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The last year of life: patterns in health service use and expenditure

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About

This study is the first in Australia to comprehensively examine service use and costs for 4 health services in the year before a person's death using linked data from AIHW's National Integrated Health Services Information Analysis Asset.

Data visualisations show service use and costs by sex, age, service type, cause of death, and use of residential aged care. Comparisons are shown to people who were not in their last year of life.

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Findings from this report:

- Average health service costs in the last year of life were highest for people who died from bowel cancer
- Health service use and associated costs varied by whether older people used residential aged care in their last year
- Average health service costs in the last year of life increased with age until, at age 70, they began to fall
- 97% of people used at least one health service in scope in their final year

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Summary

In 2020, 161,300 people died in Australia (AIHW 2022a). The types and number of health services people use in the year before death, as well as how much is spent on these services, are of key interest to health-care professionals and policy makers.

Australians use various health services in their final year of life. The frequency and type of services used can be affected by demographic and clinical factors. For example, some people have no contact with the health system in the 12 months before their death. These tend to be healthy young people and people who die suddenly from causes such as injury. Other people have high levels of health service use. These tend to be people aged 65 and over, people with multiple comorbidities (Legler et al. 2011; Luta et al. 2020) and people who die from specific causes, such as cancer.

Some international research and research for specific states and territories in Australia have explored patterns of health service use and costs in the period before death. This study is the first large-scale analysis for a range of health services and causes of death in Australia. It provides new insights, including:

- estimates of the total health expenditure in the last year of life for 4 health services
- detailed cost estimates of these services by whether people used residential aged care (that is, permanent residential and/or respite care) in their final year
- characteristics of people who used, and did not use, health services in their final year.

The findings help fill a major evidence gap in an area with growing policy relevance in Australia. This is particularly so in the context of population growth, ageing, increased longevity, a growing economy and increased spending on health.

This study uses linked administrative data from the AIHW's National Integrated Health Services Information Analysis Asset to examine health service use and costs for 4 main service types:

- public hospital emergency department (ED) presentations
- public (and some private) hospital admitted patient hospitalisations
- Medicare services covered by the Medicare Benefits Schedule (MBS), such as general practitioner (GP), specialist, pathology and diagnostic imaging services
- prescriptions supplied under the Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS).

The average number of services used and associated costs for people in their last year of life were estimated by age, sex, service type, cause of death and use of residential aged care services. Findings were compared to the average number of services used and associated costs in a single year for people not in their last year of life. The study period was between 1 July 2010 and 31 December 2017 for people in their last year of life and between 1 July 2010 and 31 December 2016 for people not in their last year of life. See Study background for more information on the NIHSI AA and the study methods.

Residential aged care services and associated costs are not included in this analysis. Rather, health service use and costs for people who used residential aged care services (permanent residential and/or respite care) at any point in their last year of life are compared with those who did not use such care in their last year. However, it is acknowledged that aged care services provide essential care and support to many people in their last year of life. In 2020–21, the Australian Government and state and territory governments spent over $23.6 billion on aged care, with the largest proportion (60%) spent on residential aged care (AIHW 2022b). Further work is needed to examine what proportion of aged care costs are for people in their last year of life.

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Key findings

Nearly all Australians use health services in their last year of life

Among the 1.14 million people who died over the study period, 97% (1.1 million people) used at least one of the 4 health services – hospital admissions, ED presentations, MBS services and prescriptions supplied under the PBS/RPBS – in their last year of life. This proportion was similar for males (97%) and females (98%) but slightly less for people aged 0–64 (91%).

8% of health service costs were spent on people in their last year of life

Overall, $296.1 billion (average of $45.6 billion per year) was spent on the 4 health service types over the study period (1 July 2010 to 31 December 2016). Of this, 8% ($23.6 billion; average of $3.6 billion per year) was spent on services for people in the last year of life.

Note that the expenditure estimates in this report differ from those published in the AIHW's *Health Expenditure Australia* reports (AIHW 2021) because of differences in the scope of the services and costs included in the NIHSI AA. For more information see 'Health services and costs excluded from the analysis' under Study background.

Average health service costs for people in their last year of life varied by age and sex

On average per year, $24,000 was spent on the 4 types of health services combined for a person in their last year of life.

By age, average costs for people in their last year of life ranged from $16,600 per person aged 20–29 to $37,100 per person aged 60–69. Average costs per person fell after the age of 70, down to $17,000 per person aged 80 and over. This pattern was similar for males and females.

Overall, males in their last year of life had a higher average annual cost than females ($26,300 and $21,600 per person respectively). Among people aged under 70, females had higher average annual costs per person than males. The greatest difference was among people aged 20–29, where costs were 90% higher for females than males ($25,300 compared with $13,200 per person). From age 70, males had higher average annual costs than females.

On average, people in their last year of life used more health services and had higher costs

For all 4 health services, on average people who died used more services in their last year of life than the rest of the population in a single year (that is, people not in their last year). The largest difference was for hospital admissions, with an average of 2.6 admissions per person in their last year of life compared with 0.1 admissions per person per year among those not in the last year of life.

Overall, the average annual health service cost per person for people in their last year of life was 14 times as high as for those not in the last year of life ($24,000 and $1,700 respectively).

The proportion of people not using any health service in their last year of life varied by age and cause of death

- 1.4% of people who died aged 65 and over did not use any of the 4 health services in their last year of life compared with 8.6% of people who died aged 0–64.
- 10% of people who died from suicide did not use any of the 4 health service types in their last year of life. This proportion was much higher than for other leading causes of death (for example, it was 3.1% for people who died from coronary heart disease).
- Among people who died aged under 65, 11% who died from coronary heart disease and 11% who died from accidental falls did not use a health service in their final year.

Health service costs were highest for people dying from cancer

Total health service costs were highest among people who died from cancer, followed by those who died from cardiovascular diseases. These two disease groups had the highest number of deaths over the period.

Among the 20 specific leading causes of death, the average annual cost in the last year of life was highest for people who died from colorectal (bowel) cancer ($40,700 per person), followed by breast cancer ($35,500 per person) and prostate cancer ($34,500 per person). It was lowest for deaths by suicide ($7,600 per person).

When looking at service use, average annual MBS claims in the last year of life were highest for people who died from breast and pancreatic cancers (both just over 100 services per person). It was lowest for deaths by suicide (22 services per person).

How did health service use and costs in the last year of life vary by use of residential aged care services?

Aged care services provide essential care and support to many people in their last year of life, with residential aged care services often providing end-of-life care. The use of aged care services and associated costs by people in their last year of life could not be examined in this study. Instead, the use and costs of 4 health services based on whether or not people used residential aged care services (permanent residential and/or respite care) in their last year of life were examined. This was explored among people aged 85 and over.

Dementia and coronary heart disease were leading causes of death

The leading underlying causes of death among people who used residential aged care in their last year of life were dementia (including Alzheimer's disease) (19%) and coronary heart disease (16%). For people who did not use residential aged care in their last year, the leading causes of death were coronary heart disease (17%) and cerebrovascular disease (8%).

Among people in their last year of life, people who used residential aged care services had:

- **Lower average health service costs.** Overall, average health service costs were 27% lower for people who used residential aged care in their last year of life than for those who did not. A similar pattern was found for all 4 health service types. However, it is acknowledged that aged care services provide essential health care and support to people in their last year of life which may not have been captured in this study.
- **A higher average number of prescriptions supplied but fewer hospital admissions and MBS claims.** The average number of prescriptions supplied under the PBS/RPBS was 27% higher among people who used residential aged care in their last year of life than for those who did not. However, on average hospital admissions and MBS claims were lower for people who used residential aged care in their last year than for those who did not (34% and 16% lower respectively).
- **Lower average health service costs for the 10 leading causes of death.** Among people who died from one of the leading causes of death, those who used residential aged care in their last year had lower average health service costs than those who did not use such care in their final year.

References

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Study background

What is the National Integrated Health Services Information Analysis Asset?

The National Integrated Health Services Information Analysis Asset (NIHSI AA) is an enduring linked data asset managed under the custodianship of the Australian Institute of Health and Welfare (AIHW). It is available for analysis by the AIHW and participating jurisdictions for approved projects.

This data asset has enabled a wide range of complex issues to be analysed for the first time. For example, the AIHW has reported on the use of general practitioners (GP) and specialist services by people with dementia (AIHW 2021a) as well as the feasibility of predicting early dementia using Medicare claims (AIHW 2021c). Using the NIHSI AA has also enabled a richer understanding of the patterns of health service use and costs in the year before death than was previously possible from a single data source. As the NIHSI AA is longitudinal, trends, patient pathways, disease prevalence and severity can be better understood and analysed over time.

The first iteration of the NIHSI AA (version 0.5) used in this study contains linked data from 2010–11 to 2016–17. It presents data on:

- admitted patient care services (in all public and, where available, private hospitals), ED services, and outpatient services in public hospitals for all participating states and territories (New South Wales, Victoria, South Australia and Tasmania)
- Pharmaceutical Benefits Scheme and Repatriation Pharmaceutical Benefits Scheme national data
- Medicare Benefits Schedule national data
- residential aged care national data (includes permanent residential aged care and/or respite care)
- National Death Index data (deaths between 1 July 2010 and 31 December 2017).

The NIHSI AA is updated annually, with the latest version including data to June 2019. Data for 2019–20 is expected to be added by September 2022. NIHSI AA version 0.5 was the most recent version available at the time of analysis for this report.

How were health services and costs examined?

In this study, linked data in the NIHSI AA (version 0.5) was used to examine records for 4 main health service types – hospital admissions, ED presentations, MBS services, and prescriptions supplied under the PBS/RPBS – in 2 groups:

- People in the last year of life – includes people who had a death record between 1 July 2010 and 31 December 2017. Health service use in the 12 months before death was examined for each person and associated costs calculated.
- People not in the last year of life – includes people who did not have a death record between 1 July 2010 and 31 December 2017. Health service use between 1 July 2010 and 31 December 2016 was examined for each person and associated costs calculated.

The number of services used and associated costs were calculated over the study period for each group. They were then averaged by the number of years examined (7.5 years for people in the last year of life and 6.5 years for people not in their last year) and the number of people in each group. This gave the average annual number of health services used and costs per person, which allows us to make a fair comparison between the 2 groups.

The study period for people in their last year of life included all years of data available. However, for people not in the last year of life, the study period ended on 31 December 2016 (rather than 31 December 2017) because those who died in the following 12 months could not be identified in the last year of data.

Residential aged care data was used to indicate whether people in each group had used residential aged care or not. In this study, residential aged care includes people who lived in permanent residential aged care for all or some of the study period and/or those who stayed one or more days in respite care during the study period.

Costs for MBS services and for prescriptions supplied under the PBS/RPBS include Australian Government benefits paid and patient out-of-pocket costs. Hospital admitted patient and ED presentation costs include government (Australian Government and state and territory governments) costs only and were estimated using the Independent Hospital Pricing Authority's activity-based funding formula.

See Technical notes for more information on the methods used to derive the 2 study populations and how people who used residential aged care were identified.

Key considerations when interpreting results

Considerations when interpreting results from this study include:

- Health service use and costs for people who died at the beginning of the study period will not cover the full 12 months before death. This may result in a slight underestimate of health services used and associated costs for people in their last year of life.
- Health service use outside the 12 months before death for people in their last year of life was excluded from the study. This may result in a slight underestimate of health services used and associated costs for people not in their last year, particularly those with chronic health conditions who use multiple services.

- Health service use and associated costs may show slightly different patterns if the length of time spent in residential aged care, as well as proximity to health service use for people not in the last year of life, was factored into the analysis.

While it was possible to calculate total expenditure for the 4 health service types, it was not possible to calculate total health services used, because of differences in their units of measure. Comparing health service types was not considered comparable (for example, one prescription is not equivalent to one hospital admission). Therefore, estimates of the total and average annual number of services used per person are reported separately for each health service type.

Health services and costs excluded from the analysis

Non-government hospital and ED costs, such as out-of-pocket and private health insurance, are not included. These are estimated to represent around 21% of health expenditure (AIHW 2021b: Table 29). Other health system costs not included in the NIHSI AA (version 0.5) and therefore not in the analysis are:

- admitted patient care services, ED services and outpatient services in all public hospitals in Queensland, Western Australia, the Australian Capital Territory and the Northern Territory
- admitted patient care services in private hospitals in any state or territory except Victoria
- ambulance services
- community health, allied health and dental services
- over-the-counter pharmaceuticals
- Department of Veterans' Affairs (DVA) primary care services (MBS equivalent and allied health) and residential care services
- community-based aged care, such as in-home palliative care and community nursing
- health-related care provided by residential aged care services that are not one of the 4 health service types examined
- community and residential mental health services
- mental health programs, such as headspace.

Aged care costs are not included in estimates for health system costs. However, aged care services can provide health-related services for people in their last year of life, with residential aged care services often providing end-of-life care.

Findings in this report indicate patterns of health service use and costs in the last year of life before the outbreak of the coronavirus disease (COVID-19) in Australia. Therefore, some patterns are likely to differ in 2020, 2021 and 2022, when lockdowns and restrictions affecting access to health services due to the pandemic were in place for some of the year.

What has previous research found?

Research is limited on this topic in Australia. Studies based on one-off linkage projects have been undertaken in New South Wales (Chróinín et al. 2018; Reeve et al. 2018) and Western Australia (Spilsbury and Rosenwax 2017), as well as survey data from the Australian Longitudinal Study on Women's Health linked to health administrative data (Dobson et al. 2020; Harris et al. 2016). Internationally, larger studies were undertaken in countries such as New Zealand (Blakely et al. 2015; Hamblin et al. 2018), England (Luta et al. 2020) and Scotland (Diernberger et al. 2021).

These studies showed that, in general, health service use was higher for people in their last year of life than for those of similar age not in their last year of life. However, health service use and costs among people in their last year of life varied according to type of service, age at death, proximity to death (for example, 6 or 12 months before death), cause of death, and place of death (such as a residential aged care facility or a hospital).

Key findings include:

- Health-care use and costs in the last year of life increase with proximity to death (Diernberger et al. 2021; Langton et al. 2016; Luta et al. 2020).
- Health service use is higher for people in their last year of life than for those of the same age not in their last year. However, as people age (particularly after age 90), this difference diminishes for most health service types (Hamblin et al. 2018).
- Overall health service costs are higher for young people in the last year of life compared with equivalent costs for people of the same age not in their last year of life. However, by age 95, there is little difference (Blakely et al. 2015).
- Older age at death, particularly of people aged 95 and over, is associated with lower hospital admission rates and costs (Chróinín et al. 2018; Diernberger et al. 2021; Hamblin et al. 2018; Langton et al. 2016; Reeve et al. 2018).
- Dying of cancer, compared with other causes, is associated with higher rates of hospitalisations, use of primary care services and prescription medicine, but lower rates of ED presentations (Diernberger et al. 2021; Langton et al. 2016; Reeve et al. 2018).
- Dying from dementia is associated with lower average hospital admissions than dying from other leading causes such as cardiovascular diseases and respiratory diseases (Diernberger et al. 2021; Dobson et al. 2020).
- Hospital use in the last year of life may be associated with factors independent of cause of death, such as the number and type of comorbidities and common principal diagnoses in hospital (Bardsley et al. 2019; Dobson et al. 2020; Luta et al. 2020). For example, a person may die from cancer but may be hospitalised for a pre-existing condition, such as cardiovascular disease.
- People who die in residential aged care incur lower health service costs than people who die in hospital (Langton et al. 2016).

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Case studies—how service use and costs may vary in the last year of life

These fictional case studies provide examples of how health services used by people in the last year of life vary under different circumstances:

- Grace, a grandmother in her 80s
- Matt, a father diagnosed with bowel cancer
- James, a young landscape gardener
- Carrie, a first-time mother.

These are not actual people, nor do they necessarily represent the circumstances of other Australians of the same age with the same health conditions. The case studies are designed to give readers a greater understanding of the diversity of health services used by people in their last year of life.

Grace's story

At 80, Grace, who was always on the ball, started forgetting little things, like where she left her keys or what she was supposed to get at the grocery store. Initially, she shrugged it off, joking that she must just be getting old. However, her forgetfulness got worse, and she even missed her grandson's birthday party. Her daughter, Sophie, recognised that this behaviour was unusual, so she took Grace to her GP. After follow-up tests, Grace was diagnosed with dementia.

Sophie organised a home-care provider to come to Grace's house a few days a week to help with household chores and home maintenance. As Grace's dementia progressed, Sophie became her full-time carer, and helped her with daily tasks such as bathing, household chores, transport and meal preparation. A few years after Grace's initial diagnosis, Sophie decided to move Grace into a residential aged care facility as she was no longer able to give Grace the care she needed.

After 18 months at the facility, Grace died after falling ill with a chronic urinary tract infection and influenza. She was 85.

Grace visited her GP regularly after receiving her dementia diagnosis. In her last year of life, she claimed 36 MBS services, which included GP visits and pathology tests. She also saw a geriatrician twice. Grace also claimed 66 prescription medications under the PBS. The total cost of health services used in her last year of life was $7,600, far below the overall average of $21,600 per person for females in their final year of life. Grace's out-of-pocket expenses were $470. These costs are only for Grace's use of specific health services (MBS services and prescriptions supplied under the PBS). Grace would likely have received other health care while living in residential aged care, so her total health-care costs are likely to have been higher if all services were included.

Matt's story

When Matt received a bowel cancer screening kit in the mail, he did not pay much attention. He did not do the test and thought nothing more about it. Two years later, he received another kit. His daughter, Amy, saw it on the dining room table and urged him to do the test. She said that someone at her work had taken part in the screening program and their test was positive. Matt was reluctant but agreed. A couple of weeks later he got a letter. His result was positive.

The next few months were a whirlwind of appointments, including a colonoscopy, scans, and pathology tests. Matt had never been keen on doctors, and now was being referred to a surgeon and oncologist. He just kept thinking, 'But I felt fine.'

Matt had surgery, chemotherapy and radiation treatment. Amy was a great support. With her encouragement, Matt made some big life changes. He stopped smoking, was eating less takeaway, and was going for regular walks. As they sat in the waiting room for his 6-monthly check-up, Matt could see that Amy was worried. Eleven months later, Matt died. He was 66.

In his last year of life, Matt was admitted to hospital 7 times, including 2 trips to the ED. His hospital costs amounted to $25,000 over his last 12 months. Before the cancer diagnosis, Matt had rarely used other medical services. In his last year, he claimed 123 health services on the MBS, one-third of which were for pathology. Matt also had 78 medications dispensed under the PBS. Matt's MBS and PBS services cost $19,000. All of Matt's health-care costs in his last year were above the national average. The costs of his health services ($47,700) were higher than the average for his 60–69 age group ($36,300). Matt paid $2,500 in out-of-pocket costs for the MBS services and PBS prescriptions used in his last year.

James's story

James was a healthy and happy 22-year-old. After graduating from Year 12, he thought about applying for university, but James loved working outdoors so was not sure that another 3 to 4 years studying was right for him. James soon found the perfect job as a landscape gardener.

James and his long-term girlfriend, Suzie, had camped along the East coast every Easter long weekend since they began dating. They had been eagerly counting the days until their next trip, but about a week before they were due to leave James felt he was getting sick. He went to see his GP who suggested that James take a couple of days off work and rest.

James and Suzie set off on their holiday a few days later. About an hour into their drive James started to feel tired. As they rounded a corner, James noticed a few kangaroos near the road but did not see the one right in front of him. He swerved and hit a tree. James and Suzie died on impact.

In his last year of life, James used one health service – a GP consultation claimed on the MBS. The cost for his health services over the 12 months before his death was $88, well below the average cost per person of $24,000.

Carrie's story

Carrie was 42 when she discovered she was pregnant. She and her partner, Paul, were delighted. They had delayed having children until they were financially secure, but what was supposed to be a couple of years turned into 5, and then 10. They were aware of the risks of having a baby later in life. They knew that first-time mothers aged 40 and over were more likely to experience complications during pregnancy and birth than younger mothers. But Carrie also knew that maternal deaths in Australia were rare. In 2019, there were 17 maternal deaths in Australia (AIHW 2021). Also, Carrie knew she was fit and healthy. She did not smoke or drink. She was not overweight and felt great.

The first trimester was tough. Carrie was at the doctor for something new every week. Paul took her to the hospital ED twice because he was so worried. By the 26th week of the pregnancy, Carrie had developed gestational diabetes, which meant more visits to her obstetrician and doctor, as well as to a dietician.

Carrie and Paul's baby boy was born at 38 weeks after a prolonged labour that ended with Carrie having a caesarean section. Carrie started to feel unwell a couple of days after she had been discharged from hospital. By that night, she was back in hospital with sepsis. She died the next day.

The cost of health services used in Carrie's last year of life was $37,000, higher than the average cost per person for females ($21,600). Nearly 90% of her costs were for 2 hospital admissions ($33,000). The remaining costs were $3,450 for 48 services claimed under the MBS (including GP visits, pathology tests and ultrasounds) and $350 for prescription medication supplied under the PBS. Carrie paid $1,150 in out-of-pocket costs for services supplied under the MBS and PBS for the year.

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Health service use and expenditure in the last year of life

The total estimated cost of the 4 health services examined (hospital admissions, ED presentations, MBS services, and prescriptions supplied under the PBS/RPBS between 1 July 2010 and 31 December 2016) was $296.1 billion, an average of $45.6 billion per year. Of this, 8% ($23.6 billion; average of $3.6 billion per year) was spent on services for people in the last year of life. The expenditure estimates in this report differ from those published in the AIHW's Health Expenditure Australia reports (AIHW 2021b) because of differences in scope of services and costs included. For more information see 'Health services and costs excluded from the analysis' under Study background.

Nearly all Australians use health services in their last year of life

Among the 1.14 million people who died over the study period, 97% (1.1 million) used at least one of the 4 health services in their last year of life. This proportion was similar for males (97%) and females (98%) but slightly less for people aged 0–64 (91%).

The visualisations in this section explore health service use and costs by sex, age, health service type, and whether people were in their last year of life.

Health service use and costs increase until age 70

For each health service type, the average annual number of services used and associated costs for people in their last year of life generally increased with age until age 70, after which they fell. For example:

- average annual use of MBS services increased from 22 services per person at age 0–9 to 84 services at age 60–69, before falling to 54 services for people aged 80 and over (Figure 1a).
- average annual costs per person for the 4 health services combined generally increased from $21,000 at age 0–9 to $37,100 at age 60–69. They then fell to $17,000 for people aged 80 and over (Figure 1b).

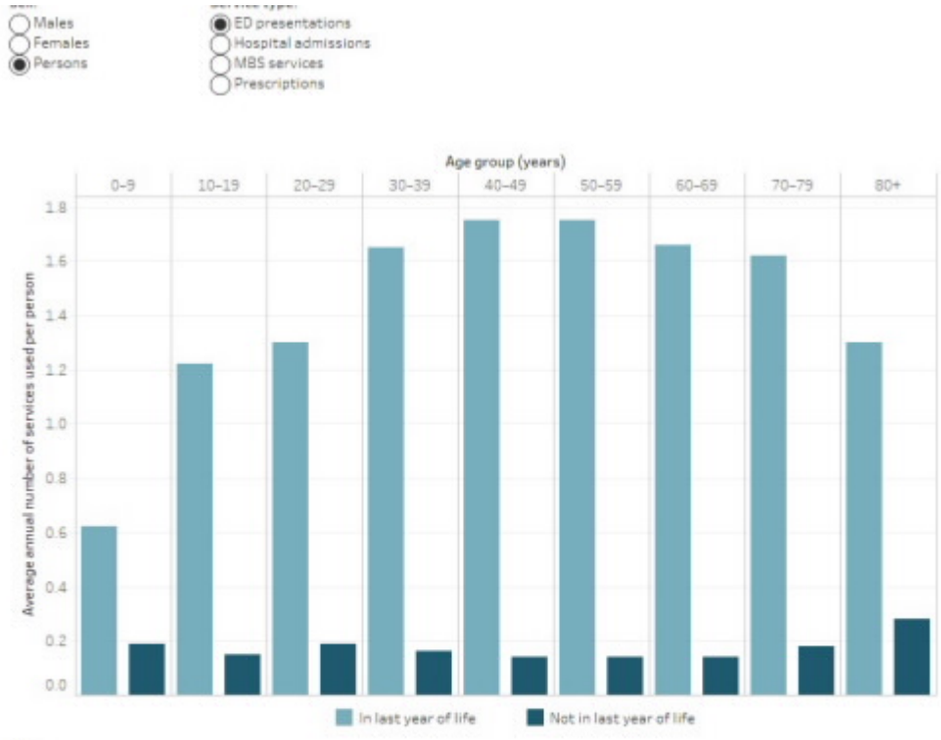
The fall in service use and costs in the older age groups coincides with when people most often enter residential aged care (AIHW 2021a). Given that costs of health-care services in residential aged care were not included in this study, health service costs for older people are likely to be underestimated.

Among people not in the last year of life, average annual service use increased steadily with age for each service type. However, in each age group, average annual service use per person was higher among people in their last year of life than among those not in their last year. These patterns were similar for males and females.

Average annual costs per person were much higher for young people in their last year of life than for young people not in their last year of life. With those aged 10–19, for example, average costs were 49 times as high for females and 39 times for males in their last year of life ($27,200 per female and $21,600 per male) compared with those not in their last year of life ($560 per female and $550 per male). However, by age 80 and over, the difference fell to 2.8 times as high for females ($14,700 compared with $5,200 per female) and 3.5 times as high for males ($19,900 compared with $5,700 per male).

Figure 1: Average annual number of health services used (a) and costs (b) per person by sex, age, service type and whether in last year of life

Figure 1 is a bar chart showing the average annual number of health services used (Figure 1a) and average annual cost of these services (Figure 1b) per person by sex, 10-year age group (from 0–9 years to 80+ years), health service type (ED presentations, hospital admissions, MBS services and prescriptions supplied under the PBS/RPBS) and whether people were in their last year of life or not. For each health service type, the average annual number of services used and associated costs for people in their last year of life generally increased with age until age 70, after which they fell. Average annual health service use and costs among people not in their last year of life generally increased steadily with age for each of the health service types except ED presentations. These patterns for people in and not in their last year of life were similar for females and males.



Notes:
1. Analysis for the *In last year of life* group includes services used by this group in the 12 months before their death. This includes services used between 1 July 2010 and 31 December 2016, presented as average number of services used, per person.
2. Analysis for the *Not in last year of life* group includes services used by this group between 1 July 2010 and 31 December 2016, presented as average number of services used per person over a 12-month period.
3. See Technical notes for more information on the linked dataset, study groups, services and costs used in this study.
Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.
http://www.aihw.gov.au

Average annual costs were 14 times as high for people in their last year of life

For each health service type, average annual service use was higher for people in their last year of life than for those not in their final year (Figure 2a). Average annual service use for people in their last year of life, when compared with those not in their final year, was:

- 26 times as high for hospital admissions (2.6 per person in last year of life compared with 0.1 per person not in their last year of life)
- 7 times as high for ED presentations (1.4 compared with 0.2)
- 5.7 times as high for MBS services (63 compared with 11)
- 7.5 times as high for prescriptions supplied under the PBS/RPBS (61 compared with 8.2).

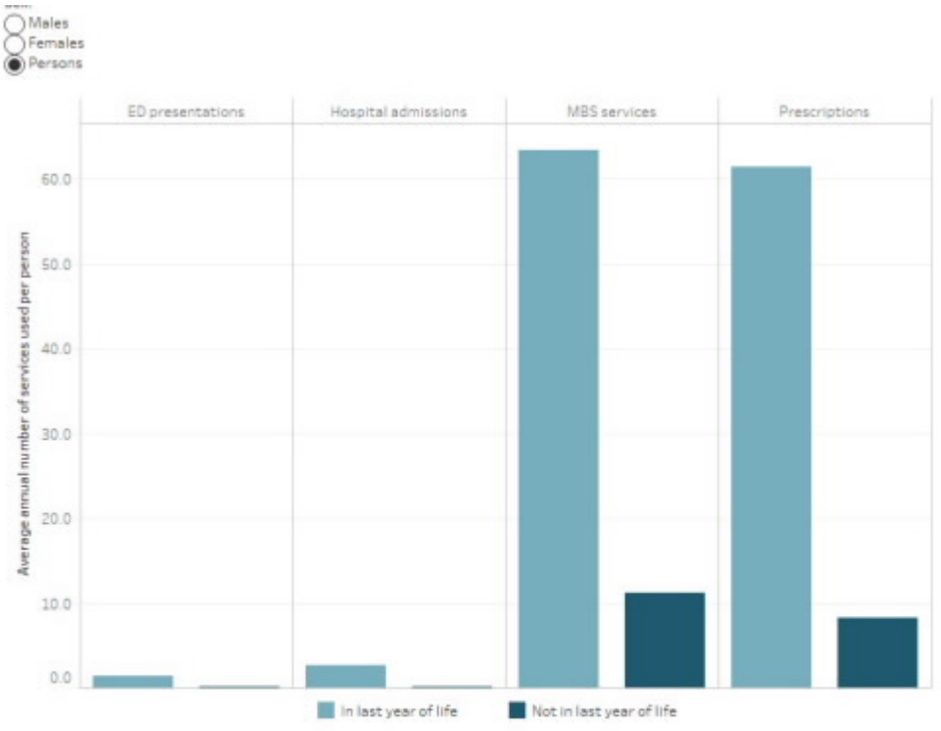
Overall, the average annual cost per person for the 4 services combined for people in their last year of life was 14 times as high as the annual average cost person for people not in their final year ($24,000 and $1,700 per person respectively). Average annual costs for people in their last year of life, compared with those not in their final year, was:

- 30 times as high for hospital admissions ($15,100 per person in last year of life compared with $500 per person not in their last year of life)
- 14 times as high for ED presentations ($760 compared with $54)
- 11 times as high for prescriptions supplied under the PBS/RPBS ($3,800 compared with $353)
- 5.5 times as high for MBS services ($4,300 compared with $780).

When adjusting for the age profiles of these 2 study groups, the difference in the age-standardised average annual cost per person was slightly greater than the difference in the crude average annual costs per person (Table S2b).

Figure 2: Average annual number of health services used (a) and costs (b) per person by sex, service type and whether in last year of life

Figure 2 is a bar chart showing the average annual number of health services used (Figure 2a) and average annual cost of these services (Figure 2b) per person by sex, health service type (ED presentations, hospital admissions, MBS services and prescriptions supplied under the PBS/RPBS) and whether people were in their last year of life or not. For each health service type, average annual service use and costs were higher for people in their last year of life than for those not in their final year. Overall, the average annual cost per person for the 4 services combined for people in their last year of life was 14 times as high as the annual average cost person for people not in their final year ($24,000 and $1,700 per person respectively). The greatest difference was for hospital admissions, where the average annual cost per person in their last year of life was 30 times as high as people not in their last year of life ($15,100 and $500 per person, respectively).



Notes:
1. Analysis for the *In last year of life* group includes services used by this group in the 12 months before their death. This includes services used between 1 July 2010 and 31 December 2016, presented as average number of services used, per person.
2. Analysis for the *Not in last year of life* group includes services used by this group between 1 July 2010 and 31 December 2016, presented as average number of services used per person over a 12-month period.
3. See Technical notes for more information on the linked dataset, study groups, services and costs used in this study.
Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.
http://www.aihw.gov.au

Australian Government
Australian Institute of
Health and Welfare

Health service use and expenditure by cause of death

This section examines how health service use and costs in the last year of life differ by the main (underlying) cause of death. These are shown by both:

- broad causes based on chapter level groups in the International Classification of Diseases and Related Health Problems: 10th Revision (ICD-10) (for example, diseases of the circulatory system)
- specific or underlying causes of death (for example, coronary heart disease). Only the 20 leading causes in Australia were examined.

Visualisations in this section explore health service use and costs in the last year of life by cause of death (broad or underlying), sex, age and service type (hospital admissions, ED presentations, MBS services, and prescriptions supplied under the PBS/RPBS).

Health expenditure over the study period for the 4 health services examined was highest among people who died from cancer ($10.2 billion), followed by cardiovascular diseases ($4.7 billion). These two groups also had the highest number of deaths over the period (335,000 and 331,000 deaths respectively).

Younger people were less likely to use a health service in their last year of life

Overall, 2.7% of people who died did not use any of the 4 health services in their last year of life. The highest proportion of people who did not use any of the 4 services in their last year of life was among people who died by suicide (10%).

By broad cause of death, 8.1% of people who died from external causes (injury and poisoning) did not use a service in their last year of life. For all other broad causes, less than 3% did not use a service in their last year of life.

The proportion of people who did not use any health service in their last year of life varied by age and underlying cause of death:

- 8.6% of people who died aged 0–64 did not use a service in their last year of life compared with 1.4% of people who died aged 65 and over
- 11% of people who died aged 0–64 from either coronary heart disease, accidental falls or by suicide did not use a service in their last year
- among people who died aged 65–84, 3.5% who died by suicide and 3.2% who died from coronary heart disease did not use a service in their last year
- among people who died aged 85 and over, the proportion who did not use a service in their last year of life was less than or around 2% for each leading cause of death.

Among males aged 0–64, 13% who died by suicide, 12% who died from coronary heart disease, and 12% who died from accidental falls did not use a service in their last year of life. For females of the same age, 7.4% who died from influenza and pneumonia did not use a service in their final year.

By disease group, average health service costs were highest for people who died from infectious diseases

Figure 3 shows for each person, the average annual number of health services (Figure 3a) and average annual cost of these services (Figure 3b) by age, sex, and service type for each broad cause of death grouping.

Overall, the average annual cost per person in the last year of life for the 4 health services combined was highest among people who died from infectious diseases ($35,200 per person) followed by neoplasms (cancer; $35,000).

By service type, the highest average annual costs in the last year of life were:

- $27,700 per person for hospital admissions and $1,100 per person for ED presentations for people who died from infectious diseases. Per person, this group had the third highest average annual number of hospital admissions (3.7, behind people who died from genitourinary diseases (7.4) and from endocrine, nutritional and metabolic diseases (4.3)) and the highest number of ED presentations (2.0).
- $7,600 per person for MBS services and $7,500 per person for prescriptions supplied under the PBS/RPBS for people who died from cancer. Per person, this group had the highest average annual number of MBS services (97.5) and the fourth highest number of prescriptions supplied under the PBS (64, with the highest being for people who died from respiratory diseases (76)).

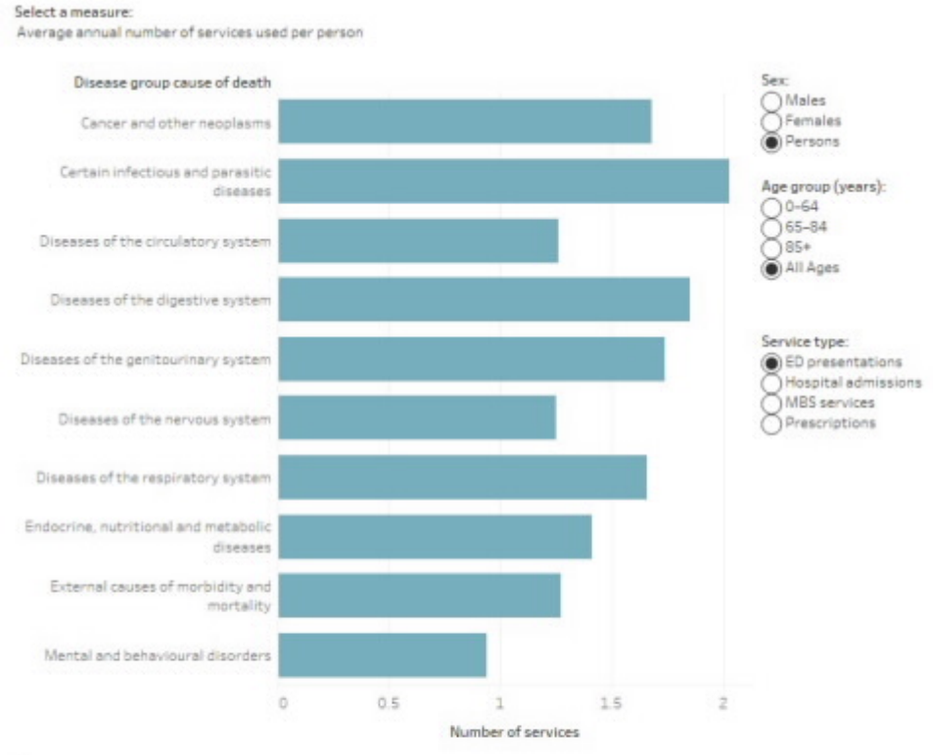
Overall and for each service type, average annual costs were lowest for people who died from mental and behavioural disorders ($9,100 per person) and external causes, meaning injury and poisoning ($12,800). These 2 groups often had the lowest number of services used per person for each service type.

Among people who died from infectious diseases, average annual costs for the 4 health services combined decreased with age from $55,300 per person for those aged 0–64 to $19,100 for those aged 85 and over. By sex, the average annual cost of health services in the last year of life was highest for females who died from cancer ($33,200 per female) and males who died from infectious diseases ($40,000 per male).

This study relates to the period before the outbreak of COVID-19 in Australia. The leading causes of death from infectious diseases over the study period were streptococcal and other sepsis (ABS 2021).

Figure 3: Health services used (a) and costs (b) (total and average annual per person) in the last year of life by broad cause of death, sex, age and service type

Figure 3 is a bar chart showing the total and average annual number of health services used (Figure 3a), and the total and average annual cost of these services (Figure 3b), per person by age group (0–64, 65–84, 85+ and All ages), sex, and service type (ED presentations, hospital admissions, MBS services and prescriptions supplied under the PBS/RPBS) for each broad cause of death grouping. MBS service use was highest for people who died from neoplasms (cancer; 97.5 services per person); prescriptions supplied under the PBS/RPBS were highest for people who died from respiratory diseases (76 per person); hospital admissions were highest for people who died from genitourinary diseases (7.3 per person); and ED presentations were highest for people who died from infectious diseases (2.0 per person). Overall, the average annual cost per person in the last year of life for the 4 services combined was highest among people who died from infectious diseases ($35,200 per person) followed by cancer ($35,000).



Notes:
1. Disease groups are based on ICD-10 chapter level groupings.
2. Only disease groups with over 15,000 deaths between 1 July 2010 and 31 December 2017 are shown.
3. Analysis for people in their last year of life includes services used in the 12 months before their death. This includes services used between 1 July 2010 and 31 December 2016 for people who died between 1 July 2010 and 31 December 2017.
4. See Technical notes for more information on the linked dataset, study groups, services and costs used in this study.

Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.
http://www.aihw.gov.au

By specific cause of death, average health service use and costs were highest for people who died from bowel cancer

The average annual cost of the 4 health services combined in the last year of life was highest among people who died from bowel (colorectal) cancer ($40,700 per person), followed by breast cancer ($35,500 per person), and among males who died from prostate cancer ($34,500 per male) (Figure 4b).

Looking at average annual service use per person in the last year of life by service type (Figure 4a):

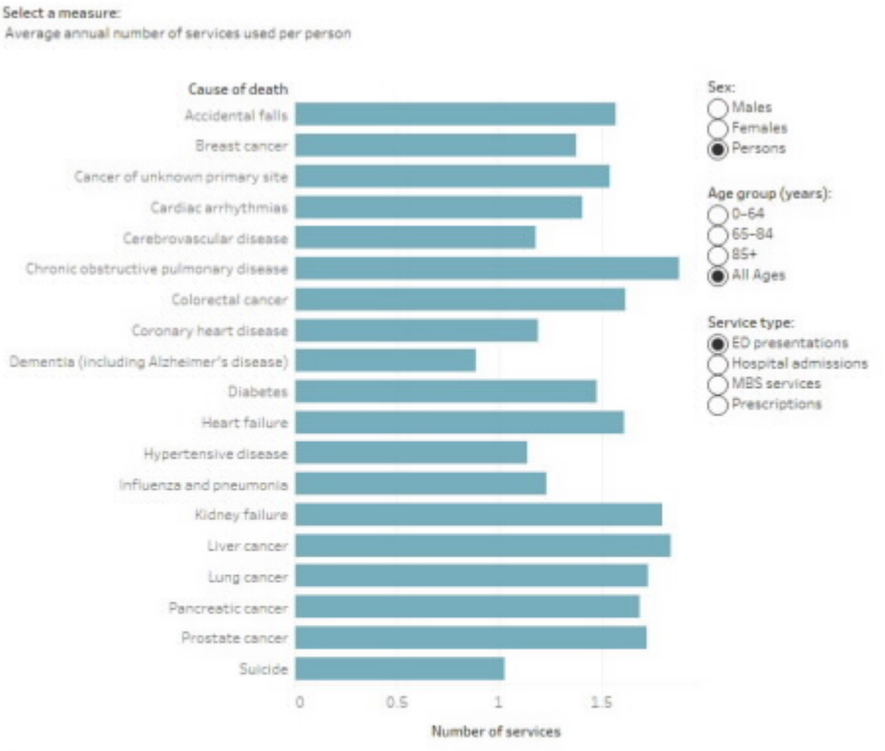
- MBS service use was highest for females who died from breast cancer (103 services per female) and males who died from pancreatic cancer (107 services per male)
- prescriptions supplied under the PBS/RPBS and ED presentations were highest for people who died from chronic obstructive pulmonary disease (COPD) (87 and 1.9 per person respectively)
- hospital admissions were highest among people who died from kidney failure (9.1 per person).

Deaths by suicide had the lowest average annual health service use per person in the last year of life for all service types. This finding should be interpreted with caution as it is likely that other services not included in the NIHSI AA may have been used (for example, ambulance, DVA-funded services, community and residential mental health services, homeless services and local drop-in health services), as well as mental health programs (like headspace). However, these results are still informative as they provide policy makers with a sense of how people who die by suicide use health services and interact with the health system (or not) in their last year of life.

Figure 4: Health services used (a) and costs (b) (total and average annual per person) in the last year of life by underlying cause of death, sex, age and service type

Figure 4 is a bar chart showing the total and average annual number of health services used (Figure 4a), and the total and average annual cost of these services (Figure 4b), per person by age group (0–64, 65–84, 85+ and All ages), sex and service type (ED presentations, hospital admissions, MBS services and prescriptions supplied under the PBS/RPBS) for the 20 leading underlying causes of death. MBS service use was

highest for females who died from breast cancer (103 services per female) and males who died from pancreatic cancer (107 services per male); prescriptions supplied under the PBS/RPBS and ED presentations were highest for people who died from chronic obstructive pulmonary disease (87 and 1.9 per person respectively); and hospital admissions were highest among people who died from kidney failure (9.1 per person). The average annual cost of the 4 health services combined for people in the last year of life was highest among people who died from bowel (colorectal) cancer ($40,700 per person), followed by breast cancer ($35,500 per person), and among males who died from prostate cancer ($34,500 per male).



Notes:
1. Leading causes of death are based on underlying causes of death in 2019, classified using an AIHW-modified version of Becker et al. 2006.
2. Analysis for people in their last year of life includes services used in the 12 months before their death. This includes services used between 1 July 2010 and 31 December 2016 for people who died between 1 July 2010 and 31 December 2017.
3. See Technical notes for more information on the linked dataset, study groups, services and costs used in this study.
Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.
http://www.aihw.gov.au

Health service use and expenditure for people who used residential aged care services

Previous Australian-based research suggests that the use of health services can change after people enter permanent residential aged care. For example, on average after entry, the median number of prescriptions dispensed and average number of GP services increased, but the average number of specialist services decreased (AIHW 2020; Inacio et al. 2021).

While this study did not explore health service use and costs before and after entry into residential aged care, patterns of health service use and associated costs were compared between people who used and did not use residential aged care services (permanent residential and/or respite care) in their final year. For those who used such services, not all would have spent the entire 12 months in aged care or would necessarily have died in a residential aged care facility. Some people living in aged care could have died elsewhere, such as in hospital (AIHW 2021c).

The analysis in this section was restricted to people aged 85 and over, as most deaths in aged care occur in this age group.

Visualisations in this section explore health service use and costs by sex, service type (hospital admissions, ED presentations, MBS services, and prescriptions supplied under the PBS/RPBS) and whether people were in their last year of life.

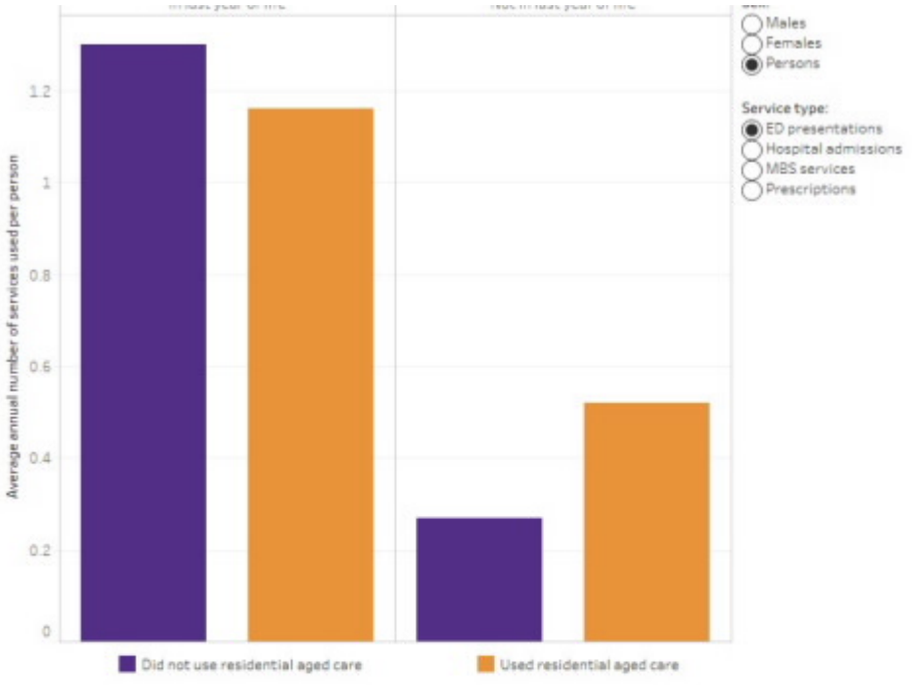
More prescriptions supplied to people who used residential aged care in their last year of life

On average, people who used residential aged care in the last year of life had (Figure 5):

- 27% more prescriptions supplied under the PBS/RPBS than those who did not use residential aged care in their final year (72 and 57 prescriptions per person respectively). A similar result was found for people not in their last year of life. These findings are consistent with those previously reported for the average number of prescriptions dispensed before and after entry into permanent residential aged care (AIHW 2019; AIHW 2020).
- Fewer hospital admissions and MBS services (1.3 and 45 per person respectively) than people who did not use residential aged care in their final year (2.0 and 53 per person). The lower use of MBS services among people who used residential aged care may be partly due to some of these people accessing GPs by other channels, such as through DVA health-care services, which are not included in MBS claims.
- Similar number of ED presentations than people who did not use residential aged care in their final year (1.2 and 1.3 per person respectively). In contrast, among people not in the last year of life, those who used residential aged care had a higher average annual number of ED presentations per person than people who did not use residential aged care.

Figure 5: Average annual number of health services used per person by sex, service type, use of residential aged care and whether in last year of life

Figure 5 is a bar chart showing the average annual number of health services used per person for people aged 85 and over by sex, service type (ED presentations, hospital admissions, MBS services and prescriptions supplied under the PBS/RPBS), whether they used residential aged care (respite and/or permanent residential aged care) and whether they were in their last year of life or not. On average, people who used residential aged care in the last year of life had 27% more prescriptions supplied under the PBS/RPBS than those who did not use residential aged care in their final year (72 and 57 prescriptions per person respectively). A similar result was found for people not in their last year of life. For MBS services and hospital admissions, the average number of services used per person was lower for people who used residential aged care in their last year of life compared with people who did not use residential aged care in their last year of life. The average number of ED presentations per person was similar among people who used and did not use residential aged care in their last year of life.



Notes:
1. This figure only presents data for people aged 85 and over.
2. Analysis for the *In last year of life* group includes services used by this group in the 12 months before their death. This includes services used between 1 July 2010 and 31 December 2016, presented as average number of services used, per person.
3. Analysis for the *Not in last year of life* group includes services used by this group between 1 July 2010 and 31 December 2016, presented as average number of services used per person over a 12-month period.
4. *Used residential aged care* includes both respite and/or permanent residential aged care.
5. See Technical notes for more information on the linked dataset, study groups, services and costs used in this study.

Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.
http://www.aihw.gov.au

Average costs were lower for people who used residential aged care in their last year of life

Of the $23.6 billion spent on the 4 health services for people in their last year of life, $6.1 billion (26%) was on those who used residential aged care. For people who died aged 85 and over, $3.2 billion (55%) was spent on people who used residential aged care in their final year.

Average annual costs for people who used residential aged care in their last year were 27% lower than for those who did not use such care in their final year ($12,500 and $17,000 per person). These costs were higher than for people not in the last year of life, irrespective of whether they used residential aged care (Table 1).

Table 1: Average annual costs per person, by whether in last year of life and use of residential aged care

	In last year of life	Not in last year of life	Ratio
Used residential aged care	$12,488	$6,852	1.8
Did not use residential aged care	$17,023	$5,126	3.3
Ratio	0.7	1.3	. .

Note: Includes costs for services for people aged 85 and over only.

Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.

Average annual costs for people who used residential aged care in their final year were higher for men than women ($14,600 per male compared with $11,400 per female) (Figure 6).

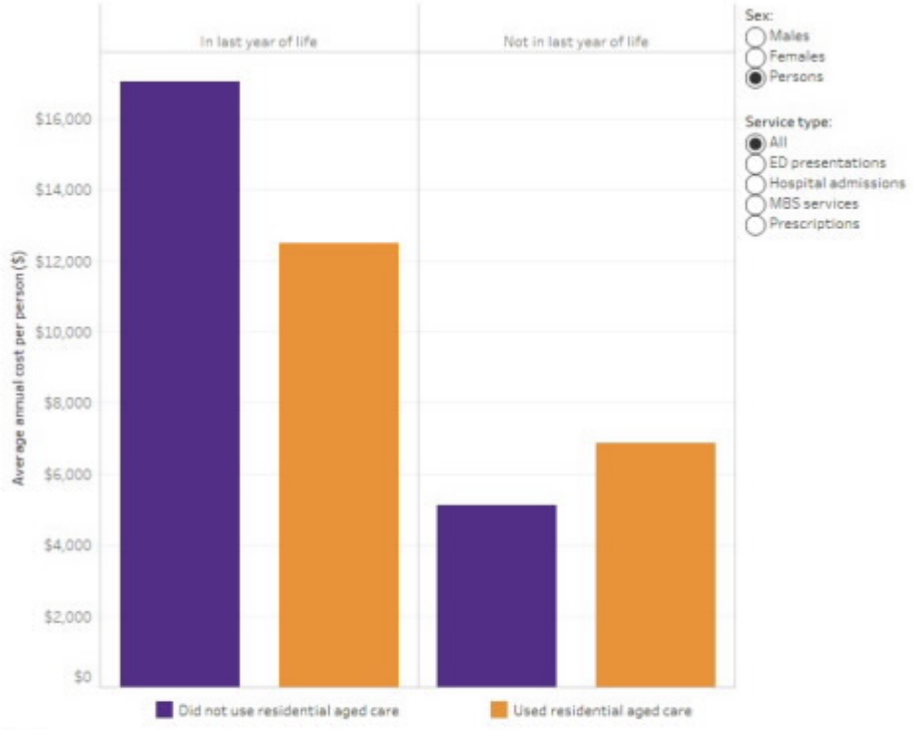
Average annual costs per person for those who used residential aged care in their last year of life were lower for all 4 health service types (Figure 6):

- 32% lower for hospital admissions ($7,100 per person compared with $10,400 for people who did not use residential aged care in their final year)
- 16% lower for ED presentations ($580 per person compared with $700)
- 23% lower for MBS services ($2,600 per person compared with $3,400)
- 14% lower for prescriptions supplied under the PBS/RPBS ($2,200 per person compared with $2,500).

Note that costs of aged care or any health care (and associated costs) delivered as part of community aged care and residential aged care services (and not through MBS, PBS/RPBS or hospital care), as well as outpatient care, are not included in these estimates.

Figure 6: Average annual health service costs per person by sex, service type, use of residential aged care and whether in last year of life

Figure 6 is a bar chart showing the average annual health service costs per person for people aged 85 and over by sex, service type (ED presentations, hospital admissions, MBS services and prescriptions supplied under the PBS/RPBS), whether they used residential aged care (respite and/or permanent residential aged care) and whether they were in their last year of life or not. Average annual costs per person for those who used residential aged care in their last year of life were lower for all 4 health service types. The largest difference was for hospital admissions, for which the average annual cost was 32% lower for people who used residential aged care in their last year of life than for people who did not use residential aged care in their final year ($7,100 per person compared with $10,400).



Notes:
1. This figure only presents data for people aged 85 and over.
2. Analysis for the *In last year of life* group includes costs for services used by this group in the 12 months before their death. This includes services used between 1 July 2010 and 31 December 2016, presented as average cost, per person.
3. Analysis for the *Not in last year of life* group includes costs for services used by this group between 1 July 2010 and 31 December 2016, presented as average cost per person over a 12-month period.
4. *Used residential aged care* includes both respite and/or permanent residential aged care.
5. See Technical notes for more information on the linked dataset, study groups, services and costs used in this study.

Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.
http://www.aihw.gov.au

Dementia and coronary heart disease were the leading causes of death among people who used residential aged care

The leading causes of death among people who used residential aged care in their last year of life were dementia (including Alzheimer's disease) (19%) and coronary heart disease (16%). For those who did not use such care in their last year, coronary heart disease (17%) and cerebrovascular disease (8%) were the leading causes.

Among all people who died from dementia (including Alzheimer's disease), 88% used residential aged care in their last year of life.

By cause of death, average costs were mostly lower for people who used residential aged care in their final year

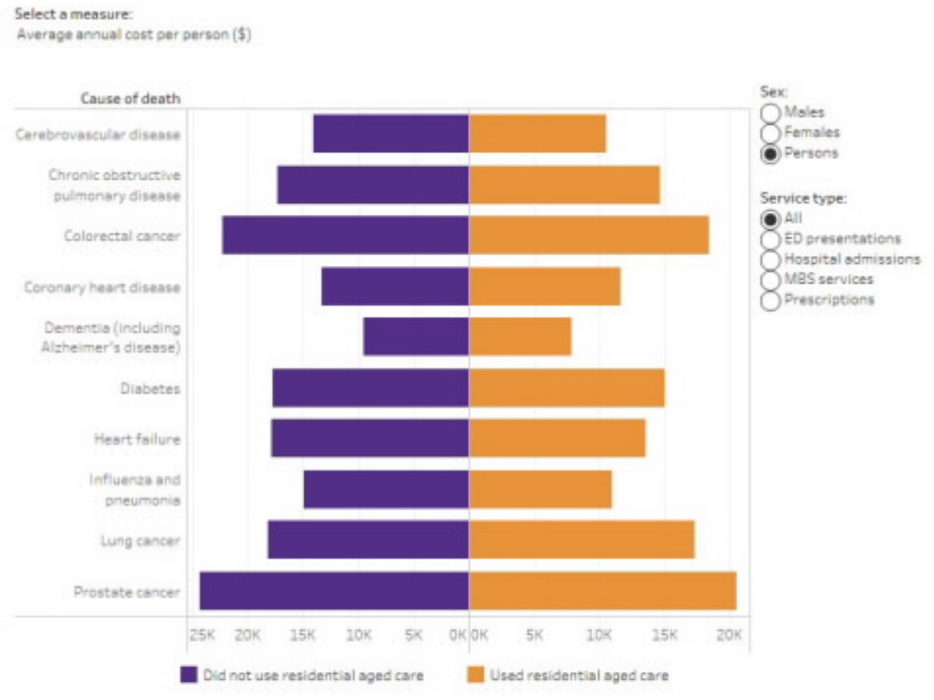
For most broad causes of death, average annual costs per person for people who used residential aged care in their last year of life were lower than for those who did not use such care (Figure 7b). The biggest difference was for deaths from diseases of the nervous system, with the average annual cost 30% lower for people who used residential aged care in the last year of life than for those who did not use such care ($10,000 compared with $14,200 per person). This may reflect differences in the types of nervous system diseases people died from between these groups. Most people who died from dementia in this study used residential aged care in their last year of life.

Looking at the 10 leading causes of death among people aged 85 and over, average annual costs per person who used residential aged care in their final year were also lower than for people who did not use residential aged care (Figure 7d). The largest difference was for deaths from influenza and pneumonia, with the average cost 26% lower than for people who did not use such care ($11,000 compared with $14,900 per person).

For the 10 leading causes of death, people who used residential aged care in their last year of life were supplied with more prescriptions per person than those who did not use such care in their final year (Figure 7c). The difference was greatest for deaths from dementia (including Alzheimer's disease) (59 compared with 43 prescriptions per person) and from colorectal cancer (71 compared with 52 prescriptions per person).

Figure 7: Health services used and costs (total and average annual per person) in the last year of life by broad cause of death (a, b) and leading underlying cause of death (c, d), sex, service type and use of residential aged care

Figure 7 is a butterfly chart showing the total and average annual number of health services used, and the total and average annual cost of these services, for people aged 85 and over by sex, service type (ED presentations, hospital admissions, MBS services and prescriptions supplied under the PBS/RPBS) for each broad cause of death grouping (figures 7a and 7b) and for the 10 leading underlying causes of death (figures 7c and 7d). For the 10 leading causes of death, people who used residential aged care in their last year of life were supplied with more prescriptions per person than those who did not use such care in their final year. The difference was greatest for deaths from dementia (including Alzheimer's disease) (59 compared with 43 prescriptions per person) and from colorectal cancer (71 compared with 52 prescriptions per person). For the 10 leading causes of death, and for most broad causes of death, average annual costs per person for people who used residential aged care in their last year of life were lower than for those who did not use such care.



Notes:
1. Leading causes of death are based on underlying causes of death in 2019, classified using an AIHW-modified version of Becker et al. 2006.
2. This figure only presents data for people aged 85 and over.
3. Analysis for people in their last year of life includes costs for services used by this group in the 12 months before death. This includes services used between 1 July 2010 and 31 December 2016 for people who died between 1 July 2010 and 31 December 2017.
4. *Used residential aged care* includes both respite and/or permanent residential aged care.
5. See Technical notes for more information on the linked dataset, study groups, services and costs used in this study.

Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.
http://www.aihw.gov.au

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Technical notes

Data on health service use from datasets in the National Integrated Health Services Information Analysis Asset (NIHSI AA) were used to estimate health service use and costs for Australians in their last year of life. This section presents the methods for estimating the number of health services used, and corresponding costs.

About the National Integrated Health Services Information Analysis Asset

The NIHSI AA is an enduring linked data asset managed under the custodianship of the AIHW. It is available for analysis by the AIHW and participating jurisdictions for approved projects.

Data on service use, costs and deaths from the first iteration of NIHSI AA (version 0.5) were used to estimate health service use and calculate associated costs. Key datasets in the NIHSI AA version 0.5 used in this analysis were:

- National Death Index (NDI), which contains person-level cause of death information previously linked from the National Mortality Database (AIHW 2021a)
- National Medicare Benefits Schedule (MBS)
- National Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS)
- Residential aged care data from the National Aged Care Data Clearinghouse
- Admitted patient care from the National Hospital Morbidity Database for public hospitals in New South Wales, Victoria, South Australia and Tasmania and some private hospitals in Victoria
- Non-Admitted Patient Emergency Department Care National Minimum Data Set for public hospitals in New South Wales, Victoria, South Australia, Tasmania.

Data was available between 1 July 2010 and 30 June 2017 for most datasets, except for deaths data which was available up to 31 December 2017.

NIHSI AA population and study groups

Overall, just under 26 million people were identified in the NIHSI AA version 0.5 (hereafter referred to as NIHSI AA) from records between 1 July 2010 and 31 December 2017. This is based on the Medicare Consumer Directory, a database of people enrolled in Medicare used in the creation of NIHSI AA, combined with 3 other main datasets – NDI, residential aged care data and hospitals data (admitted patient and emergency department care). All people in the Medicare Consumer Directory were first identified, which accounted for 97.8% of the NIHSI AA population. People not in the Medicare Consumer Directory but who appeared in hospital datasets accounted for an additional 2%. Those in the NDI and residential aged care data accounted for the remainder.

Study groups

In this study, the NIHSI AA population was divided into 2 study groups:

- People in the last year of life – includes people who had a death record in the NDI data between 1 July 2010 and 31 December 2017. Health service use in the 12 months before death was examined for each person and associated costs calculated.
- People not in the last year of life – includes people who did not have a death record in the NDI data between 1 July 2010 and 31 December 2017. Health service use between 1 July 2010 and 31 December 2016 was examined for each person and associated costs calculated.

The NIHSI AA comprises 4 core health and aged care service data (MBS, PBS/RPBS, residential aged care and hospital care) and deaths data (from the NDI). It therefore excludes people who did not use any of these services and/or did not have a death record in the NDI data at any point during the study period. Table A1 shows the numbers and proportions of the NIHSI AA population within each study group. Approximately 4% of people identified in the data were in their last year of life and 96% not in their last year.

Table A1: Cumulative population and percentage in each study group from records in NIHSI AA version 0.5

Study group(a)	Total	Per cent (%)
People in the last year of life	1,137,043	4.4
People not in the last year of life	24,736,845	95.6
Total population in NIHSI AA	**25,873,888**	**100.0**

(a) Population in scope are people identified in the National Integrated Health Services Information Analysis Asset version 0.5. The 'last year of life' group includes people who died between 1 July 2010 and 31 December June 2017. People not in the last year of life includes people without a death record between 1 July 2010 and 31 December 2017.

People in the last year of life

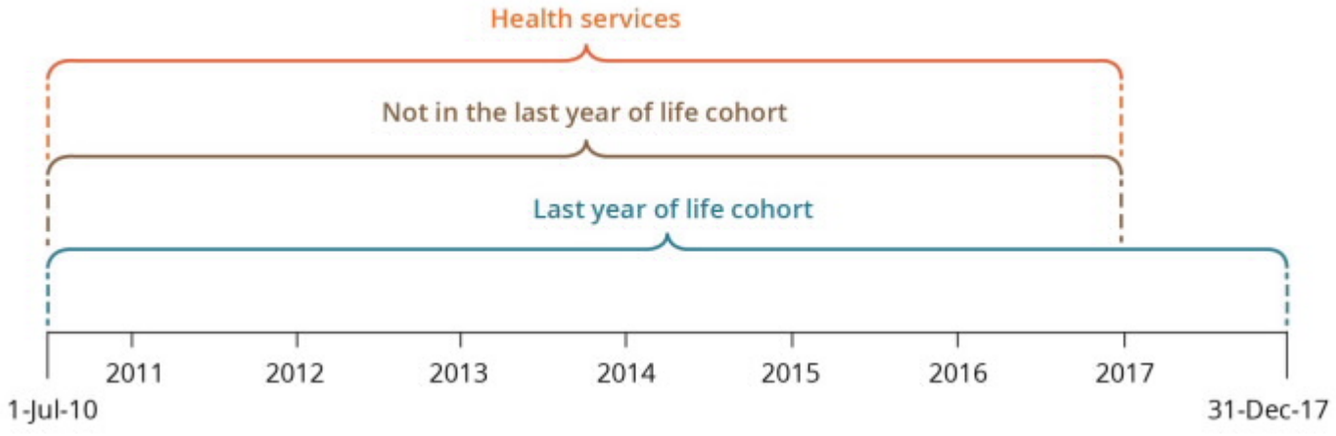
Health service use in the 12 months before death was retrospectively examined for people in their last year of life. Note that for health service use and costs for people who died in the first year of data, the study period will not cover a full 12 months before death. As a result, health service use and costs for people in their last year of life may be slightly underestimated. Figure A1 shows the time periods for the study cohorts and service use in scope.

People not in the last year of life

The number of health services used over the study period was examined for people not in their last year of life. Unlike the last-year-of-life group, which covers 7.5 years of NIHSI AA data, the study period for people not in the last year of life covers 6.5 years of data (between 1 July 2010 and 31 December 2016). For people not in the last year, service use between 1 January 2017 and 31 December 2017 was excluded because those who died in the following 12 months could not be identified.

Although the study periods for these 2 population groups are slightly different, they are mutually exclusive and useful comparisons can be made between the average number of health services used and associated costs for each group over 12 months.

Figure A1: Time period for study groups (whether in last year of life or not) and health service use



Identifying people who used residential aged care services

Health service use and costs over the study period (between 1 July 2010 and 31 December 2016) were disaggregated by whether a person used residential aged care services or not. This includes people living in permanent residential care and/or those who stayed one or more days in respite care over the study period.

Four comparison populations were derived:

1. People in the last year of life

- people who used residential aged care at any point during their last year of life
- people who did not use residential aged care in their last year of life

2. People not in the last year of life

- people who used residential aged care at any point during the study period
- people who did not use residential aged care during the study period.

Residential aged care data were only used to indicate whether people had used residential aged care or not. The care and support provided by residential aged care services directly are not captured in the 4 health service types examined.

Estimating age

The age of people in the study groups was based on when the person died and when they used a health or aged care service. These dates were used to first estimate single year ages of each person in the study groups.

For people in the last year of life, age at death was calculated by adjusting each person's age at their first service in the linked data, by half a year. For example, if a person was recorded as being aged 84 at their first service, it was estimated that they were 84.5 years old, because there was no information on the number of days since their 84th birthday. Then the difference in years between the first service and when the person died was added to the adjusted age to derive single year of age for each person in their last year of life. For example, if the difference in years was
6.5 years, then the person was aged 91 when they died (84.5 years plus 6.5 years).

For people not in the last year of life, adjusted age at first linked service was added to the difference in years between the first and the last service used.

For people in the last year of life, information on the person's sex and age at death was obtained from the NDI data because this was considered the most accurate source. For people not in their last year of life, information on the person's sex and age at first service was obtained from other data sources.

For reporting purposes, health service use and cost estimates are reported in 10-year or broader age groups.

Estimating health service use and costs

The study examined 4 health service types: emergency department (ED) presentations; hospital admissions; MBS services; and prescriptions supplied under the PBS/RPBS. Different approaches were used to estimate costs and number of health services used by people in their last year of life and those not in their last year between July 2010 and December 2016.

Calculating National Weighted Activity Units for acute admitted hospital and ED services

The first approach involved calculating the National Weighted Activity Units (NWAUs) to derive a common unit against which costs can be applied for hospital use. NWAU is a measure of health service activity expressed as a common unit, against which the National Efficient Price (NEP) is paid. NWAU is a way of comparing and valuing each public hospital service (whether ED presentations, admissions or outpatient episodes), weighted for clinical complexity. NWAUs were calculated for acute admitted services and ED presentations. In this report, acute admitted services include mental health admissions. For more information on NWAUs see: https://www.publichospitalfunding.gov.au/calculation-national-weighted-activity-unit

Historical hospital utilisations of service categories (acute admitted and ED presentations), except for subacute, considered to have been funded under activity-based funding between 1 July 2010 and 31 December 2016 were converted into NWAUs. This was done using the Independent Hospital Pricing Authority (IHPA) NWAU16 calculators for acute admitted services and ED presentations.

NWAU16 calculators were selected as the most appropriate bases for standardising hospital uses because at the time of this analysis, the latest data available in NIHSI AA were for 2016–17 and for only 4 jurisdictions (New South Wales, Victoria, South Australia, and Tasmania). In addition, the IHPA 2016–17 NEP was selected and applied to estimate the cost of hospital utilisations. However, the AIHW has since updated the NIHSI AA (to version 1.0) to include 2018–19 data and for 6 jurisdictions (New South Wales, Victoria, South Australia, Tasmania, Queensland and the Australian Capital Territory).

To account for clinical complexity, NWAUs were derived at episode level by applying price weights and adjustments developed by the IHPA. Price weights for NWAU16 used include:

- Diagnostic Related Groups for acute admitted services
- Urgency Related Groups or Urgency Disposition Groups for ED presentations.

Adjustments for Indigenous status, radiotherapy, dialysis, and paediatric services were applied to acute admitted services and ED presentations to create a consistent, uniform set of service utilisations and costs, comparable across care types. For more information on IHPA's NWAU16 calculators see: National Efficient Price Determination 2016-17 and Technical Specifications.

NWAUs derived in this study were compared with those published by the Administrator for 2015–16 and 2016–17. They were found to be slightly higher than those supplied by jurisdictions to the Administrator for payment purposes. This is because costs calculated for this study include the most recent data available.

After calculating NWAUs, the cost of hospital services (for acute admitted services and ED presentations) were calculated by multiplying the volume of weighted services by the 2016–17 NEP ($4,883 per NWAU). For more information see: IHPA's determinations of the National Efficient Price is available in the National Efficient Price Determination 2016–17 .

The costs estimated using this approach did not consider proportions of Australian Government and state and territory government contributions. Since the costs estimated are at national level, cross-border adjustments were not considered.

Estimating MBS services and prescriptions supplied under the PBS/RPBS

The second approach involved estimating the number of MBS services and number of prescriptions supplied under the PBS and RPBS, and their associated costs.

MBS items were mapped to broad type of service categories to obtain the total MBS services and total costs by broad type of service, such as un-referred (GP) attendances, specialist attendances and operations (Table A2). Fee charged, including patient co-payment, were used as the total cost of an MBS service. These estimates should be interpreted with caution due to data limitations that may have underestimated or overestimated the total cost of MBS services.

Table A2: MBS Broad Type of Service items

Broad Type of Service items	MBS item
Unreferred attendances: VR GP	1:4, 13:14, 19:20, 23:26, 33, 35:40, 43:44, 47:51, 193, 195, 197, 199, 597, 599, 601:603, 2497:2501, 2503:2504, 2506:2507, 2509, 2517:2518, 2521:2522, 2525:2526, 2546:2547, 2552:2553, 2558:2559, 2574:2575, 2577:2578, 5000, 5003, 5007, 5010, 5020:5023, 5026:5028, 5040:5043, 5046, 5049, 5060, 5063:5064, 5067

Unreferred attendances: enhanced primary care	700:710, 712:747, 749:750, 757:759, 762, 765, 768, 771:773, 775, 778:779, 900, 903, 2700:2702, 2710, 2712:2713, 2715, 2717, 2719, 6087
Unreferred attendances: other	5:12, 15:18, 21:22, 27:32, 34, 41:42, 45:46, 52:84, 86:87, 89:93, 95:98, 101, 160:173, 444:449, 598, 600, 696:698, 980, 996:998, 2100, 2122, 2125:2126, 2137:2138, 2143, 2147, 2179, 2195:2199, 2220, 2598, 2600, 2603, 2606, 2610, 2613, 2616, 2620, 2622:2624, 2631:2633, 2635, 2664, 2666:2668, 2673:2675, 2677, 2704:2705, 2707:2708, 2721, 2723, 2725, 2727, 4001, 5200, 5203, 5207:5208, 5220:5228, 5240, 5243, 5247:5248, 5260:5263, 5265:5267, 17600
Practice nurse	711, 10983:10984, 10986:10989, 10993:10999
Specialist	85, 88, 94, 99:100, 102:152, 154:159, 288:289, 291:293, 296:297, 299:338, 342:353, 355:359, 361, 364, 366:367, 369:370, 384:389, 410:417, 501:503, 507, 511, 515, 519:520, 530, 532, 534, 536, 801, 803, 805, 807:809, 811:813, 815, 820, 822:823, 825:830, 832, 834:835, 837:838, 851:852, 855, 857:858, 861, 864, 866, 871:872, 880, 887:893, 2799, 2801, 2806, 2814, 2820, 2824, 2832, 2840, 2946:2949, 2954, 2958, 2972:2978, 2984:3003, 3005, 3010, 3014:3015, 3018, 3023, 3028:3032, 3040, 3044, 3051:3055, 3062, 3069, 3074:3078, 3083, 3088, 3093, 5906:5912, 6004, 6007:6009, 6011:6016, 6018:6019, 6023:6026, 6028:6029, 6031:6032, 6034:6035, 6037:6038, 6042, 6051:6052, 6057:6060, 6062:6065, 6067:6068, 6071:6075, 6080:6081, 10801:10816, 17603:17690
Diagnostic imaging	791:794, 910:911, 913, 990:993, 995, 999, 2400:2460, 2502, 2505, 2508, 2512:2516, 2520, 2524, 2528:2545, 2548:2551, 2554:2557, 2560:2573, 2576, 2579:2597, 2599, 2601, 2604, 2607:2609, 2611, 2614, 2617, 2621, 2625:2630, 2634, 2638:2657, 2665, 2672, 2676, 2678:2699, 2703, 2706, 2709, 2711, 2714, 2716, 2718, 2720, 2722, 2724, 2726, 2728:2798, 2800, 2802:2805, 2807:2813, 2815:2819, 2823, 2825:2831, 2833:2839, 2841:2859, 2960:2971, 2980:2981, 5861, 8712:8713, 8716:8717, 8720:8721, 8723:8724, 8727:8849, 8851:8874, 9066, 9341:9344, 55000:55054, 55056:64991
Pathology collection	73899:73940, 74992:74999
Pathology tests	1001:2099, 2101:2120, 2123:2124, 2127:2136, 2139:2142, 2145:2146, 2148:2178, 2181:2192, 2201:2219, 2221:2399, 65001:73844, 74990:74991
Other allied health services	10950:10977, 80000:82035, 82300:87777
Obstetrics	190:192, 194, 196, 198, 200:284, 290, 295, 298, 354, 360, 362:363, 365, 368, 383, 9011, 15999, 16399:16636
Anaesthetics	401:409, 443, 450:500, 505:506, 509:510, 513:514, 517:518, 521:529, 531, 533, 535, 537:577, 748, 751:756, 760, 764, 767, 787:790, 9021:9042, 13006:13009, 17500:17506, 17701:18298, 20100:25205
Operations	924, 3004, 3006, 3012, 3016, 3022, 3027, 3033:3039, 3041, 3046:3050, 3058, 3063, 3073, 3082, 3087, 3092, 3098:3101, 3104:3113, 3116, 3120:3124, 3130, 3135:3142, 3148:3173, 3178:3183, 3194:3226, 3233:3237, 3247:3253, 3261:3265, 3271:3281, 3289, 3295:3330, 3332:3384, 3391, 3399, 3404:3425, 3431:3455, 3459, 3465, 3468:3472, 3477:3480, 3495:3496, 3505, 3509:3516, 3526:3988, 4012:4838, 4844:4860, 4864:4999, 5002, 5006, 5009, 5015:5018, 5024, 5029:5038, 5045, 5048, 5050:5059, 5062, 5066, 5068:5196, 5201, 5205, 5210:5217, 5229:5237, 5241:5242, 5245, 5254, 5264, 5268:5270, 5277:5280, 5284, 5288, 5292:5855, 5864:5905, 5916:6001, 6005:6006, 6010, 6017, 6022, 6027, 6030, 6033, 6036, 6039:6041, 6044:6050, 6053:6056, 6061, 6066, 6069:6070, 6077:6079, 6083:6086, 6089:6918, 6922:7126, 7129:7133, 7135:7143, 7147,7397, 7410:7483, 7505:7719, 7721:7722, 7725, 7727:7728, 7739:7743, 7749, 7764:7766, 7774:7803, 7808:7809, 7815:7817, 7821:7823, 7828, 7834, 7839, 7844:7847, 7853:7886, 7898:7902, 7911:8003, 8009:8173, 8179:8458, 8462, 8466:8467, 8470:8478, 8480:8481, 8483:8504, 8508:8512, 8515:8519, 8521:8557, 8560, 8564, 8568:8570, 8574, 8578, 8582:8636, 8640, 8644, 8648, 8652, 8655:8658, 8660, 8662, 8664, 8666, 8668, 8670, 8672, 8674:8699, 9401:9409, 9415:9435, 9438, 9441:9449, 9458, 9476:9478, 30000:30524, 30526:30632, 30634:41868, 41870:42824, 42833:50952
Assistance at operations	2951:2953, 2955:2957, 51300:51318
Optometry	180:186, 10900:10948
Radiotherapy and Therapeutic Nuclear Medicine	2861:2945, 8850, 8875:8886, 9381:9392, 15000:15900, 16000:16018

Miscellaneous	153, 340, 770, 774, 777, 780:786, 795:800, 802, 804, 806, 810, 814, 816:819, 821, 824, 831, 833, 836, 839:850, 853:854, 856, 859:860, 862:863, 865, 870, 874:879, 882:886, 895:897, 902, 904:909, 912, 915:923, 925:979, 981:989, 994, 3059, 3068, 3095, 3103, 3114, 3117, 3128, 3134, 3147, 3175, 3187, 3229:3230, 3245, 3258, 3268, 3284, 3290, 3331, 3386, 3393, 3400, 3427, 3456, 3462, 3466, 3475, 3483, 3500, 3507, 3521, 4003, 4841, 4862, 5249, 5259, 5274, 5282, 5286, 5291, 6920, 7128, 7134, 7146, 7402, 7485, 7720, 7723:7724, 7726, 7729:7731, 7745, 7753, 7770, 7804, 7812, 7818, 7824, 7831, 7836, 7841, 7849, 7888, 7907, 8006, 8175, 8460, 8464, 8468, 8479, 8482, 8506, 8514, 8520, 8558, 8562, 8566, 8572, 8576, 8580, 8638, 8642, 8646, 8650, 8654, 8659, 8661, 8663, 8665, 8667, 8669, 8671, 8673, 8700:8711, 8714:8715, 8718:8719, 8722, 8725:8726, 8901:8990, 9061:9065, 9067, 9410:9414, 9436:9437, 9439, 9450:9457, 9459:9475, 10985, 10990:10992, 11000:13003, 13012:14245, 18350:18379, 30525, 30633, 41869, 42827:42830, 51700:53706, 55055, 75000:75854, 82100:82225

Source: Department of Health 2022.

Similarly, listed items on the PBS/RPBS were mapped to Anatomical Therapeutic Chemical (ATC) groups to obtain the total number of prescriptions and associated costs by selected ATC groups. In this analysis, ATC3 groups, such as anti-dementia drugs, opioids and immuno-suppressants, were used. The total cost of prescriptions were calculated by adding benefits paid to patients' contributions. However, this estimate is affected by data quality issues, including discounting of patient co-payment.

The 'Notes and caveats' section details data limitations and gaps for estimating the costs of MBS services and pharmaceuticals supplied under the PBS/RPBS.

Identifying cause of death

To estimate health service use and costs in the last year of life by cause of death, information on the underlying cause of death information in the NDI data was used. Two levels of groupings were included:

- cause of death disease group, based on the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) chapter level groupings (Table A3)
- ICD-10 codes for the 20 leading causes of death in Australia, based on the leading causes of death in Australia in 2019, and classified using an AIHW-modified version of Becker et al. 2006 (Table A4).

Disease groups with less than 15,000 deaths over the study period are not presented in the report's data visualisations.

Table A3: Definition of cause of death disease groups and number of deaths in the linked data between 1 July 2010 and 31 December 2017

Cause of death disease group in web report	ICD-10-Chapter disease group name	ICD-10 codes	Definition and examples of causes	Number of deaths
Infectious diseases	Certain infectious and parasitic diseases	A00–B99	Includes diseases generally recognised as communicable or transmissible, such as intestinal infectious diseases, other bacterial diseases viral hepatitis and tuberculosis.	19,707
Cancer	Neoplasms	C00–D48	Includes malignant neoplasms such as colorectal, pancreatic, lung, breast and prostate cancers. Also includes in situ and benign neoplasms, as well as neoplasms of uncertain or unknown behaviour.	334,675
Endocrine diseases (including diabetes)	Endocrine, nutritional and metabolic diseases	E00–E90	Includes diabetes mellitus, disorders of the thyroid gland, malnutrition, obesity, and metabolic disorders.	46,505
Mental and behavioural disorders	Mental and behavioural disorders	F00–F99	Includes disorders of psychological development such as schizophrenia, mental and behavioural disorders due to psychoactive substance use, mood disorders and some but not all types of dementia. Does not include suicide and self-harm, which is included under External causes.	92,221
Nervous system diseases	Diseases of the nervous system	G00–G99	Includes diseases such as epilepsy, muscular dystrophy, spinal muscular atrophy, Alzheimer's disease, and inflammatory diseases of the central nervous system.	32,059

Cardiovascular diseases	Diseases of the circulatory system	I00–I99	Includes diseases such as coronary heart disease, cerebrovascular disease, heart failure, hypertensive disease and cardiac arrhythmias.	330,594
Respiratory diseases	Diseases of the respiratory system	J00–J99	Includes diseases such as chronic obstructive pulmonary disease (COPD), influenza and pneumonia.	102,791
Digestive diseases	Diseases of the digestive system	K00–K93	Includes diseases such as diseases of the liver and intestines.	40,967
Genitourinary diseases	Diseases of the genitourinary system	N00–N99	Includes diseases such as kidney failure and diseases of the urinary system.	25,898
External causes (Injury and poisoning)	External causes of morbidity and mortality	V01–Y98	Includes external causes of injuries such as accidents, falls and assaults, as well as suicide and poisoning.	73,204
Other	Other ICD-10 chapters	Includes: D50–D89, H00–H59, H60–H95, L00–L99, M00–M99, O00–O99, P00–P96, Q00–Q99, R00–R99	Includes Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50–D89), Diseases of the eye and adnexa (H00–H59), Diseases of the ear and mastoid process (H60–H95), Diseases of the skin and subcutaneous tissue (L00–L99), Diseases of the musculoskeletal system and connective tissue (M00–M99), Pregnancy, childbirth and the puerperium (O00–O99), Certain conditions originating in the perinatal period (P00–P96), Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99) and Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00–R99).	38,422
Total	**All Chapter level causes**			**1,137,043**

Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.

Table A4: Number of deaths in the linked data between 1 July 2010 and 31 December 2017 by underlying cause of death

Rank[(a)]	Cause of death	Number of deaths
1	Coronary heart disease (I20–I25)	148,972
2	Dementia (including Alzheimer's disease) (F01, F03, G30)	86,773
3	Cerebrovascular disease (I60–I69)	79,883
4	Lung cancer (C33, C34)	61,340
5	Chronic obstructive pulmonary disease (COPD) (J40–J44)	49,836
6	Colorectal cancer (C18–C20, C26.0)	38,969
7	Diabetes (E10–E14)	33,225
8	Influenza and pneumonia (J09–J18)	22,443
9	Prostate cancer (C61)	23,773
10	Heart failure and complications and ill-defined heart disease (I50–I51)	25,833

11	Suicide (X60–X84)	20,446
12	Breast cancer (C50)	21,614
13	Pancreatic cancer (C25)	19,732
14	Cancer of unknown or ill-defined primary site (C26, C39, C76–C80 excl. C26.0)	20,391
15	Accidental falls (W00–W19)	16,987
16	Kidney failure (N17–N19)	17,062
17	Other ill-defined causes (R00–R94, R96–R99, I46.9, I95.9, I99, J96.0, J96.9, P28.5)	12,066
18	Cardiac arrhythmias (I47–I49)	15,060
19	Liver cancer (C22)	12,406
20	Hypertensive disease (I10–I15)	15,683
21	All other causes	394,549
	All Causes	**1,137,043**

(a) Ranking is based on 2019 deaths, classified using the AIHW-modified version of Becker et al. 2006 causes of death classification.

Source: AIHW National Integrated Health Services Information Analysis Asset version 0.5.

Estimating health service use and associated costs

For each study group, the number of health services used and associated costs were first calculated over the study period. For the last year of life group, the period refers to the number of services used in the last 12 months of life for each person who died between 1 July 2010 and 31 December 2017. For the not in the last year of life group, the period refers to the number of services used between 1 July 2010 and 31 December 2016.

This was then averaged by the number of years examined (7.5 years for people in the last year of life and 6.5 years for those not in the last year) and the number of people in each group to obtain average annual health service use and costs per person.

Reporting average annual estimates per person provided a fair comparison measure between the 2 groups. Where appropriate, these measures were adjusted to account for differences in age structure.

Estimating lifetime health system costs

Estimating lifetime health system costs of Australians using the NIHSI AA is challenging because it does not include the full use of health services over a person's lifetime. Hence, it was assumed that the use of health services and associated costs for people not in the last year of life was equivalent to the period before the 12 months before deaths for those in the last year of life. This methodology is a work in progress as the AIHW continues to revise this method.

For people in the last year of life, health service costs were divided into 2 groups (one to 6 months before death and 7 to 12 months before death). Costs per person by age and sex for each group were calculated by dividing total costs for people in the last year of life by the population in the last year of life.

To estimate health system costs incurred before the last year of life, annual age-specific costs by sex for people not in the last year were used. Since health system costs before the last year of life differ by age, the cumulative costs for each age group were estimated by applying the age difference to costs per person. Total lifetime costs by age group and sex were then derived by adding estimated costs in the one to 6 months before death and costs in the 7 to 12 months before death to the estimated costs before the last year of life.

Notes and caveats

Health services used by people in the last year of life outside of the 12 months before death were excluded from the study. They were not included in with people not in the last year of life. This may result in a slight underestimate of the number of services and costs for people not in their last year of life, particularly those with chronic health conditions who use multiple services.

Cost estimates were not adjusted for inflation.

Costs for hospital admissions and ED presentations

Costs for hospital admitted patient and ED presentations include Australian Government and state and territory government costs only. Non-government costs, such as out-of-pocket and private health insurance – estimated to represent around 21% of total spending on hospitals (Table 29, AIHW 2021b) – are not captured. Other health system costs not captured in the NIHSI AA and/or not included in estimates presented in this analysis are outlined in 'Health services and costs excluded from the analysis' under Study background.

Hospital utilisations and estimates of adjusted costs between 1 July 2010 and 31 December 2016 are of public hospital data and, where available, private hospitals and ED presentations in public hospitals for New South Wales, Victoria, South Australia and Tasmania.

Acute care type of newborn with unqualified days only have been excluded from estimates for acute admitted hospitalisations. Except for acute admitted (using care types 7.1 and 7.2 qualified days), it was not possible – using the information available – to estimate with certainty, separate and reliable perinatal (including neonatal) utilisations and costs. As such, their utilisations and costs have been included in the 0–9 age group.

MBS services and prescriptions supplied under the PBS

Health service costs for MBS services and prescriptions supplied under the PBS/RPBS include Australian Government benefits paid and patient out-of-pocket costs.

Total MBS and total PBS/RPBS estimated costs need to be interpreted with care. For the MBS this is because:

- Where a patient claims on Medicare before paying the treating practitioner, the fee charged is unsubstantiated. Co-payments for non-inpatient services (other than hospital substitute services, such as hospital-in-the-home services), count towards safety net thresholds, but only for substantiated services. Where a patient claims on Medicare before paying the treating practitioner, some practitioners subsequently accept a discounted fee for prompt payment.
- There is an anomaly in data capture for some bulk billed pathology claims, resulting in some apparent co-payments for these services. For all bulk billed services in recent years (and for the years examined in this study), the fee charged should equal the benefit paid.
- Total pathology services are included in total MBS services which greatly inflates the number of MBS services estimated.
- Data on MBS services exclude services to the Department of Veterans' Affairs (DVA) card holders where care is reimbursed through DVA. It also excludes services by salaried GPs in residential aged care or outpatient departments. For more information on the use of DVA services by people living in residential aged care see: GP use by people living in permanent residential aged care , pages 7 and 8.

For the PBS/RPBS, this is because:

- data in the NIHSI AA exclude premiums paid by the patient, for example, brand or therapeutic premiums.
- From 1 January 2016, pharmacists have had the option of a $1 discount of the patient co-payment. The PBS/RPBS data in NIHSI AA do not reflect any such discounting.
- For under co-payment prescriptions, the patient contribution is an estimate reflecting the PBS value of the prescription and not the actual value paid at the pharmacy (which may have been discounted). Therefore, estimates from the PBS/RPBS may be overestimated.
- For under co-payment prescriptions, the NIHSI AA data do not include the 'optional' pharmacy fees of safety net recording fee and additional extra fee.
- Over-the-counter pharmaceuticals are not included.

Residential aged care services

Residential aged care services are not included in the health service use and cost estimates. Rather, health service use and costs for people who used residential aged care services (permanent residential and/or respite care) at any point in their last year of life are compared with those who did not use such care in their last year.

This analysis uses a flag to identify people who used residential aged care in their final year, not all of whom would have spent all 12 months in aged care or would have died in a residential aged care facility (some people living in aged care could have died elsewhere, such as in hospital) (AIHW 2021b).

There may be slightly different patterns of service use and associated costs if the length of time spent in residential aged care, as well as proximity to service use for people not in the last year of life, was factored into the analysis.

Community-based aged care, such as in-home palliative care and community nursing, are excluded.

Deaths

Deaths data used in this analysis are based on year of occurrence. These may differ from deaths data used in other AIHW publications that are based on year of registration.

Deaths where the underlying cause of death information was missing were excluded.

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Abbreviations

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
ATC	Anatomical Therapeutic Chemical
COPD	chronic obstructive pulmonary disease
COVID-19	coronavirus disease of 2019
DVA	Department of Veterans Affairs
ED	emergency department
GPs	general practitioners
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th Revision
MBS	Medicare Benefits Schedule
NDI	National Death Index
NEP	National Efficient Price
NIHSIAA	National Integrated Health Services Information Analysis Asset
NSW	New South Wales
NWAUs	National Weighted Activity Units
PBS	Pharmaceutical Benefits Scheme
RPBS	Repatriation Pharmaceutical Benefits Scheme

Glossary

administrative data: Information collected, processed and stored in automated information systems. Administrative data include enrolment or eligibility information, claims information and managed care encounters.

administrative data collection: Data set that results from information collected for the purposes of delivering a service or paying the provider of the service. This type of collection is usually complete (that is, all in-scope events are collected), but may not be fully suitable for population-level analysis because data are collected primarily for an administrative purpose.

Alzheimer's disease: Degenerative brain disease caused by nerve cell death resulting in shrinkage of the brain. A common form of dementia.

cancer (malignant neoplasm): Large range of diseases where some body cells become defective, begin to multiply out of control, invade and damage the area around them, and can then spread to other parts of the body causing more damage.

cause of death: All diseases, morbid conditions or injuries that resulted in or contributed to death – and the circumstances of the accident or violence that produced any such injuries – entered on the Medical Certificate of Cause of Death.

chronic obstructive pulmonary disease (COPD): Serious, progressive and disabling long-term lung disease where damage to the lungs (usually because of both emphysema and chronic bronchitis) obstructs oxygen intake and causes increasing shortness of breath. By far the greatest cause is cigarette smoking.

comorbidity: Situation where a person has 2 or more health problems at the same time.

coronary heart disease: Disease due to blockages in the heart's own (coronary) arteries, expressed as angina or a heart attack. Also known as ischaemic heart disease.

data linkage: Bringing together (linking) of information from 2 or more data sources believed to relate to the same entity (for example, to the same individual or same institution). This linkage can yield more information about the entity and, in certain cases, provide a time sequence. The term is used synonymously with 'record linkage' and 'data integration'.

deidentified: Process involving removal or alteration of personal identifiers, followed by applying additional techniques or controls to remove, obscure, aggregate, alter and/or protect data so it is no longer about an identifiable (or reasonably identifiable) individual.

dementia: Group of conditions affecting the brain. Dementia is generally progressive and characterised by symptoms such as impaired thinking, changes in behaviour and declining ability to perform the activities of daily living. Common types are Alzheimer's disease, vascular dementia and mixed types of dementia.

diabetes (diabetes mellitus): Chronic condition where the body cannot effectively use its main energy source, the sugar glucose. This is due to a relative or absolute deficiency in insulin, a hormone produced by the pancreas that helps glucose to enter the body's cells from the bloodstream and to be processed by them. Diabetes is marked by an abnormal build-up of glucose in the blood. It can have serious short and long-term effects. The 3 main types are type 1 diabetes, type 2 diabetes and gestational diabetes.

general practitioner (GP): Medical practitioner who provides primary, comprehensive and continuing care to patients and their families in the community.

hospital admission: Acute or mental health admission to hospital. 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.

infectious disease: Disease or illness caused by infectious organisms or their toxic products. The disease may be passed directly or indirectly to humans through contact with other humans, animals or environments where the organism is found. Also referred to as a communicable disease.

International Statistical Classification of Diseases and Related Health Problems (ICD): World Health Organization's internationally accepted classification of death and disease. The Tenth Revision (ICD-10) is in use. The ICD-10-AM is the Australian Modification of the ICD-10. It is used for diagnoses and procedures recorded for patients admitted to hospitals.

Medicare: National, government-funded scheme that subsidises the cost of personal medical services for all Australians and aims to help them afford medical care. The MBS is the listing of Medicare services subsidised by the Australian Government. The schedule is part of the wider Medicare Benefits Scheme (Medicare).

non-admitted patient: Patient who receives care from a recognised non-admitted patient service/clinic of a hospital, including emergency departments and outpatient clinics.

out-of-pocket costs: Total costs incurred by individuals for health-care services, over and above refunds from the MBS, PBS or private health insurance funds.

Pharmaceutical Benefits Scheme (PBS): National, government-funded scheme that subsidises the cost of a wide variety of pharmaceutical drugs. It covers all Australians, to help them afford standard medications. The PBS lists the medicinal products available under the PBS and explains uses for which subsidies can apply. More information: Repatriation Pharmaceutical Benefits Scheme.

principal diagnosis: Diagnosis established, after study, to be chiefly responsible for an episode of patient care (hospitalisation), residential care or attendance at a health-care establishment. Diagnoses are recorded using the relevant edition of the International Statistical Classification of Diseases and Related Health Problems, 10th revision, Australian modification (ICD-10-AM).

private patient: Person admitted to a private hospital, or person admitted to a public hospital who decides to choose the doctors who will treat them or have private ward accommodation. This means they will be charged for medical services, food and accommodation.

public patient: Person admitted to hospital who has agreed to be treated by doctors of the hospital's choice and to accept shared ward accommodation. Such patients are admitted and treated at no charge and are mostly funded through public sector health or hospital service budgets.

Repatriation Pharmaceutical Benefits Scheme (RPBS): Australian Government scheme providing a range of pharmaceuticals and wound dressings at a concessional rate for the treatment of eligible veterans, war widows and widowers and their dependants.

residential aged care: Care provided to a person in an aged care facility approved by the Australian Government (often called nursing homes). Services include: accommodation in private or shared rooms (bedding and other furnishings, meals and laundry); personal care (assistance with activities of daily living, such as bathing, showering, toileting, dressing, eating and moving about), social activities; and nursing and allied health-care services. Residential aged care can be on a permanent basis (people live in the facility), or on a short-term basis for respite or emergency support.

specialist services: Services supporting people with specific or complex health conditions and issues, who are generally referred by primary health-care providers. These services are often described as secondary health-care services. In many cases, a formal referral is required for an individual to access the recommended specialist service.

suicide: Action to deliberately end one's own life.

underlying cause of death: Primary or main cause of death: the condition, disease or injury that initiated the sequence of events leading directly to death; or the circumstances of the accident or violence that produced the fatal injury. See **cause of death**.

Australian Government
Australian Institute of
Health and Welfare

Data

Australian Government
Australian Institute of
Health and Welfare

Notes

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