



# Hospital care for people with dementia 2016–17

The Australian Institute of Health and Welfare is a major national agency whose purpose is to create authoritative and accessible information and statistics that inform decisions and improve the health and welfare of all Australians.

© Australian Institute of Health and Welfare 2019 

This product, excluding the AIHW logo, Commonwealth Coat of Arms and any material owned by a third party or protected by a trademark, has been released under a Creative Commons BY 3.0 (CC BY 3.0) licence. Excluded material owned by third parties may include, for example, design and layout, images obtained under licence from third parties and signatures. We have made all reasonable efforts to identify and label material owned by third parties.

You may distribute, remix and build upon this work. However, you must attribute the AIHW as the copyright holder of the work in compliance with our attribution policy available at [www.aihw.gov.au/copyright/](http://www.aihw.gov.au/copyright/). The full terms and conditions of this licence are available at <http://creativecommons.org/licenses/by/3.0/au/>.

A complete list of the Institute's publications is available from the Institute's website [www.aihw.gov.au](http://www.aihw.gov.au).

ISBN 978-1-76054-591-8 (Online)

ISBN 978-1-76054-592-5 (Print)

#### **Suggested citation**

Australian Institute of Health and Welfare 2019. Hospital care for people with dementia 2016–17. Cat. no. AGE 94. Canberra: AIHW.

#### **Australian Institute of Health and Welfare**

Board Chair

Mrs Louise Markus

Chief Executive Officer

Mr Barry Sandison

Any enquiries relating to copyright or comments on this publication should be directed to:

Australian Institute of Health and Welfare

GPO Box 570

Canberra ACT 2601

Tel: (02) 6244 1000

Email: [info@aihw.gov.au](mailto:info@aihw.gov.au)

Published by the Australian Institute of Health and Welfare.

Please note that there is the potential for minor revisions of data in this report.

Please check the online version at [www.aihw.gov.au](http://www.aihw.gov.au) for any amendment.

# Contents

Summary .....	iv
What is dementia? .....	1
Hospital care .....	4
Appendix A: Methods .....	15
Acknowledgments .....	17
Abbreviations .....	17
References .....	18
List of tables .....	19
List of figures .....	19
Related publications .....	19

## Summary

Although it is not known exactly how many Australians have dementia, it is estimated to affect up to 436,000 people. In 2017, dementia caused more than 13,700 deaths and was the second-leading cause of death in Australia, behind coronary heart disease (18,600 deaths). Dementia is the leading cause of death for females.

Dementia is not 1 specific disease, but a term used to describe a group of conditions characterised by the gradual impairment of brain function. There are many different forms of dementia—Alzheimer's disease is the most common. Although dementia can affect younger people, it occurs mainly among those aged over 65, and is a major cause of disability and dependency among older people. This report focuses on hospital care provided for people with dementia in Australia in 2016–17; whether the number of hospitalisations has increased over the past decade; and the outcome of these hospitalisations.

### What is the profile of dementia hospitalisations in Australia?

In 2016–17, there were about 94,800 hospitalisations of people who had at least 1 diagnosis of dementia. Of these hospitalisations:

- 52% were of females, 48% were of males
- 43% were of people aged 85–94, 3% were aged under 65
- 1% were of Aboriginal and Torres Strait Islander Australians
- 71% involved patients who lived in *Major cities*, 28% in *Inner regional* and *Outer regional* areas, and 1% in *Remote* and *Very remote* areas
- 23% involved patients who lived in the lowest socioeconomic areas; 17% lived in the highest socioeconomic areas.

### Who is most likely to be hospitalised with dementia?

In 2016–17:

- male hospitalisation rates were 1.3 times as high as female rates
- hospitalisation rates for people aged 95 and over were 5 times as high as those aged 75–79
- Indigenous Australians' hospitalisation rates were 1.5 times as high as for Other Australians
- hospitalisation rates for people living in *Major cities* were 1.2 times as high as for people living in *Inner regional* and *Outer regional* areas
- hospitalisation rates for people living in the lowest socioeconomic areas were 1.1 times as high as for people living in the highest socioeconomic areas.

## About the dementia hospitalisations

- About 9 in 10 (92%) involved at least 1 overnight stay; the average length of stay was 13 days
- 1 in 3 (33%) were for unspecified dementia, over 1 in 4 (27%) were for Alzheimer's disease
- Almost 1 in 2 (48%) ended with the patient going home; about 1 in 3 (29%) ended with the patient continuing care in hospital (for example, the patient was transferred to another hospital, or the type of hospital care changed); almost 1 in 5 (17%) ended in a new admission to residential aged care; and 6% ended with the patient dying in hospital.

## 8 health conditions were on average recorded in dementia hospitalisations

People with dementia may have more than 1 health condition. In 2016–17, dementia was recorded as the principal diagnosis in about 1 in 5 (22%) dementia hospitalisations and as an additional diagnosis in almost 4 in 5 (78%). On average, about 8 health conditions were recorded in dementia hospitalisations.

*Type 2 diabetes* was the most common comorbid condition, recorded in 24% of dementia hospitalisations. Where dementia was an additional diagnosis, the most common principal diagnosis was related to injury and poisoning (21%) and more than 1 in 3 (36%) of these were for a leg fracture.

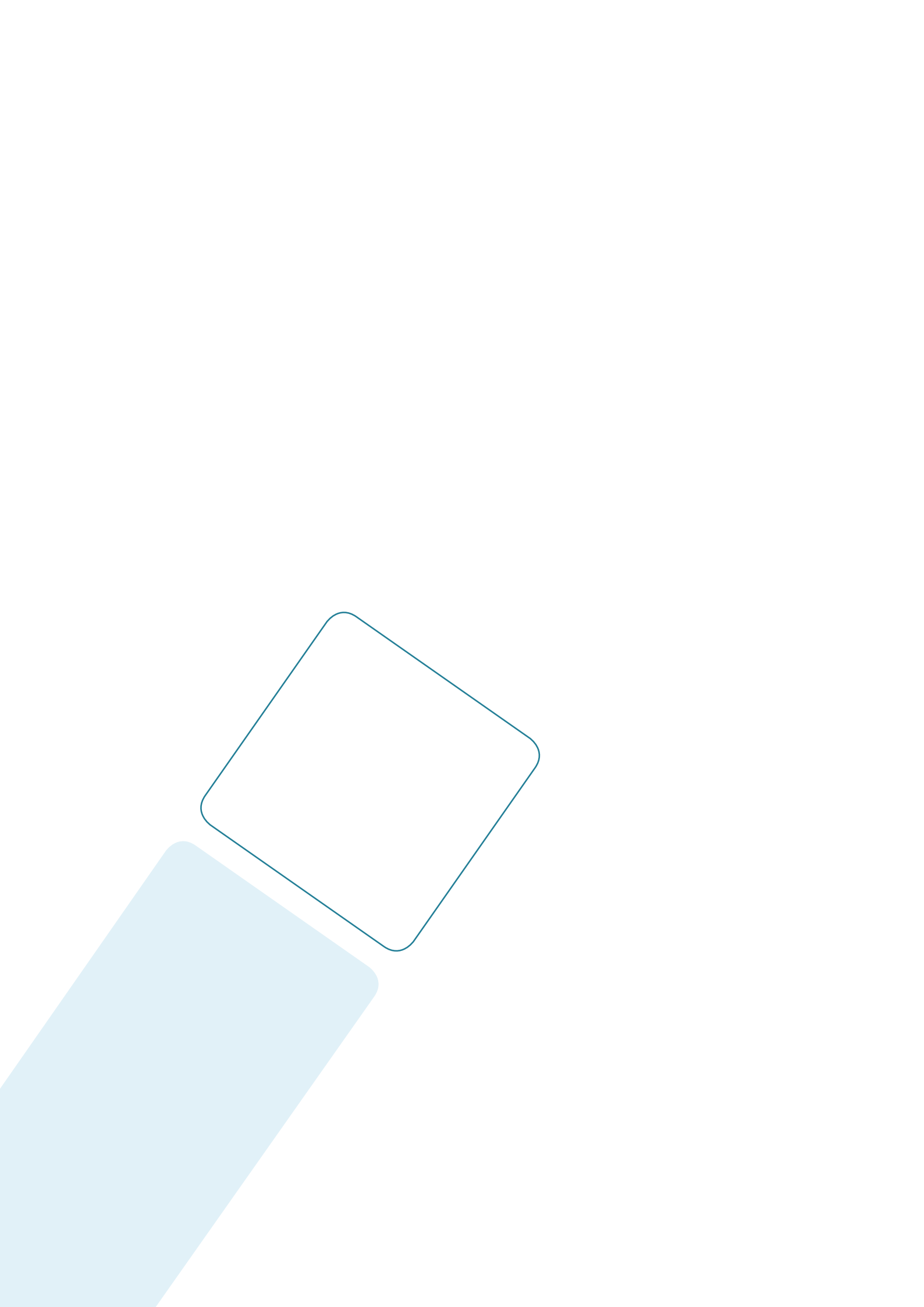
## 7 in 10 dementia hospitalisations were of the highest clinical complexity

Almost all hospitalisations (97%) with at least 1 diagnosis of dementia were of the highest or second-highest clinical complexity. The majority (71%) were of the highest clinical complexity, compared with 16% of hospitalisations without a diagnosis of dementia.

## Rate of dementia hospitalisations has decreased by almost a quarter in the last decade

Between 2006–07 and 2016–17, the age-adjusted rate of dementia hospitalisations decreased by 23%—from 408 to 313 hospitalisations per 100,000 population. Further, they:

- decreased by 60% for unspecified dementia
- remained similar for Alzheimer's disease
- increased by 37% for vascular dementia
- increased by 416% for delirium superimposed on dementia.



# What is dementia?

Dementia is a term used to describe a group of similar conditions characterised by the gradual impairment of brain function. It is commonly associated with memory loss, but can affect speech, cognition (thought), behaviour and mobility. An individual's personality may also change, and health and functional ability decline as the condition progresses.

While there are many forms of dementia, the most common is Alzheimer's disease—a degenerative brain disease caused by nerve cell death resulting in shrinkage of the brain (Australian Alzheimer's Research Foundation 2018). Other major forms include:

- vascular dementia—mainly caused by haemodynamic (blood flow to the brain) disorders (for example, strokes); thromboembolism (small blood clots that block small blood vessels in the brain); small blood vessel disease in the brain; and bleeding into or around the brain
- dementia with Lewy bodies—caused by the degeneration and death of nerve cells in the brain due to the presence of abnormal spherical structures, called Lewy bodies, which develop inside nerve cells
- fronto-temporal dementia—caused by progressive damage to the frontal and/or temporal lobes of the brain (DA 2018a; Draper 2013).

The boundaries between different forms of dementia are indistinct and it is possible for a person to have multiple (mixed) types of dementia at the same time (WHO 2017).

Although dementia can affect younger people, it is increasingly common with advancing age and occurs mainly among those aged over 65. It is important to note that dementia is not an inevitable part of ageing. Dementia is a major cause of disability and dependency among older people. It not only affects individuals with the condition but also has a substantial impact on their families and carers, as people with dementia eventually become dependent on their care providers in most, if not all, areas of daily living.

## How common is it?

The exact number of people with dementia in Australia is not known. The most recent estimates of dementia prevalence for 2018 range from 376,000 (AIHW 2018) to 436,000 (DA 2018b) with Alzheimer's disease accounting for up to 70% of cases (DA 2018c). In 2017, the reference year for this report, dementia prevalence estimates ranged between 365,000 (AIHW 2017) and 413,000 (DA 2016). The estimates vary because national data for the prevalence of dementia are not readily available. As a result, current estimates are based on rates derived from published international and local studies that have been applied to the Australian population, and the method in which they have been applied to the Australian context differs between reports.

The number of people with dementia is expected to increase to between 550,000 (AIHW 2018) and 590,000 by 2030 (DA 2018b).

## What is the burden?

Burden of disease is a measure of the health impact of different diseases or injuries on a population. It measures how many years of healthy life are lost due to people living with or dying prematurely from disease or injury and is expressed as disability-adjusted life years (DALY).

In 2015, dementia was the fourth-leading cause of disease and injury burden in Australia, after coronary heart disease, back pain and problems, and chronic obstructive pulmonary disease. Dementia accounted for 179,804 DALY, equivalent to 4% of the total burden of disease and injury. The burden from dementia was greater for females than males, accounting for 5% of total DALY (3% for males). Dementia burden was also higher among people aged 65 and over, for whom it was the second-leading cause of total burden of disease and injury (8% of total DALY) (AIHW 2019).

## How many deaths?

Dementia was the second-leading underlying cause of death in Australia in 2017, accounting for about 13,700 deaths. Of these, 31% were due to Alzheimer's disease. When examined by sex, dementia was the leading cause of death for females (8,900 deaths), and the third-leading cause for males (4,900 deaths) (ABS 2018).

The number of deaths from dementia as an underlying cause has increased 68% over the past decade, and the death rate has increased from 33 deaths per 100,000 people in 2008 to 42 in 2017 (ABS 2018). This may reflect not only an increase in the number of older people with dementia, but also changes in how dementia deaths are recorded.

## Purpose of this report

While many people with dementia living in the community are able to live independently without assistance or with the help of family and friends, others (especially those in the later stages of the condition) require formal services to allow them to remain living in the community. These services include health care (such as care provided by general practitioners and in hospital) and aged care services. This report focuses on the hospital care provided for people with dementia in Australia in 2016–17; whether the number of hospitalisations has increased over the past decade; and the outcome of these hospitalisations.

### Terminology used in this report

**additional diagnosis:** The diagnosis of a condition or recording of a complaint—either coexisting with the **principal diagnosis** or arising during the episode of admitted patient care (**hospitalisation**), episode of residential care or attendance at a health-care establishment—that requires the provision of care. Multiple diagnoses may be recorded.

**admission:** An admission to hospital. In this report, the term **hospitalisation** is used to describe an episode of hospital care that starts with the formal admission process and ends with the formal **separation** process.

**Australian Refined Diagnosis Related Groups (AR-DRGs):** An Australian system of diagnosis related groups (DRGs). DRGs provide a clinically meaningful way of relating the number and type of patients treated in a hospital (that is, its **casemix**) to the resources required by the hospital. Each AR-DRG represents a class of patients with similar clinical conditions requiring similar hospital services.

*continued*



## Terminology used in this report (continued)

**average length of stay:** The average number of **patient days** for admitted patient episodes. Patients who have an **admission** and a **separation** on the same date are allocated a length of stay of 1 day.

**care type:** The care type defines the overall nature of a clinical service provided to an admitted patient during an episode of care (admitted care), or the type of service provided by the hospital for boarders or posthumous organ procurement (care other than admitted care).

- Admitted patient care consists of the following categories: acute care, rehabilitation care, palliative care, geriatric evaluation and management, psychogeriatric care, maintenance care, newborn care, mental health care and other admitted patient care—where the principal clinical intent does not meet the criteria for any of the other care types.
- Care other than admitted care includes: posthumous organ procurement and hospital boarder.

**casemix:** The range and types of patients (the mix of cases) treated by a hospital or other health service. Casemix classifications (such as **AR-DRGs**) provide a way of describing and comparing hospitals and other services for management purposes.

**dementia:** A general term used to describe a group of similar conditions (such as Alzheimer's disease or vascular dementia) characterised by the gradual impairment of brain function. It is commonly associated with memory loss, but can affect speech, cognition (thought), behaviour and mobility.

**episode of care:** The period of admitted patient care between a formal or statistical **admission** and a formal or statistical **separation**, characterised by only one care type (see **care type** and **separation**).

**hospitalisation:** Synonymous with **separation**; that is, an episode of hospital care that starts with the formal admission process and ends with the formal separation process. An episode of care can be completed by the patient being discharged, being transferred to another hospital or care facility, or dying, or by a portion of a hospital stay starting or ending in a change of type of care (for example, from acute to rehabilitation).

**patient days:** The total number of days for all patients who were admitted for an episode of care and who separated during a specified reference period. A patient who is admitted and separated on the same day is allocated 1 patient day.

**principal diagnosis:** The diagnosis established after study to be chiefly responsible for occasioning an episode of patient care (**hospitalisation**), an episode of residential care or an attendance at the health care establishment.

**procedure:** A clinical intervention that is surgical in nature, carries a procedural risk, carries an anaesthetic risk, and requires specialist training and/or special facilities or equipment available only in the acute-care setting.

**separation (from hospital):** The formal process where a hospital records the completion of an episode of treatment and/or care for an admitted patient—in this report, described by the term **hospitalisation**.

## Hospital care

In 2016–17, there were about 94,800 episodes of care (hospitalisations) with at least 1 diagnosis of dementia, a rate of 392 dementia hospitalisations per 100,000 people. Dementia hospitalisations:

- totalled 1,195,422 patient days: 8% were same day separations (8,036 days) and 92% involved at least 1 overnight stay (1,187,386 days); the average length of stay was 13 days
- involved 274,000 procedures or interventions: 83% of dementia hospitalisations involved at least 1 procedure. The average was 3 procedures per hospitalisation, the vast majority of which were generalised allied health interventions such as physiotherapy, social work, or occupational therapy (79%), followed by cerebral anaesthesia (4%) and assessment of personal care and other activities of daily/independent living (3%)
- were mostly for acute care (72%)—followed by geriatric evaluation and management (8%), maintenance care (7%) and rehabilitation care (6%)—and commonly began with a new admission from the community (70%) and ended with the patient going home to their usual place of residence (48%).

There was only a moderate seasonal pattern to dementia hospitalisations. In 2016–17 the monthly rates of dementia hospitalisations were generally similar, although a slight rise was evident during the winter months.

### 1 in 3 dementia hospitalisations were for unspecified dementia

In 2016–17, the most commonly recorded dementia diagnoses for hospitalisations were:

- unspecified dementia (33%)
- Alzheimer’s disease (27%)
- delirium superimposed on dementia (18%)
- vascular dementia (14%).

Other recorded dementia types were dementia in Parkinson’s disease (4%), Lewy body dementia (3%), dementia due to psychoactive substance use (2%) and fronto-temporal dementia (2%).

It is possible for a person hospitalised with dementia to have more than 1 type of dementia recorded as a diagnosis. While the majority (97%) of dementia hospitalisations had only 1 type of dementia recorded, 3% (about 3,000 hospitalisations) had 2 or more types recorded.

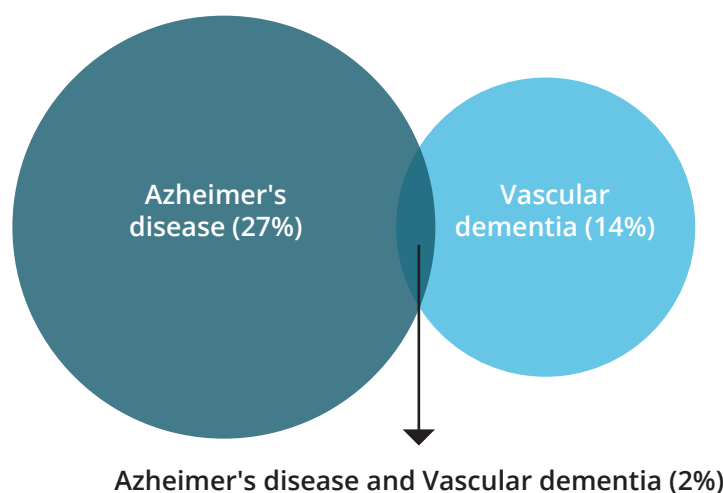
Some dementia types were more likely than others to be recorded as co-occurring:

- Nearly 2 in 10 dementia hospitalisations with a diagnosis of vascular dementia or dementia due to psychoactive substance use included more than 1 specified type of dementia.
- About 1 in 10 hospitalisations with Alzheimer’s disease, dementia in Parkinson’s disease, Lewy body dementia or fronto-temporal dementia included more than 1 specified type of dementia.

The most commonly co-occurring dementia types were Alzheimer’s disease and vascular dementia, recorded together in 2% of dementia hospitalisations.

### People with both Alzheimer's disease and vascular dementia

In 2016–17, there were nearly 2,000 hospitalisations where both Alzheimer's disease and vascular dementia were recorded as a diagnosis, accounting for 2% of all dementia hospitalisations.



Nearly 1 in 4 (24%) of these had Alzheimer's disease as the principal diagnosis, 9% had vascular dementia as the principal diagnosis and the remainder (67%) had other conditions as the principal diagnosis, including, 'problems related to medical facilities and other health care' (for example, waiting for admission to acute hospital) (14%), 'delirium superimposed on dementia' (8%) and 'fracture of femur' (7%).

Compared with all dementia hospitalisations, those with both Alzheimer's disease and vascular dementia recorded as diagnoses were associated with a:

- higher proportion of males (51% compared with 49%)
- similar average age (83 years)
- similar average number of procedures (3)
- longer average length of stay (18 days compared with 13)
- lower proportion of hospitalisations for acute care (55% compared with 72%) and a higher proportion for geriatric evaluation and management (18% compared with 8%).

## 8 health conditions were on average recorded in dementia hospitalisations

In 2016–17, dementia was the principal diagnosis in about 1 in 5 (22%) dementia hospitalisations and recorded as an additional diagnosis (but not a principal diagnosis) in almost 4 in 5 (78%).

On average, about 8 diagnoses were recorded in dementia hospitalisations. *Type 2 diabetes* was the most common comorbid condition, recorded in 24% of dementia hospitalisations, followed by *Unspecified urinary incontinence* (23%) and *Other disorders of the urinary system* (19%).

When dementia was an additional diagnosis, the most common principal diagnoses were conditions related to:

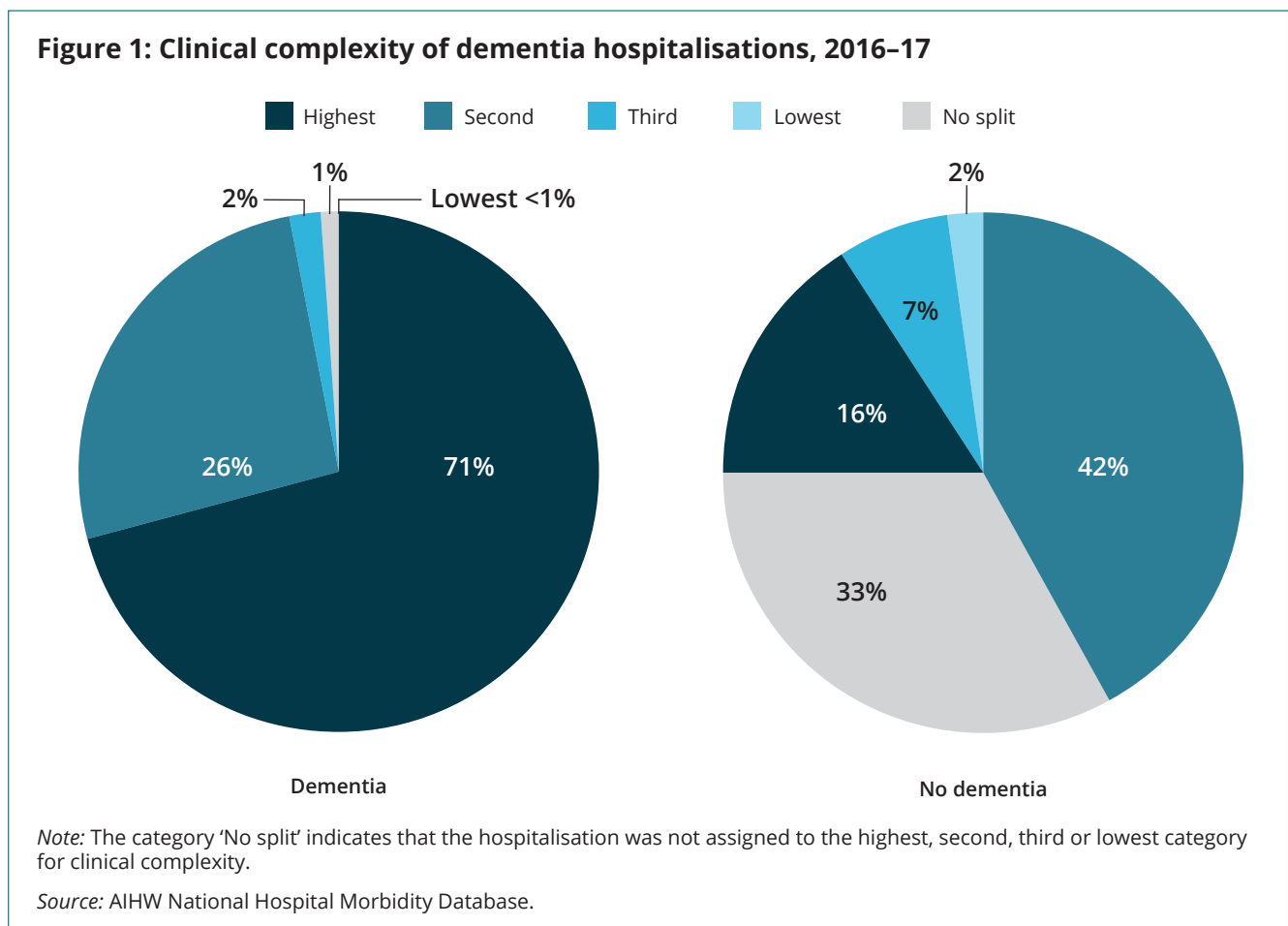
- *Injury, poisoning (for example, poisoning by drugs, medicaments and biological substances) and certain other consequences of external causes* (21%): more than one-third (36%) of these were for 'Fracture of femur'

- *Diseases of the respiratory system* (12%): more than one-third (36%) of these were for 'Unspecified pneumonia'
- *Factors influencing health status and contact with health services* (11%): about two-thirds (67%) of these were for 'Person awaiting admission to residential aged care service'
- *Diseases of the circulatory system* (10%): nearly one-quarter (23%) of these were for 'Heart failure'
- *Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified* (9%): one-fifth (20%) of these were for 'Other symptoms and signs involving the nervous and musculoskeletal systems'.

## 7 in 10 dementia hospitalisations were of the highest clinical complexity

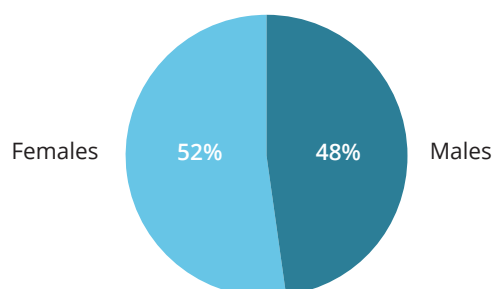
Clinical complexity, as reported below, is based on the Australian refined diagnosis related group (AR-DRG) assigned to each hospitalisation. AR-DRGs classify units of hospital output. The classification groups inpatient stays into clinically meaningful categories of similar levels of complexity (outputs) that consume similar amounts of resources (inputs).

In 2016–17, almost all (97%) hospitalisations with at least 1 diagnosis of dementia were assigned to the highest or second highest categories for clinical complexity. Further, the majority (71%) of dementia hospitalisations were of the highest clinical complexity, compared with 16% of hospitalisations without a diagnosis of dementia (Figure 1).



## 52% of dementia hospitalisations were among females

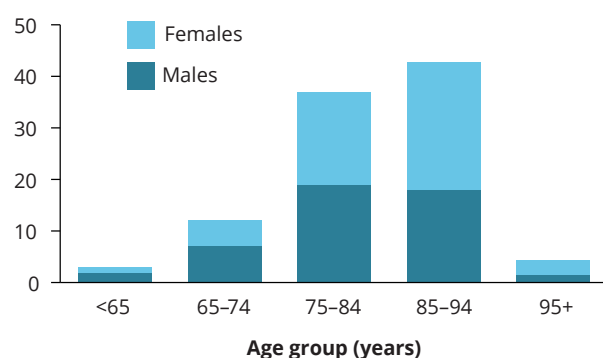
### Of dementia hospitalisations at any age:



52% were among females, 48% were for males (refer to online Table S1).

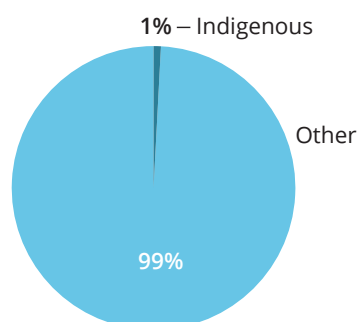
When differences in age and population size were accounted for, males were 1.3 times as likely to be hospitalised with dementia than females.

### Per cent



43% were aged 85-94 (38% male, 47% female), 3% were aged under 65 (4% male, 2% female), and 4% aged 95 or over (3% male, 6% female) (refer to online Table S1).

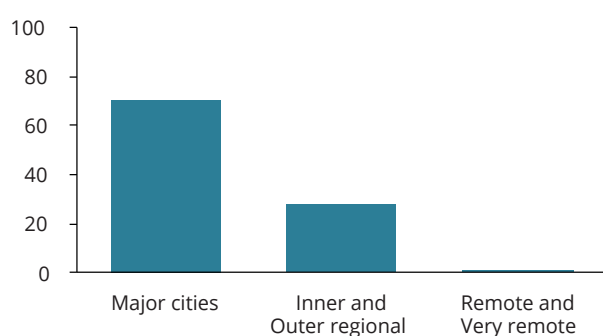
Males hospitalised with dementia were on average younger (average age 81) than females (average age 84).



1% identified as Aboriginal and/or Torres Strait Islander, a rate of 178 hospitalisations per 100,000 Indigenous Australians (refer to online Table S2).

When differences in age and population size were accounted for, Indigenous Australians were 1.5 times as likely to be hospitalised with dementia than Other Australians.

### Per cent

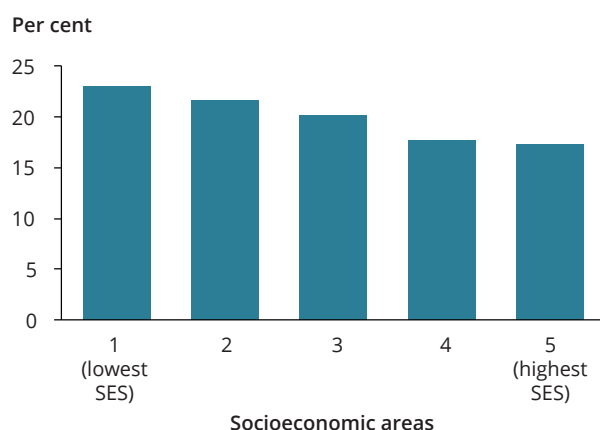


71% lived in *Major cities*, 28% in *Inner regional* and *Outer regional* areas, and 1% in *Remote* and *Very remote* areas.

When differences in age and population size were accounted for, people living in *Major cities* were 1.2 times as likely to be hospitalised with dementia than people living in *Inner regional* and *Outer regional* areas, but were hospitalised with dementia at a similar rate to those living in *Remote* and *Very remote* areas.

*continued*

### Of dementia hospitalisations at any age (continued):



23% lived in the lowest socioeconomic areas and 17% lived in the highest socioeconomic areas.

When differences in age and population size were accounted for, people living in the lowest socioeconomic areas were 1.1 times as likely to be hospitalised with dementia as people living the highest socioeconomic areas.

## Younger onset dementia

Although dementia primarily occurs among people aged 65 and over, it can affect people under 65 and is then referred to as 'younger onset dementia'.

In 2016–17, there were about 3,200 younger onset dementia hospitalisations. Of these, the majority (51%) occurred among those aged 60–64 followed by those aged 55–59 (26%). Males accounted for the majority (62%) of younger onset dementia hospitalisations, and females for 38%.

The most commonly recorded younger onset dementia diagnoses were:

- Alzheimer's disease (22%)
- dementia due to psychoactive substance use (mainly alcohol) (21%)
- unspecified dementia (17%)
- fronto-temporal dementia (15%)
- vascular dementia (10%).

Dementia due to psychoactive substance use (21%, compared with 2% for all ages) and fronto-temporal dementia (15% compared with 2%) were much more commonly recorded as dementia diagnoses among the younger onset population.

Dementia was the principal diagnosis in 27% of dementia hospitalisations in this age group, slightly higher than for all dementia hospitalisations (22%), and recorded as an additional diagnosis only in 73%. When dementia was an additional diagnosis, the most common principal diagnoses were:

- *Mental and behavioural disorders* (20%): nearly one-quarter (23%) of these were for 'Mental and behavioural disorders due to use of alcohol'
- *Diseases of the nervous system* (14%): just over two-fifths (43%) of these were due to 'Other degenerative diseases of nervous system not elsewhere classified'
- *Factors influencing health status and contact with health services* (13%): almost four-fifths (79%) of these were for 'Problems related to medical facilities and other health care'
- *Injury, poisoning (e.g. poisoning by drugs, medicaments and biological substances) and certain other consequences of external causes* (10%): 17% of these were due to 'Fracture of femur'.

## Aboriginal and Torres Strait Islander people

In 2016–17, there were about 1,300 dementia hospitalisations among Aboriginal and Torres Strait Islander people, a rate of 178 hospitalisations per 100,000 Indigenous Australians. After adjusting for age, Indigenous Australians were hospitalised with dementia at 1.5 times the rate of Other Australians (465 compared with 318 per 100,000 population, respectively).

Dementia hospitalisations among Indigenous Australians were most commonly:

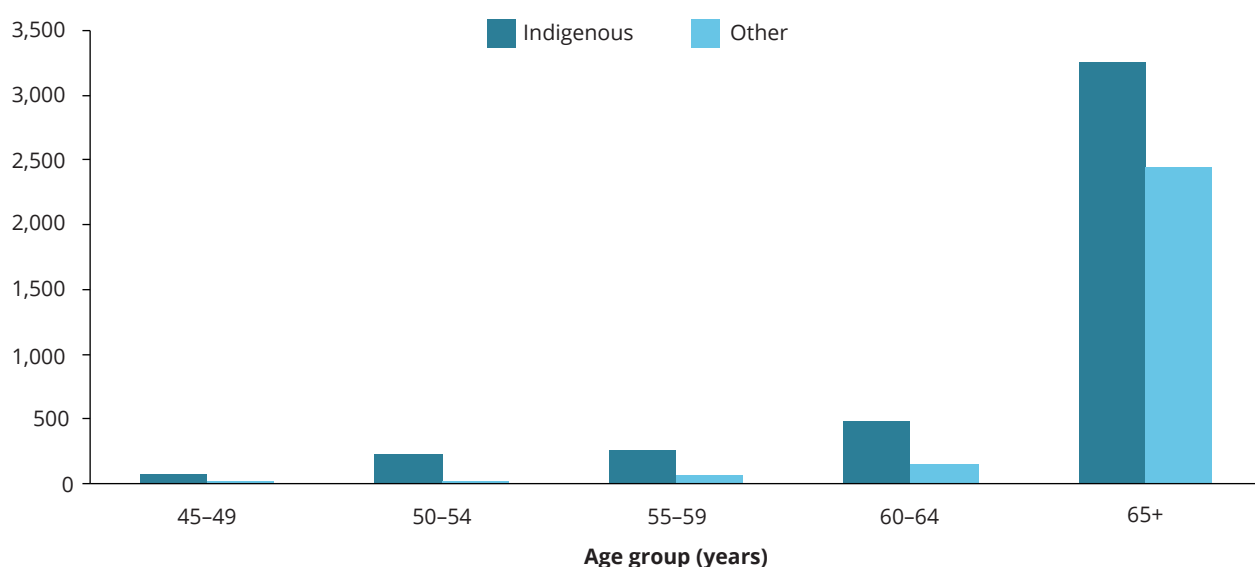
- for acute care (78%)
- admitted from the community (77%)
- of the highest clinical complexity (70%)
- discharged home (usual place of residence—this can include to a residential aged care facility) (54%).

The proportion of dementia hospitalisations for acute care was slightly higher among Indigenous Australians than the total population hospitalised with dementia (78% compared with 72%), as was the proportion admitted from the community (77% compared with 70%) and the proportion discharged home (54% compared with 48%). However, similar proportions of dementia hospitalisations were assigned to the highest category for clinical complexity regardless of Indigenous status (70% compared with 71%).

The average length of stay for dementia hospitalisations of Indigenous Australians (including same day separations) was 16 days, which was higher than the average stay for the total population (13). In contrast, while 71% of dementia hospitalisations among Indigenous Australians involved at least 1 procedure this was much lower than for the total population (83%).

The average age of Indigenous Australians hospitalised with dementia was 70 for males and 76 for females, which was much younger than in the total population (81 and 84, respectively). The age-specific dementia hospitalisation rate increased from 57 hospitalisations per 100,000 Indigenous people aged 45–49 to 3,262 per 100,000 for those aged 65 and over. The age-specific dementia hospitalisations rates of Indigenous Australians were higher than the rates of Other Australians at all ages.

**Hospitalisations per 100,000 population**



*continued*

In 2016–17, the most commonly recorded dementia diagnoses for Indigenous Australians were:

- unspecified dementia (46%)
- Alzheimer’s disease (16%)
- delirium superimposed on dementia (13%)
- dementia due to psychoactive substance use (11%)
- vascular dementia (11%).

The proportion of unspecified dementia was much higher among Indigenous Australians than in the total population hospitalised with dementia (46% compared with 33%), as well as the proportion of dementia due to psychoactive substance use (11% compared with 2%). In contrast, the proportion of Alzheimer’s disease was much lower (16% compared with 27%).

Dementia was the principal diagnosis in 18% of dementia hospitalisations of Indigenous Australians. Dementia was an additional diagnosis in 82% of hospitalisations. The most common principal diagnoses were:

- *Factors influencing health status and contact with health services* (15%): more than two-thirds (67%) of these were for ‘Problems related to medical facilities and other health care’
- *Diseases of the respiratory system* (14%): 39% of these were for ‘Pneumonia, organism unspecified’
- *Injury, poisoning (e.g. poisoning by drugs, medicaments and biological substances) and certain other consequences of external causes* (13%): more than one-quarter (26%) of these were due to ‘Fracture of femur’.

## Rate of dementia hospitalisations has decreased by almost a quarter in the last decade

Between 2006–07 and 2016–17, the number of hospitalisations for dementia fluctuated between about 83,200 and 94,800 (Figure 2a). After accounting for differences in the age distribution and the size of the population over this period, the rate of dementia hospitalisations decreased by 23%—from 408 to 313 hospitalisations per 100,000 population (Figure 2b).

The numbers and rates of hospitalisations for the different types of dementia have also changed over time. Between 2006–07 and 2016–17, the number of hospitalisations decreased by 46% for unspecified dementia but increased for vascular dementia (84%), Alzheimer’s disease (35%) and delirium superimposed on dementia (609%) (Figure 2a). That is, the number of hospitalisations with delirium superimposed on dementia in 2016–17 (17,100) was 7 times as high as in 2006–07 (2,400). This may be due to the marked increase in awareness and education for delirium during this decade. For example, between 2006–07 and 2016–17, the Victorian Department of Health and Human Services released ‘Clinical Practice Guidelines for the Management of Delirium in Older People’ (2011) and the Australian Government Department of Health published ‘Delirium Care Pathways’ (2011).

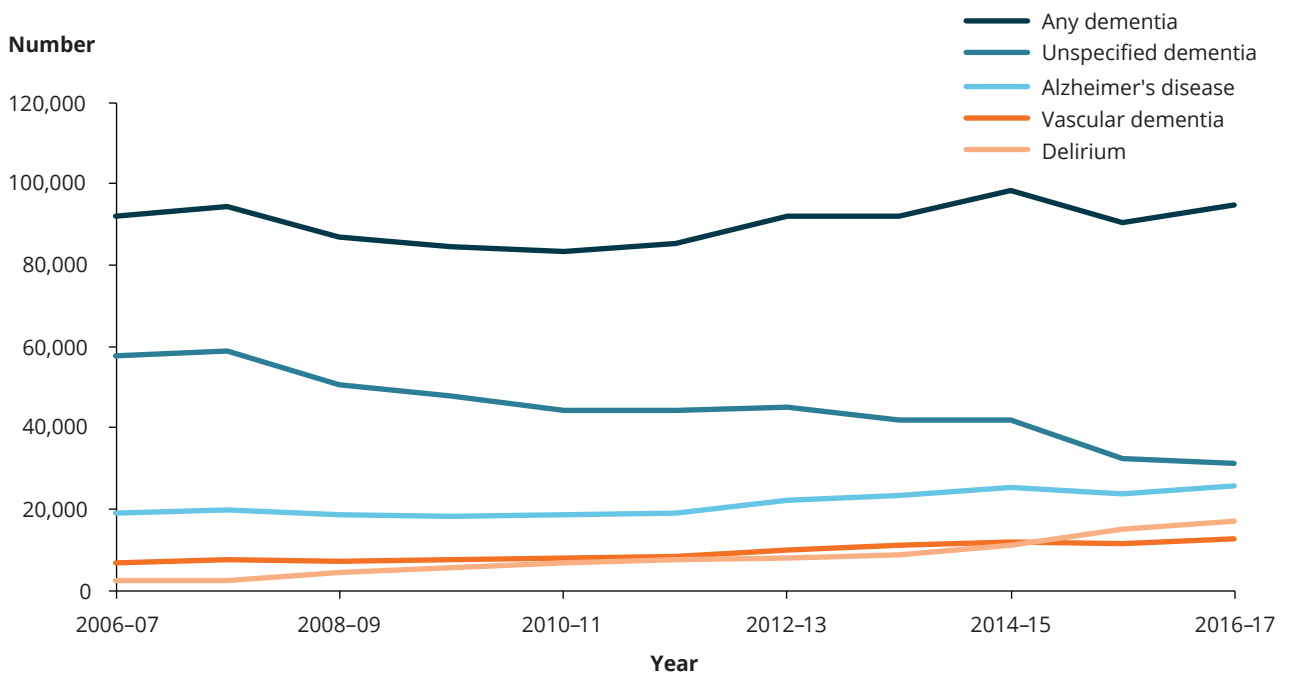
Similar to the trend in the number of hospitalisations by dementia type, between 2006–07 and 2016–17, the age-adjusted rate:

- decreased by 60% for unspecified dementia (Figure 2b)
- increased by 37% for vascular dementia
- increased by 416% for delirium superimposed on dementia.

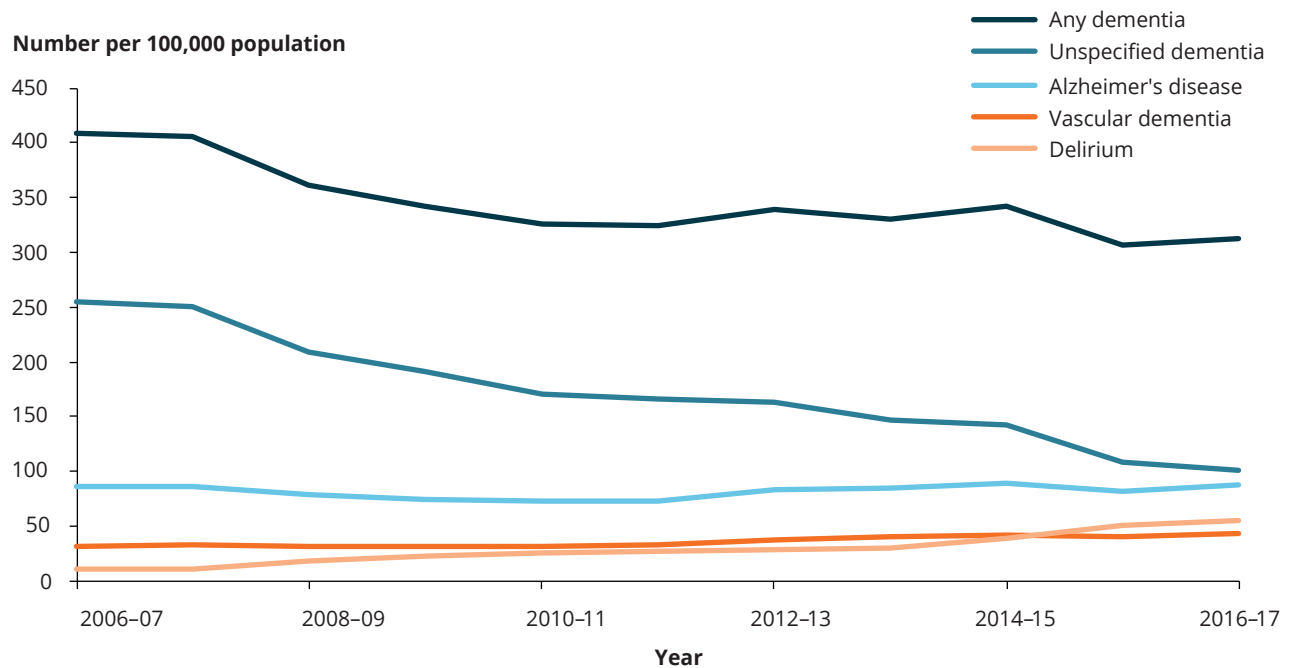
In contrast, while the number of hospitalisations for Alzheimer’s disease increased, the rate remained similar (86 and 87 hospitalisations per 100,000 population in 2006–07 and 2016–17, respectively).



**Figure 2a: Number of dementia hospitalisations, by dementia type, 2006-07 to 2016-17**



**Figure 2b: Age-standardised rates of dementia hospitalisations, by dementia type, 2006-07 to 2016-17**



*Notes*

1. It is possible for a dementia hospitalisation to have more than 1 type of dementia recorded as a diagnosis. Therefore, the numbers for dementia hospitalisations by dementia type are not mutually exclusive.
2. The data for these figures are in online Table S4.

Source: AIHW National Hospital Morbidity Database.

## Nearly half of all dementia hospitalisations ended with the patient going home

In 2016–17, nearly half (45,700; 48%) of the 94,800 dementia hospitalisations ended with the patient going home to their usual place of residence, which can include a residential aged care facility. Of the rest:

- 27,100 (29%) ended with continuing care in hospital (patient was transferred to another hospital, or the type of hospital care changed)
- 15,900 (17%) ended in a new admission to residential aged care
- 5,600 patients (6%) died in hospital.

This section examines the pathway for each hospitalisation, starting with whether it began as a new admission from the community or as an existing admission, which includes patients transferred from another hospital or those with a change in care type; whether the principal diagnosis was dementia or another condition; and the outcome of the hospitalisation. Overall, the most common pathway (38%) started as a new admission from the community to acute care and ended with discharge to the patient's home.

### Continuing care

In 2016–17, about 3 in 10 (27,100, or 29%) of the dementia hospitalisations ended with the patient being transferred to another hospital, or the type of hospital care changing (Figure 3). These 'continuing care' hospitalisations had the same proportion of males and females, and the majority were aged under 85 (14,800, or 54%).

The most common pathway resulting in the patient being transferred to another hospital, or the type of hospital care changing, was to commence as a new admission with a non-dementia condition as the principal diagnosis, accounting for 47% of these hospitalisations.

Females were more likely to take this pathway than males (50% compared with 45%), and it was also more common among those aged 90 and over (53%) than those aged under 80 (42%). The average number of days in hospital (11) for this common pathway was less than for the total 'continuing care' group (15).

### Going home

In 2016–17, almost half (45,700, or 48%) of the dementia hospitalisations resulted in the patient being discharged home to their usual place of residence, which can include to a residential aged care facility (Figure 3). Females comprised a greater proportion of 'going home' hospitalisations (53%) than males (47%), and the majority were aged under 85 (25,000, or 55%).

Similar to the 'continuing care' hospitalisations, the most common pathway resulting in going home was to commence as a new admission with a non-dementia condition as the principal diagnosis, accounting for 62% of 'going home' hospitalisations.

The proportion of hospitalisations 'going home' was similar for males and females (62% and 63%), and the proportion overall increased with increasing age, from 59% among people aged less than 75, to nearly two-thirds (67%) of people aged 90 or over. Compared with the total 'going home' group, hospitalisations on this common pathway were for slightly younger people (average age 81 compared with 82) and averaged twice the number of days in hospital (20 days compared with 10).

## New admission into residential aged care

### Data considerations

The outcome of a hospitalisation can be determined using the variable mode of separation on the National Hospital Morbidity Database, which records the status of the patient at the time of separation, and for some categories, the place to which the person was discharged or transferred. The mode of separation distinguishes between patients transferring into residential aged care for the first time (coded to the category discharge/transfer to a residential aged care service, unless this is a usual place of residence) and those returning to their usual place of residence.

While some modes of separation, such as death in hospital, are assumed to be reported accurately, a previous report by the AIHW, *Deriving key patient variables: a technical paper for the Hospital Dementia Services Project*, has shown differences in the reported and actual number of patients being transferred into residential aged care for the first time. Using linked hospitalisation and aged care data for New South Wales for 2006–07, this report highlighted that when using hospitalisation data only, 19% of hospitalisations for dementia ended in the patient being transferred to residential aged care for the first time. In comparison, linked hospitalisation and residential aged care data showed that the proportion was 14% (AIHW 2012).

As analyses in the report used hospitalisation data only, information in this section should be interpreted with caution.

In 2016–17, about 15,900 (17%) dementia hospitalisations ended in a new admission to residential aged care (Figure 3). These ‘new residential aged care’ hospitalisations had a higher proportion of females (55%) than males (45%), and the majority were aged 85 and over (8,300, or 52%).

Similar to the ‘continuing care’ and ‘separated home’ hospitalisations, the most common pathway resulting in an admission to residential aged care for the first time was to commence as a new admission with dementia as an additional diagnosis only, accounting for 44% of these hospitalisations.

Females were more likely to experience the most common pathway than males (46% compared with 41%), and it was also more common among those aged 90 and over (51%) than those aged under 75 (35%). Compared with the total ‘new residential aged care’ group, hospitalisations on this common pathway were for slightly older people (average age 85 compared with 84), and averaged nearly half the number of days in hospital (10 days compared with 19).

### Waiting for residential aged care

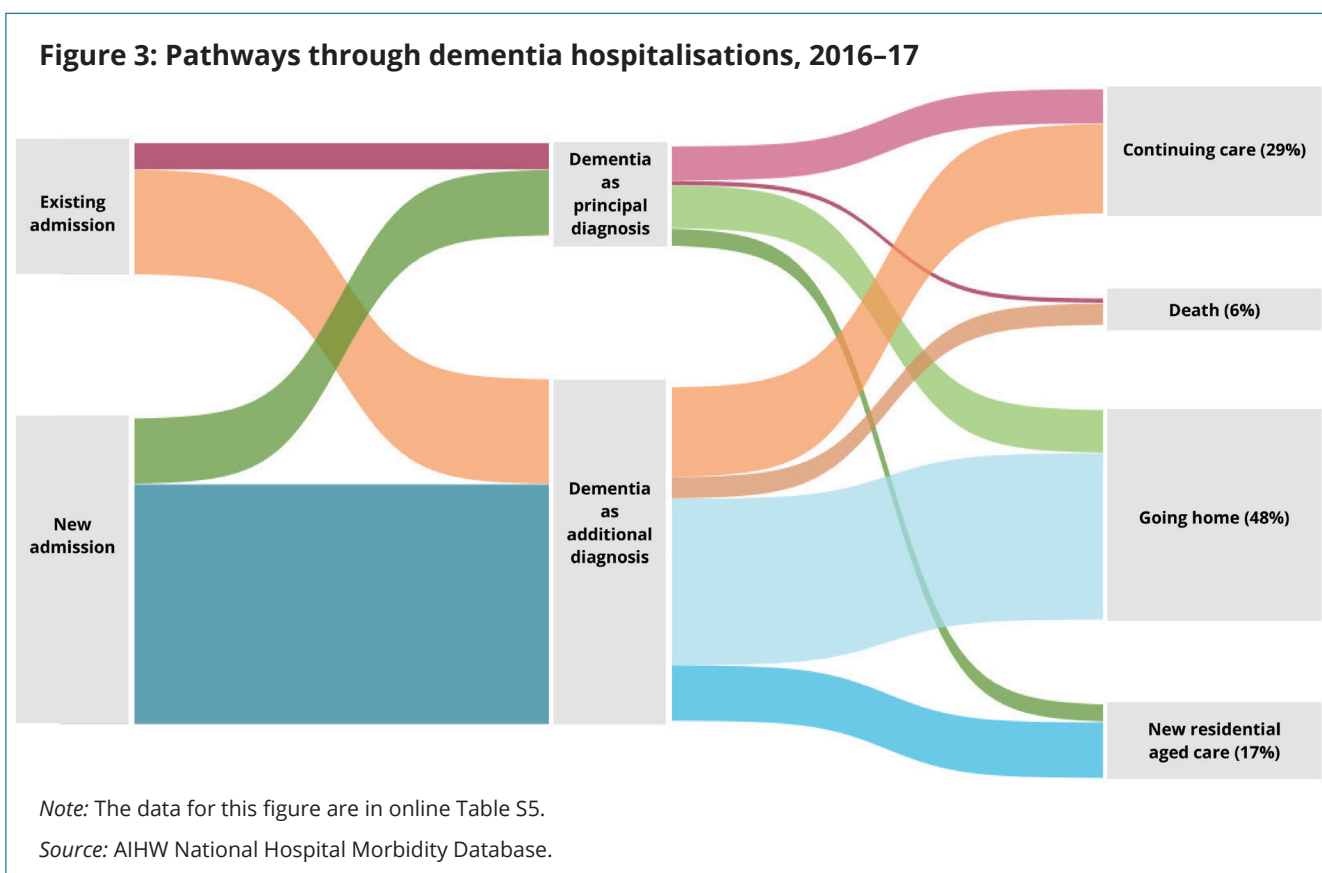
A hospital stay can, in some cases, be extended if the patient has been assessed as requiring admission into residential aged care and is awaiting placement.

In 2016–17, 12,500 (13%) dementia hospitalisations involved at least 1 diagnosis relating to waiting for residential aged care. Of these, 50% were male and 50% were female, the average age was 83 and the average length of stay was 21 days—nearly double that for dementia hospitalisations that did not include a waiting for residential aged care diagnosis (11 days).

## Death

In 2016–17, about 5,600 (6%) dementia hospitalisations ended in a death in hospital (Figure 3). These hospitalisations comprised a higher proportion of males (53%) than females (47%) and were most common among those aged 85 and over (3,300, or 58%).

The most common pathway was to commence as a new admission with dementia as an additional diagnosis only, accounting for more than half (55%) of dementia hospitalisations ending in death in hospital. Males and females dying in hospital were similarly likely to experience the most common pathway (53% and 57%), and this pathway was slightly more common among those aged 90 and over (57%) than those aged under 80 (52%). Compared with all hospitalisations ending in death, hospitalisations on this pathway averaged just over half the number of days in hospital (9 days compared with 16).



# Appendix A: Methods

## Definitions

### All hospitalisations for dementia

Diagnoses in hospitals data are recorded using the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM).

Dementia hospitalisations were defined as hospitalisations with at least 1 diagnosis of dementia, recorded as a principal and/or additional diagnosis (ICD-10-AM codes F00, F01, F02, F03, F05.1, F10.7, F13.7, F18.7, G30).

Hospitalisations for newborn without qualified days, hospital boarder and posthumous organ procurement (care types 7.3, 9.0 and 10.0) or where age was not reported or sex was recorded as intersex, indeterminate, not stated or inadequately described were excluded from the analysis.

### Specified dementia types

Selected from 'All hospitalisations for dementia in 2016–17', based on the diagnosis codes described in Table A1.

**Table A1: Defining dementia type in the National Hospital Morbidity Database 2016–17**

Dementia type	ICD-10-AM diagnosis code
Alzheimer's disease	F00.0, F00.1, F00.2, F00.9, G30.0, G30.1, G30.8, G30.9
Vascular dementia	F01.0, F01.1, F01.2, F01.3, F01.8, F01.9
Fronto-temporal dementia	F02.0 <i>and</i> G31.0 <sup>(a)</sup>
Dementia in Creutzfeldt-Jakob disease	F02.1 <i>and</i> A81.0 <sup>(a)</sup>
Dementia in Huntington's disease	F02.2 <i>and</i> G10 <sup>(a)</sup>
Dementia in Parkinson's disease	F02.3 <i>and</i> G20 <sup>(a)</sup>
Dementia in human immunodeficiency virus (HIV) disease	F02.4 <i>and</i> B22 <sup>(a)</sup>
Lewy Body dementia	F02.8 <i>and</i> G31.3 <sup>(b)</sup>
Dementia in other diseases (remainder)	F02.8 <i>and not</i> G31.3
Dementia due to psychoactive substance use	F10.7, F13.7, F18.7
Unspecified dementia	F03 <i>and not</i> F00.0, F00.1, F00.2, F00.9, G30.0, G30.1, G30.8, G30.9, F01.0, F01.1, F01.2, F01.3, F01.8, F01.9, F02.0, F02.1, F02.2, F02.3, F02.4, F02.8, F10.7, F13.7, F18.7
Delirium superimposed on dementia	F05.1 <i>and not</i> F00.0, F00.1, F00.2, F00.9, G30.0, G30.1, G30.8, G30.9, F01.0, F01.1, F01.2, F01.3, F01.8, F01.9, F02.0, F02.1, F02.2, F02.3, F02.4, F02.8, F03, F10.7, F13.7, F18.7

(a) Indicates that the dementia type is valid regardless of whether the hospitalisation also includes this code.

(b) Indicates that the dementia type is only valid when the hospitalisation also includes this code.

## Data source

### National Hospital Morbidity Database

The National Hospital Morbidity Database (NHMD) is a compilation of episode-level records from admitted patient morbidity data collection systems in Australian hospitals.

The data supplied are based on the National minimum data set (NMDS) for Admitted patient care and include demographic, administrative and length of stay data, as well as data on the diagnoses of the patients, the procedures they underwent in hospital and external causes of injury and poisoning.

The purpose of the NMDS for Admitted patient care is to collect information about care provided to admitted patients in Australian hospitals. The scope of the NMDS is episodes of care for admitted patients in all public and private acute and psychiatric hospitals, free-standing day hospital facilities, and alcohol and drug treatment centres in Australia. Hospitals operated by the Australian Defence Force, corrections authorities and in Australia's off-shore territories are not in scope but some are included.

The counting unit in the NHMD is a separation, described as hospitalisations in this report. Separation is the term used to refer to the episode of admitted patient care, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute care to rehabilitation).

Although hospital separations data are a valuable source of information about admitted patient care, they have limitations as indicators of ill health. Sick people who are not admitted to hospital are not counted and those who have more than 1 separation in a reference year are counted on each occasion.

The hospital separations data do not include episodes of non-admitted patient care provided in outpatient clinics or emergency departments. Patients in these settings may be admitted subsequently, with the care provided to them as admitted patients being included in the NHMD.

Data on diagnoses are recorded uniformly using the ICD-10-AM. Information on procedures was recorded using the Australian Classification of Health Interventions. These have been developed by the National Centre for Classification in Health (NCCH 2016).

The years of data used for this report were for the financial years 2006–07 to 2016–17. The data were extracted in September 2018 and small changes may have occurred since this time.

A complete data quality statement for the NHMD is available online at <[meteor.aihw.gov.au](http://meteor.aihw.gov.au)>.

### Quality of Indigenous status data

There is some under-identification of Indigenous Australians in the NHMD, but NHMD data for all states and territories are considered to have adequate Indigenous identification from 2010–11 onwards (AIHW 2013).

An AIHW study in 2011–12 found that the 'true' number of hospitalisations nationally for Indigenous Australians was about 9% higher than reported (AIHW 2013). NHMD data presented in this report have not been adjusted for under-identification, so are likely to underestimate the true level of Indigenous hospitalisations.

# Acknowledgments

This report was prepared by Mardi Ellis and Thao Vu of the Chronic Conditions Program Development Unit at the Australian Institute of Health and Welfare (AIHW), with valued input from Fadwa Al-Yaman, George Bodilsen, Mark Cooper-Stanbury, Fleur de Crespigny, Melanie Dunford, Dale Gruber, Kate Hafekost, Richard Juckes, Miriam Lum On, Lynelle Moon and Harene Ranjithakumaran, also of the AIHW.

External expert clinical review was provided by Professor Brian Draper of the University of New South Wales.

Dementia Australia funded this report.

## Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
AR-DRGs	Australian Refined Diagnosis Related Groups
DALY	Disability-Adjusted Life Years
DRGs	Diagnosis Related Groups
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification
NHMD	National Hospital Morbidity Database
NMDS	National minimum data set
WHO	World Health Organization

## References

- Australian Alzheimer's Research Foundation 2018. Viewed 3 December 2018, <<https://alzheimers.com.au/about-alzheimers/what-is-alzheimers/>>.
- ABS (Australian Bureau of Statistics) 2018. Causes of death, Australia, 2017. ABS cat. no. 3303.0. Canberra: ABS.
- AIHW (Australian Institute of Health and Welfare) 2012. Deriving key patient variables: a technical paper for the Hospital Dementia Services Project. Data linkage series no. 15. CSI 15. Canberra: AIHW.
- AIHW 2013. Australian Institute of Health and Welfare 2013. Indigenous identification in hospital separations data–Quality report. Cat. no. IHW 90. Canberra: AIHW.
- AIHW 2017. Australia's welfare 2017. Australia's welfare series no. 13. AUS 214. Canberra: AIHW.
- AIHW 2018. Australia's health 2018. Australia's health series no. 16. AUS 221. Canberra: AIHW.
- AIHW 2019. Australian Burden of Disease Study: impact and causes of illness and death in Australia 2015. Australian Burden of Disease series no. 19. Cat. no. BOD 22. Canberra: AIHW.
- DA (Dementia Australia) 2016. Economic cost of Dementia 2016–2056. Viewed 13 May 2019, <<https://www.dementia.org.au/files/NATIONAL/documents/The-economic-cost-of-dementia-in-Australia-2016-to-2056.pdf>>.
- DA 2018a. Types of dementia. Australia: Dementia Australia. Viewed 5 November 2018, <<https://www.dementia.org.au/information/about-dementia/types-of-dementia>>.
- DA 2018b. AUSTRALIAN Dementia Prevalence Estimates 2018–2058, commissioned research undertaken by National Centre for Social and Economic Modelling, University of Canberra. Canberra: DA.
- DA 2018c. Alzheimer's disease. Australia: Dementia Australia. Viewed 5 November 2018, <<https://www.dementia.org.au/about-dementia/types-of-dementia/alzheimers-disease>>.
- Department of Health and Ageing 2011. Delirium care pathways. Canberra: Department of Health and Ageing.
- Department of Health & Human Services 2011. Clinical Practice Guidelines for the Management of Delirium in Older People 2006. Victoria: Department of Health & Human Services.
- Draper, Brian 2013. Understanding Alzheimer's disease and other dementias. London: Jessica Kingsley Publishers.
- NCCH (National Centre for Classification in Health) 2016. Sydney: National Centre for Classification in Health. Viewed 8 April 2019, <<http://sydney.edu.au/health-sciences/ncch/about.shtml>>.
- WHO (World Health Organization) 2017. Dementia. Geneva: WHO. Viewed 6 November 2018, <<http://www.who.int/news-room/fact-sheets/detail/dementia>>.



## List of tables

Table A1: Defining dementia type in the National Hospital Morbidity Database 2016–17 . . . . .	15
--	----

## List of figures

Figure 1: Clinical complexity of dementia hospitalisations, 2016–17 . . . . .	6
Figure 2a: Number of dementia hospitalisations, by dementia type, 2006–07 to 2016–17 . . . . .	11
Figure 2b: Age-standardised rates of dementia hospitalisations, by dementia type, 2006–07 to 2016–17 . . . . .	11
Figure 3: Pathways through dementia hospitalisations, 2016–17 . . . . .	14

## Related publications

AIHW (Australian Institute of Health and Welfare) 2012. Dementia in Australia. Cat. no. AGE 70. Canberra: AIHW.

AIHW 2018. Australia's health 2018. Australia's health series no. 16. AUS 221. Canberra: AIHW.

AIHW 2019. Dispensing patterns for anti-dementia medications 2016–17. Cat. no. AGE 95. Canberra: AIHW.