Vic	130	242
Botany	NSW	104	109
Beaudesert	Qld	101	33
Campbelltown (NSW)	NSW	92	325
Cronulla - Miranda - Caringbah	NSW	92	258
Blacktown - North	NSW	91	169
Kwinana	WA	91	69
Camden	NSW	90	119
Rouse Hill - McGraths Hill	NSW	89	57
Dapto - Port Kembla	NSW	88	166
Liverpool	NSW	87	224
Kogarah - Rockdale	NSW	86	286
Bringelly - Green Valley	NSW	86	184

Notes:
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 Population 30 June 2014 to 2016.

Thyroidectomy

Rates across Australia

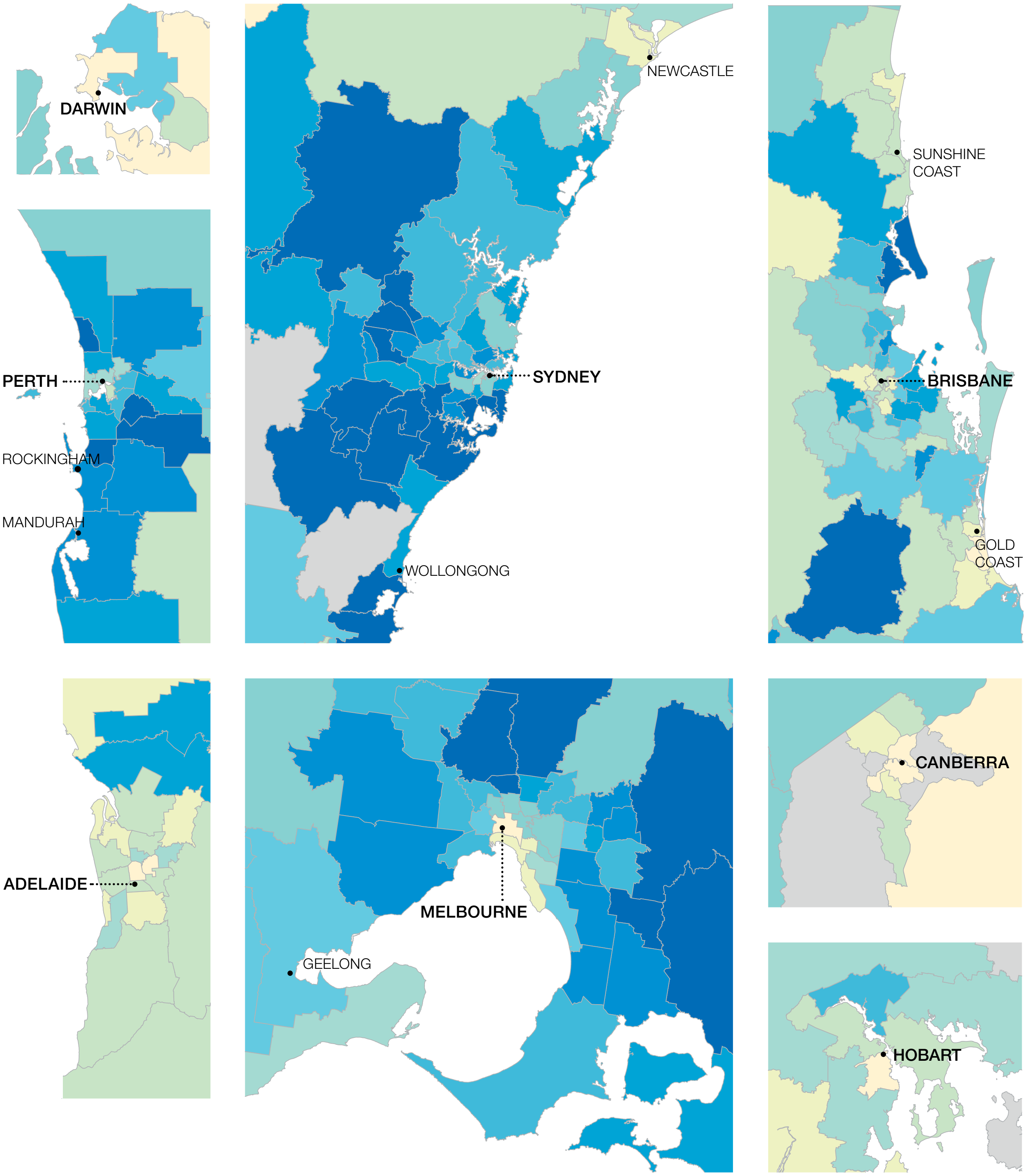
Figure 3.23: Number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2014–15 to 2016–17



Notes:
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 Population 30 June 2014 to 2016.

Rates across capital city areas

Figure 3.24: Number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2014–15 to 2016–17



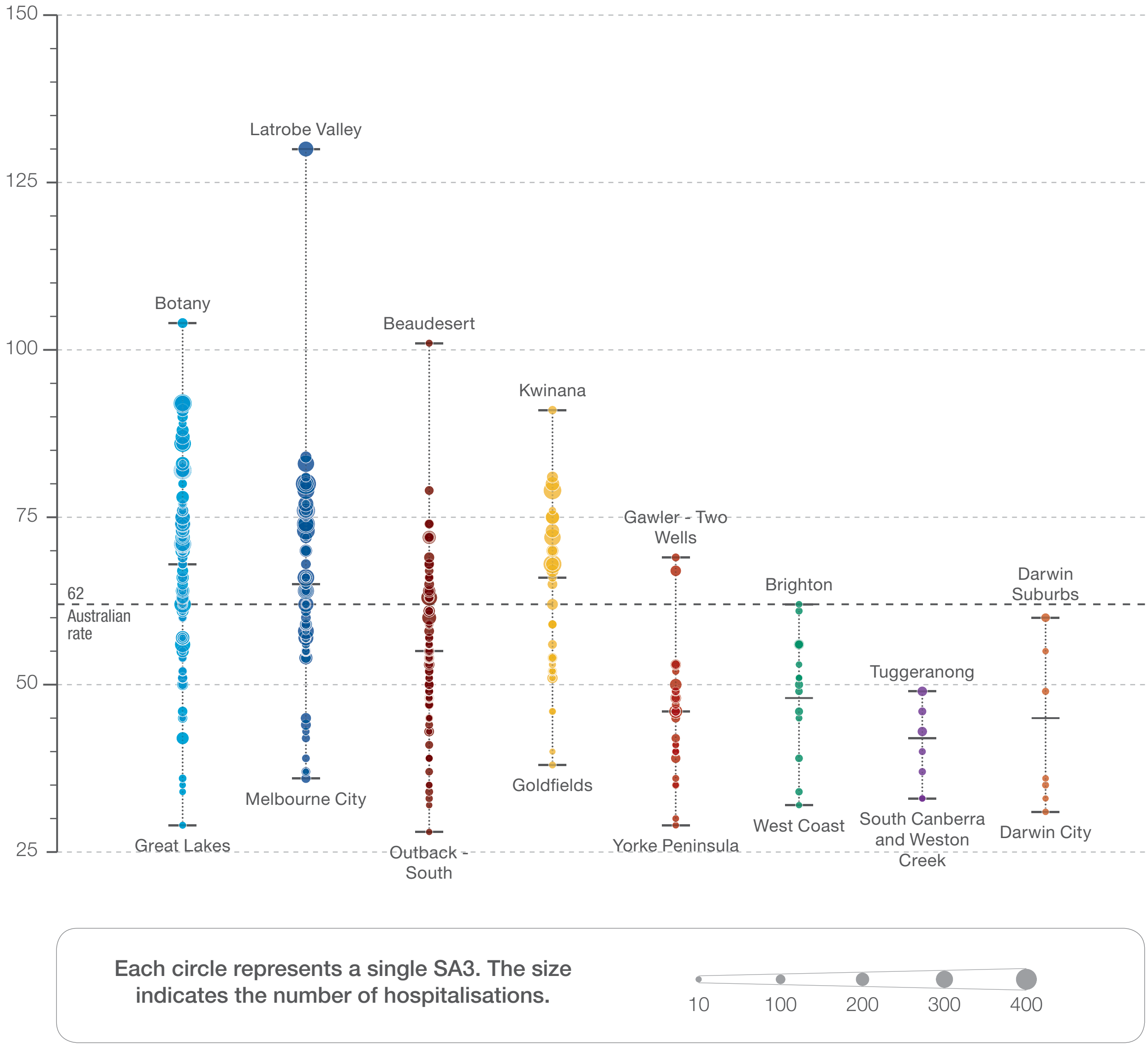
Notes:
For further detail about the methods used, please refer to the Technical Supplement.
Sources: AIHW analysis of National Hospital Morbidity Database and ABS Estimated Resident Population 30 June 2014 to 2016.

Thyroidectomy

Rates by state and territory

Figure 3.25: Number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2014–15 to 2016–17

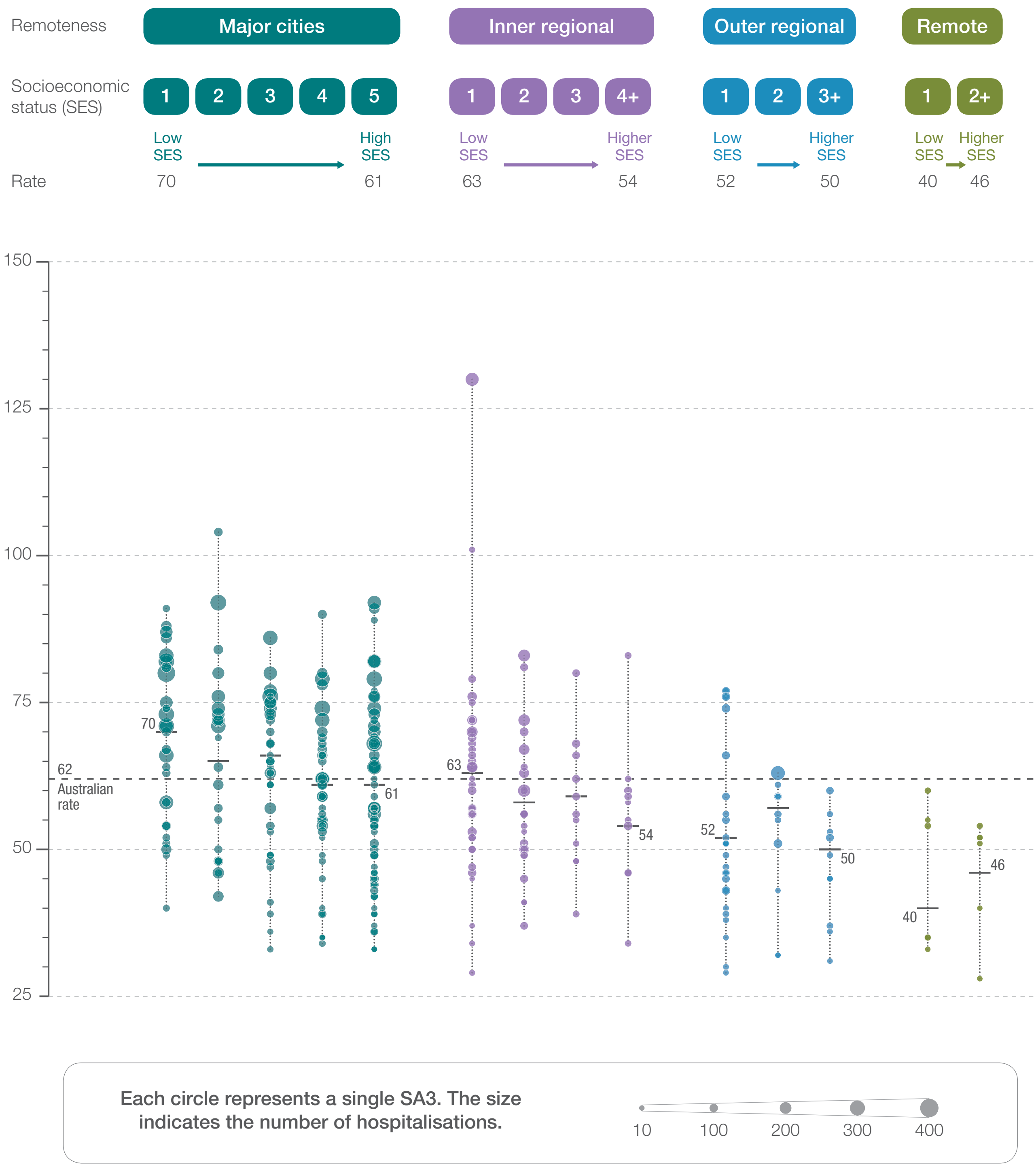
	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Highest rate	104	130	101	91	69	62	49	60
State/territory	68	65	55	66	46	48	42	45
Lowest rate	29	36	28	38	29	32	33	31
No. hospitalisations	12,485	9,388	6,217	3,879	1,926	621	380	222



Notes:
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 Population 30 June 2014 to 2016.

Rates by remoteness and socioeconomic status

Figure 3.26: **Number of hospitalisations for thyroidectomy per 100,000 people aged 18 years and over, age and sex standardised, by Statistical Area Level 3 (SA3) of patient residence, 2014–15 to 2016–17**



Notes:
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 Population 30 June 2014 to 2016.

Neck ultrasound and thyroidectomy

Resources

- British Thyroid Association guidelines for the management of thyroid cancer, 3rd edition[14]
- American Thyroid Association management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer[1]
- *Therapeutic Guidelines: Endocrinology*[36] (for electronic version, visit http://tgldcdp.tg.org.au/etgcomplete)
- Cancer Council of Australia, *Understanding Thyroid Cancer: A guide for people with cancer, their families and friends*.[37]

Australian initiatives

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

- Australia and New Zealand Thyroid Cancer Registry, Monash University, established 2017[11]
- Endocrine Society of Australia, Choosing Wisely recommendation 1: Don't routinely order a thyroid ultrasound in patients with abnormal thyroid function tests if there is no palpable abnormality of the thyroid gland.[16]

Many state and territory initiatives are also in place to improve management of thyroid cancer, including:

- WA Cancer and Palliative Care Network, *Thyroid Cancer Model of Care*[38]
- Tasmanian Ministerial Thyroid Advisory Committee (established in the 1970s) – leads advocacy for thyroid research informing public health policy
- Tasmanian Health Pathways – provides advice in line with the Endocrine Society of Australia's Choosing Wisely recommendations
- Queensland Health Clinical Prioritisation Criteria – provide guidance to GPs on referral requirements for specialist hospital care for thyroid enlargement or nodules (https://cpc.health.qld.gov.au/Condition/222/thyroid-enlargement-thyroid-nodules and https://cpc.health.qld.gov.au/Condition/69/thyroid-mass).

References

1. Haugen BR, Alexander EK, Bible KC, Doherty GM, Mandel SJ, Nikiforov YE, et al. 2015 American Thyroid Association management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer: the American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid 2016;26(1):1–33.
2. Vaccarella S, Dal Maso L, Laversanne M, Bray F, Plummer M, Franceschi S. The impact of diagnostic changes on the rise in thyroid cancer incidence: a population-based study in selected high-resource countries. Thyroid 2015;25(10):1127–36.
3. Australian Institute of Health and Welfare. Cancer compendium: information and trends by cancer type. Canberra: AIHW; 2018. www.aihw.gov.au/reports/cancer/cancer-compendium-information-trends-by-cancer/report-contents/thyroid-cancer (accessed Jun 2018).
4. Ahn HS, Kim HJ, Welch HG. Korea's thyroid-cancer 'epidemic': screening and overdiagnosis. N Engl J Med 2014;371(19):1765–7.
5. Davies L, Morris LG, Haymart M, Chen AY, Goldenberg D, Morris J, et al. American Association of Clinical Endocrinologists and American College of Endocrinology disease state clinical review: the increasing incidence of thyroid cancer. Endocr Pract 2015;21(6):686–96.
6. Pandeya N, McLeod DS, Balasubramaniam K, Baade PD, Youl PH, Bain CJ, et al. Increasing thyroid cancer incidence in Queensland, Australia 1982–2008: true increase or overdiagnosis? Clin Endocrinol (Oxf) 2016;84(2):257–64.
7. Walsh J. Managing thyroid disease in general practice. Med J Aust 2016;205(4):179–84.
8. Cancer Council NSW. Active surveillance for thyroid cancer [Internet]. Sydney: Cancer Council NSW; 2018 [cited 2018 Jun 13]. Available from: www.cancercouncil.com.au/thyroid-cancer/treatment/active-surveillance
9. Yip L, Carty SE. Expanding the options for patient-guided decision making in papillary thyroid cancer. JAMA 2018;319(1):76–7.
10. Cancer Institute NSW. Cancer control in New South Wales: statewide report, 2017. Sydney: Cancer Institute NSW; 2018. www.cancer.nsw.gov.au/getattachment/cancer-control/Cancer-Control-in-NSW-Statewide-report-2017-2.pdf (accessed Jun 2018).
11. Ioannou L, Serpell J, Dean J, Bendinelli C, Gough J, Lisewski D, et al. Development of a bi-national thyroid cancer clinical quality registry: Australian & New Zealand Thyroid Cancer Registry (poster on display at Alfred Hospital 18–22 June 2018) [Internet]. Melbourne: ANZTCR; 2018 [cited 2018 Jun 26]. Available from: https://twitter.com/ANZTCR
12. Australian Institute of Health and Welfare. Cancer in Aboriginal and Torres Strait Islander people of Australia [Internet]. Canberra: AIHW; 2018 [updated 2018 Mar 15; cited 2018 Aug 23]. Available from: www.aihw.gov.au/reports/cancer/cancer-in-indigenous-australians/contents/cancer-type/thyroid-cancer-c73
13. Britt H, Miller GC, Henderson J, Bayram C, Harrison C, Valenti L, et al. General practice activity in Australia 2015–16. Sydney: University of Sydney Family Medicine Research Centre; 2016.
14. Perros P, Colley S, Boelaert K, Evans C, Evans R, Gerrard G, et al. British Thyroid Association guidelines for the management of thyroid cancer. Clin Endocrinol (Oxf) 2014;81 Suppl 1:1–122.
15. US Preventive Services Task Force. Screening for thyroid cancer: US Preventive Services Task Force recommendation statement. JAMA 2017;317(18):1882–7.
16. Choosing Wisely Australia. Endocrine Society of Australia: tests, treatments and procedures clinicians and consumers should question – recommendation 1 [Internet]. Sydney: NPS MedicineWise; 2016 [updated 2016 Mar; cited 2018 Jun 26]. Available from: www.choosingwisely.org.au/recommendations/esa
17. Medicare Australia Statistics. Medicare items 55011, 55013, 55032, 55033 processed from January 1995 to December 2017 per capita [Internet]. Canberra: Medicare Australia; 2018 [cited Apr 2018]. Available from: http://medicarestatistics.humanservices.gov.au/statistics/mbs_item.jsp
18. Australian Thyroid Foundation. Thyroid surgery [Internet]. Sydney: Australian Thyroid Foundation; 2018 [cited 2018 Oct 4]. Available from: https://thyroidfoundation.org.au/Surgery-Hemi-Thyroidectomy-Total-Thyroidectomy
19. Lin J, Aiello Bowles E, Williams S, Morrison C. Screening for thyroid cancer: updated evidence report and systematic review for the US Preventive Services Task Force. JAMA 2017;317(18):1888–903.
20. Furuya-Kanamori L, Sedrakyan A, Onitilo AA, Bagheri N, Glasziou P, Doi SA. Differentiated thyroid cancer: millions spent with no tangible gain? Endocr Relat Cancer 2018;25(1):51–7.
21. Jegerlehner S, Bulliard J, Aujesky D, Rodondi N, Germann S, Konzelmann I, et al. Overdiagnosis and overtreatment of thyroid cancer: a population-based temporal trend study. PLoS One 2017;12(6):e0179387.
22. Vaccarella S, Franceschi S, Bray F, Wild CP, Plummer M, Dal Maso L. Worldwide thyroid-cancer epidemic? The increasing impact of overdiagnosis. N Engl J Med 2016;375(7):614–7.
23. Zevallos J, Hartman C, Kramer J, Sturgis E, Chiao E. Increased thyroid cancer incidence corresponds to increased use of thyroid ultrasound and fine-needle aspiration: a study of the Veterans Affairs health care system. Cancer 2014;121(5):741–6.
24. Australian Institute of Health and Welfare. Cancer in Australia 2017 (Tables A9.32[a], A9.32[c]). Canberra: AIHW; 2017. (AIHW Cat. No. CAN 100; Cancer Series No. 101.)
25. Altekruse S, Das A, Cho H, Petkov V, Yu M. Do US thyroid cancer incidence rates increase with socioeconomic status among people with health insurance? An observational study using SEER population-based data. BMJ Open 2015;5(12):e009843.
26. Burgess JR, Tucker P. Incidence trends for papillary thyroid carcinoma and their correlation with thyroid surgery and thyroid fine-needle aspirate cytology. Thyroid 2006;16(1):47–53.
27. Schmid D, Ricci C, Behrens G, Leitzmann MF. Adiposity and risk of thyroid cancer: a systematic review and meta-analysis. Obes Rev 2015;16(12):1042–54.
28. Sanabria A, Kowalski LP, Shah JP, Nixon IJ, Angelos P, Williams MD, et al. Growing incidence of thyroid carcinoma in recent years: factors underlying overdiagnosis. Head Neck 2018;40(4):855–66.
29. Kahn C, Simonella L, Sywak M, Boyages S, Ung O, O'Connell D. Pathways to the diagnosis of thyroid cancer in New South Wales: a population-based cross-sectional study. Cancer Causes Control 2012;23(1):35–44.
30. Hall SF, Irish J, Groome P, Griffiths R. Access, excess, and overdiagnosis: the case for thyroid cancer. Cancer Med 2014;3(1):154–61.
31. Nickel B, Brito JP, Moynihan R, Barratt A, Jordan S, McCaffery K. Patients' experiences of diagnosis and management of papillary thyroid microcarcinoma: a qualitative study. BMC Cancer 2018;18(1):242.
32. Russ G, Bonnema S, Erdogan M, Durante C, Ngu R, Leenhardt L. European Thyroid Association guidelines for ultrasound malignancy risk stratification of thyroid nodules in adults: the EU-TIRADS. Eur Thyroid J 2017;6(5):225–37.
33. Miyauchi A, Ito Y, Oda H. Insights into the management of papillary microcarcinoma of the thyroid. Thyroid 2018;28(1):23–31.
34. Nickel B, Brito JP, Barratt A, Jordan S, Moynihan R, McCaffery K. Clinicians' views on management and terminology for papillary thyroid microcarcinoma: a qualitative study. Thyroid 2017;27(5):661–71.
35. Nikiforov YE, Seethala RR, Tallini G, Baloch ZW, Basolo F, Thompson LD, et al. Nomenclature revision for encapsulated follicular variant of papillary thyroid carcinoma: a paradigm shift to reduce overtreatment of indolent tumors. JAMA Oncol 2016;2(8):1023–9.
36. Therapeutic guidelines: endocrinology. Version 5. Melbourne: Therapeutic Guidelines Limited; 2014. https://www.clinicalguidelines.gov.au/register/therapeutic-guidelines-endocrinology-version-5 (accessed 16 Oct 2018).
37. Cancer Council Australia. Understanding thyroid cancer: a guide for people with cancer, their families and friends. Sydney: Cancer Council Australia; 2018. www.cancercouncil.com.au/wp-content/uploads/2014/05/UC-pub-Understanding-Thyroid-Cancer-CAN1137-web-lo-res-Jan-2018.pdf (accessed 13 Jun 2018).
38. WA Cancer and Palliative Care Network. Thyroid cancer model of care. Perth: Department of Health WA; 2012. https://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/Health%20Networks/WA%20Cancer%20and%20Palliative%20Care/Cancer/Thyroid-Cancer-Model-of-Care.pdf (accessed 04 Oct 2018).