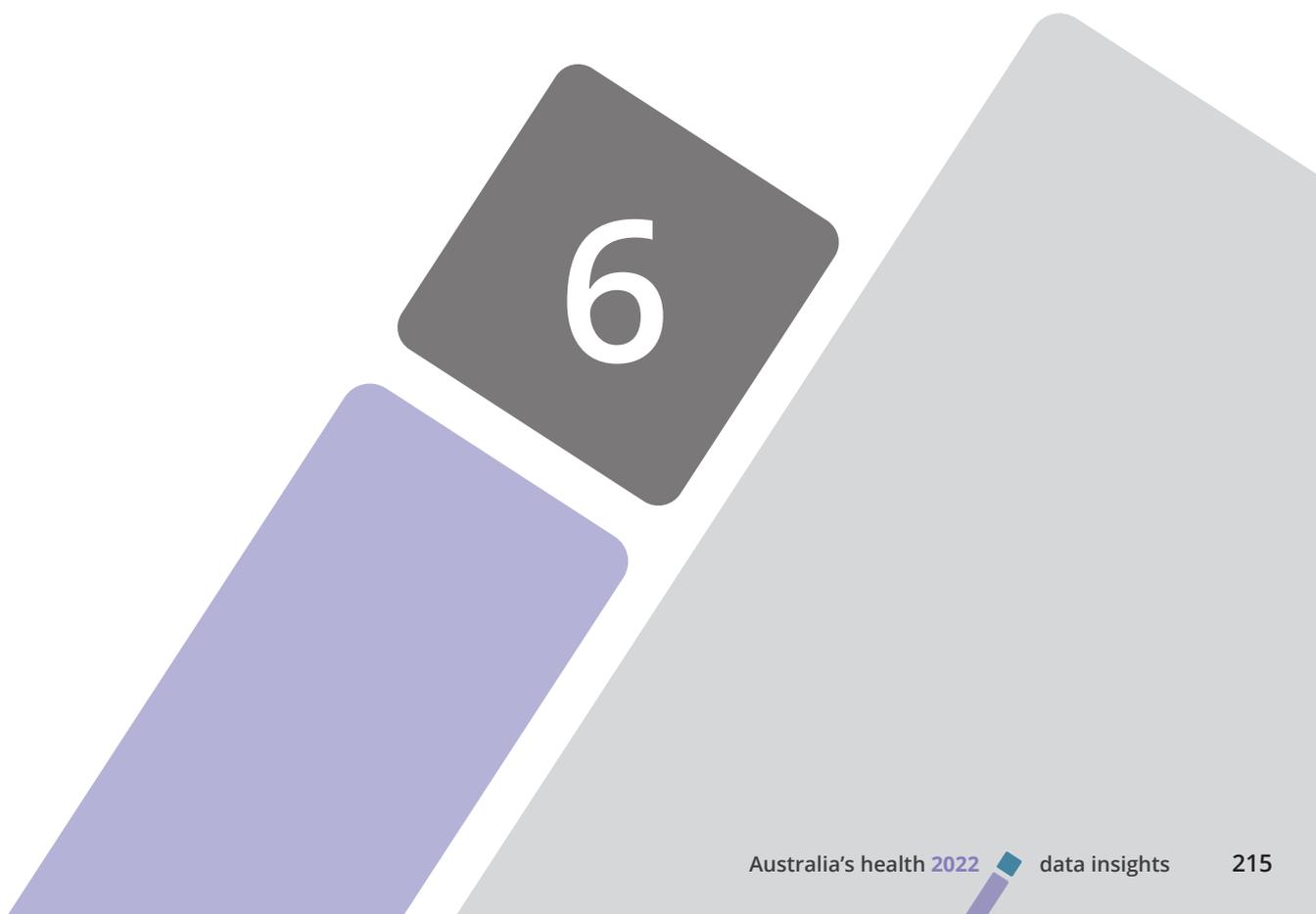


Health service costs in the last year of life



6

Health service costs in the last year of life

Key findings

This article presents findings from a forthcoming AIHW study (AIHW forthcoming 2022b) that used linked administrative data to examine health service use and costs in the last year of a person's life for 4 main types of health services: hospital admissions, emergency department (ED) presentations, Medicare Benefits Schedule (MBS) services, and prescriptions supplied under the Pharmaceutical Benefits Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS).

Key findings are:

- although only around 0.7% of the Australian population die each year, 8.0% of the health expenditure in scope was for people in their final year of life. This outlay was 17 times as high as costs for people not in the last year of their life (when adjusted for the different age profiles of these 2 population groups)
- for each of the 4 health service types analysed, costs were higher for people in their last year of life than for people who were not. This cost ranged from 4.8 times as high for MBS services to 39 times as high for hospital admissions
- average annual health service costs per person were much higher for young people in their last year of life compared with equivalent costs for people of the same age not in their last year of life, but this differential decreased with age. For example, costs for young people aged 10–19 in their last year of life were 43 times as high as costs for people of the same age who were not in their last year of life, but only 3.1 times as high for people aged 80 and over
- among the leading causes of death, average health service costs in the last year of life were highest for people who died from cancer (in particular, colorectal, breast and prostate cancer), and lowest for people who died from dementia (including Alzheimer's disease) and suicide
- people who died aged 85 and over and used residential aged care in their last year of life:
 - used fewer hospital and MBS services, but had more prescriptions supplied under the PBS (on average) than people of the same age who died and did not use residential aged care in their last year of life.
 - had 27% lower average health service costs (excluding the costs of aged care and health care provided by residential aged care services) than people of the same age who died and did not use residential aged care in their last year of life.

Although these findings are largely consistent with previous research, the study reported on in this article has provided new insights on this topic.

In 2020, 161,300 deaths were registered in Australia (AIHW 2022a). Understanding how people interact with Australia's health system in the period leading up to death provides vital information on health care provision in the last year of life. This information is essential to assess and evaluate health service planning and policy.

Australians experience a wide variety of health service pathways in their final year of life, which vary according to demographic and clinical factors. Healthy young people and people who die due to causes such as injury often have no contact with the health system in the 12 months before their death. In contrast, people aged 65 and over who have multiple comorbidities (Legler et al. 2011; Luta et al. 2020) and die from specific causes such as cancer have very high levels of health service use.

Knowing the cost of services in the last year of life allows us to understand and compare the intensity of health care service needs in the lead up to death across different types of services. Past research suggests that there are large variations in health service costs by age and that these costs vary by cause of death (being higher for causes such as cancer and lower for those such as dementia (including Alzheimer's disease)).

While there has been some international and Australian-based research exploring patterns of health service use and costs in the period leading up to death, the findings presented in this article are from a study that looked at a range of health care services and causes of death in Australia on a large-scale for the first time. The study (AIHW forthcoming 2022b) delivers new insights on the topic, including:

- estimates of the total cost of the health services examined that were spent in the last year of life
- detailed cost estimates for people who used and did not use residential aged care in their last year of life
- characteristics of people who use, and do not use, health services in their last year of life.

The study uses linked administrative data available from the AIHW's National Integrated Health Services Information Analysis Asset (NIHSI AA), to estimate health service costs for 4 main types of health services:

- public hospital ED presentations
- public (and some private) hospital admitted patient hospitalisations
- Medicare services covered by the MBS, such as general practitioner (GP), specialist, pathology and diagnostic imaging services
- prescriptions supplied under the PBS and RPBS (referred to collectively as PBS in this article).

The total estimated cost of these 4 health services over the period of analysis (1 July 2010 to 31 December 2016) was \$296.1 billion (average of \$45.6 billion per year). Of this total, 8.0% (\$23.6 billion; average of \$3.6 billion per year) was spent on these health services in the last year of life. Note the health expenditure estimates in this article differ from those published in the AIHW's Health Expenditure Australia reports (AIHW 2021) because of differences in the scope of the health services and costs included in NIHSI AA (version 0.5). For further information, see the section 'Health services and costs in and out of scope of this analysis' below.

Key findings from this study will help to fill a major evidence gap in an area with growing policy relevance in Australia – particularly in the context of population growth, ageing, increased longevity, a growing economy and increased spending on health. This article and its findings will be useful for health care professionals (including those people working in palliative care settings), policy makers and researchers for current and future planning and health service delivery.

Findings from previous research

Limited research has been undertaken previously 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). Studies were also published using survey and linkage data from the Australian Longitudinal Study on Women's Health (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 previous studies showed that, in general, health service use was higher for people in their last year of life than for people of similar age who were not. However, health service use and costs among people in their last year of life have also been found to vary according to the type of service, age of the person, proximity to death (for example, 6 months or 12 months before death), cause of death, and place of death (such as a residential aged care facility or a hospital).

For example, studies looking at proximity to death and age at death have found the following:

- healthcare 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 people of the same age who are not. 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 than equivalent costs for people of the same age who are not. However, by the time people reach age 95, there is little difference in costs between the people in their last year of life and those who are not (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).

Cancer and cardiovascular diseases are leading causes of death in Australia. Dementia (including Alzheimer's disease) is the leading cause of death for older Australians (aged 85 and over). Studies looking at health service use and costs in the last year of life by cause of death have found that:

- dying of cancer is associated with higher rates of hospitalisations, primary care service use and prescription medicine use but lower rates of ED use than deaths from other causes (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 is associated with other factors that may be independent of the 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.

Studies looking at place of death have found that people who die in residential aged care incur lower health service costs than people who die in hospital (Langton et al. 2016).

How did this study examine health services and costs in the last year of life?

De-identified data from the NIHSI AA were used to retrospectively examine health service records of people who had died. Four health service types were examined: ED visits, hospital admissions, MBS services and prescriptions supplied under the PBS. See Box 6.1 for more information on the NIHSI AA.

Box 6.1: What is 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. Creating this data asset has enabled, for the first time ever, a wide range of complex issues to be analysed. For example, the AIHW has reported on data currently available on the use of primary and community-based secondary healthcare services by people with dementia through services provided under the MBS (AIHW 2021a); it has also examined the feasibility of predicting early dementia using Medicare claims (AIHW 2021e).

Using NIHSI AA has enabled a richer understanding of the patterns of health service use and costs in the year before death than was previously possible by using a single data source. NIHSI AA datasets are also longitudinal, so that trends, patient pathways, disease prevalence and severity can be better understood and analysed over time.

The version of NIHSI AA (version 0.5) used in this study contains linked data from 2010–11 to 2016–17, which was the most recent available at the time of analysis. 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)
- PBS and RPBS national data (hereafter, for ease of reference, collectively referred to as PBS data in this article)
- MBS national data
- residential aged care national data (includes permanent residential aged care and respite care)
- National Death Index data (deaths from 1 July 2010 to 31 December 2017).

The NIHSI AA is currently updated annually, with the latest version including data up to June 2019, with data for 2019–20 expected to be added by September 2022.

This article uses the 12 months before death to analyse and present patterns of health service use and costs that align with the time period before death used in some other key research on this topic. Deaths from 1 July 2010 to 31 December 2017 were included in the analysis. Note that service use and costs for people who died at the start or end of the study period will not cover a full 12 months before death. Methods used in this study are detailed in the Technical notes of the detailed report (AIHW forthcoming 2022b).

Residential aged care data in the NIHSI AA were used only to indicate whether people had used residential aged care or not in their last year of life. The costs of residential aged care were not included in this study. However, it is acknowledged that aged care services provide essential care and support to many people in their last year of life.

Similar analyses using data in the NIHSI AA could be undertaken for different proximities to death (for example, last 2 years, 6 months or 3 months before death).

Note that findings in this article 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. Some of these 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.

Health services and costs in and out of scope of this analysis

Health service costs for MBS services and for prescriptions supplied under the PBS include both Australian Government benefits paid, and patient out-of-pocket costs. Hospital admitted patient and ED attendance costs include government (Australian Government and state/territory government) costs only. Non-government hospital and ED costs such as out-of-pocket and private health insurance costs (estimated to represent around 21% of total health expenditure (AIHW 2021b: Table 29)) are not captured.

Other health system costs not captured in the NIHSI AA v0.5 and thus not included in estimates presented in this article include those for:

- 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
- community and residential mental health services
- mental health programs such as headspace.

Government costs for hospital admitted patient hospitalisations and ED presentations were estimated using the Independent Hospital Pricing Authority's activity based funding formula applied to each service. Methods and calculations used to estimate costs and service utilisation are in the Technical notes of the detailed report (AIHW forthcoming 2022b).

Aged care costs are not included in the estimates for health system costs. However, it is acknowledged that aged care services can provide health-related services for residents in their final year that are not provided through MBS, PBS or hospital care.

Health service use and costs in the last year of life

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

Slightly more than 1.1 million people died between July 2010 and December 2017. Of these people, 97% (1.1 million) used at least one health service (as captured by the NIHSI AA) in their last year of life. This proportion was similar for males (97%) and females (98%) but was slightly less for people aged 0–64 (91%).

Under half (48%, 550,000 people) of Australians who died between July 2010 and December 2017 visited an ED at least once in their last year of life, and 48% (549,000) had at least one acute hospital admission. Around 94% (1.1 million people) were supplied at least one prescription under the PBS (such as anti-dementia drugs, opioids and immuno-suppressants) and 91% (1.0 million) used at least one MBS service (such as a GP attendance, specialist service, pathology service and diagnostic imaging).

Considering the 20 leading underlying causes of death, people least likely to use any of the 4 health service types in their last year of life were people who died by suicide (10%) and from coronary heart disease (3.1%). Furthermore, 63% of people who died by suicide did not visit an ED, 98% did not have a mental health hospital admission and 78% did not have an acute hospital admission in their last year of life. Eleven per cent of people aged 0–64 who died from accidental falls did not use a health service in their last year.

In their last year of life, people visited an ED an average of 1.4 times per person and were admitted to hospital 2.6 times, on average. There was little difference in the age-standardised average annual numbers of hospital admissions and ED visits per person between people in their last year of life and people who were not.

After adjusting for age, average annual MBS service use among people in their last year of life was 4.5 times as high as that for people who were not (48 and 11 services per person, respectively), while the average annual number of prescriptions supplied to people in their last year of life was 4 times as high as that for people not in the last year of life (30 and 7.4 prescriptions per person, respectively). The number of reported MBS services are very high as every pathology test generates a separate MBS claim.

Estimated lifetime health costs for people who died

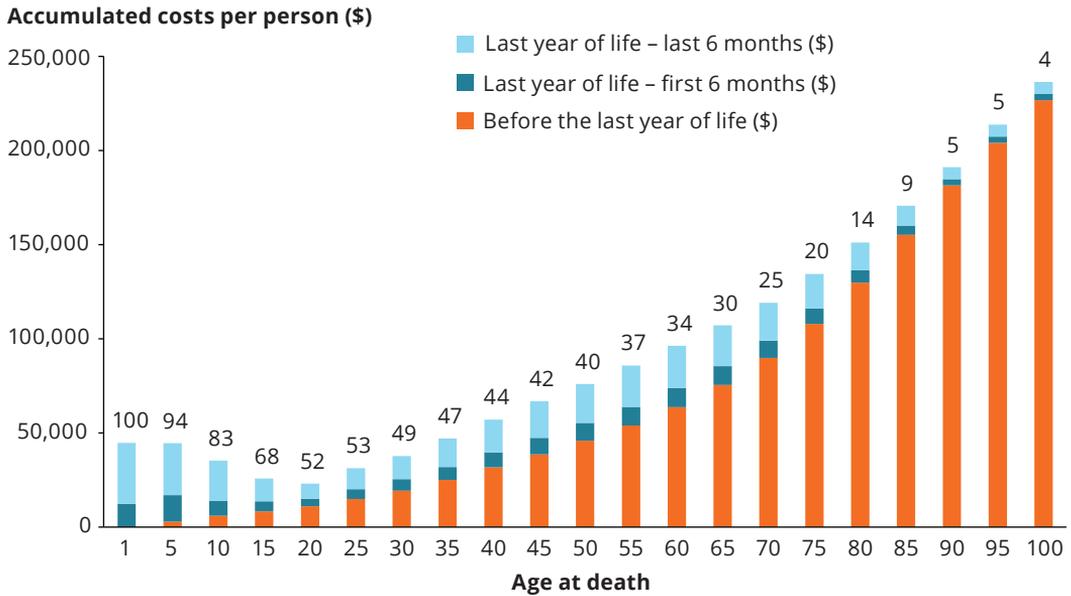
Total estimated lifetime costs for the 4 services analysed ranged from:

- \$44,800 for infants
- to \$23,200 for people aged 20 when they died
- to \$236,000 for people aged 100 or over when they died.

An estimated 8.0% of all health expenditure for the 4 health services was incurred for people in their last year of life. However, this varied depending on the age at death. When looking at the accumulated lifetime costs per person for the health services examined, costs spent in the last year of life generally fell with increasing age (Figure 6.1).

Due to data limitations, estimating lifetime health system costs of Australians using linked data is challenging. Importantly, for this analysis, it was assumed that health care costs for people in the years before their last year of life, are equivalent to the annualised age-specific costs estimated from the data. Methods used to estimate lifetime costs are in the Technical notes of the detailed report (AIHW forthcoming 2022b).

Figure 6.1: Estimated lifetime health costs, by age at death



Note: The numbers above each bar are percentages, representing, the proportion of costs attributable to the last year of life at each age at death.

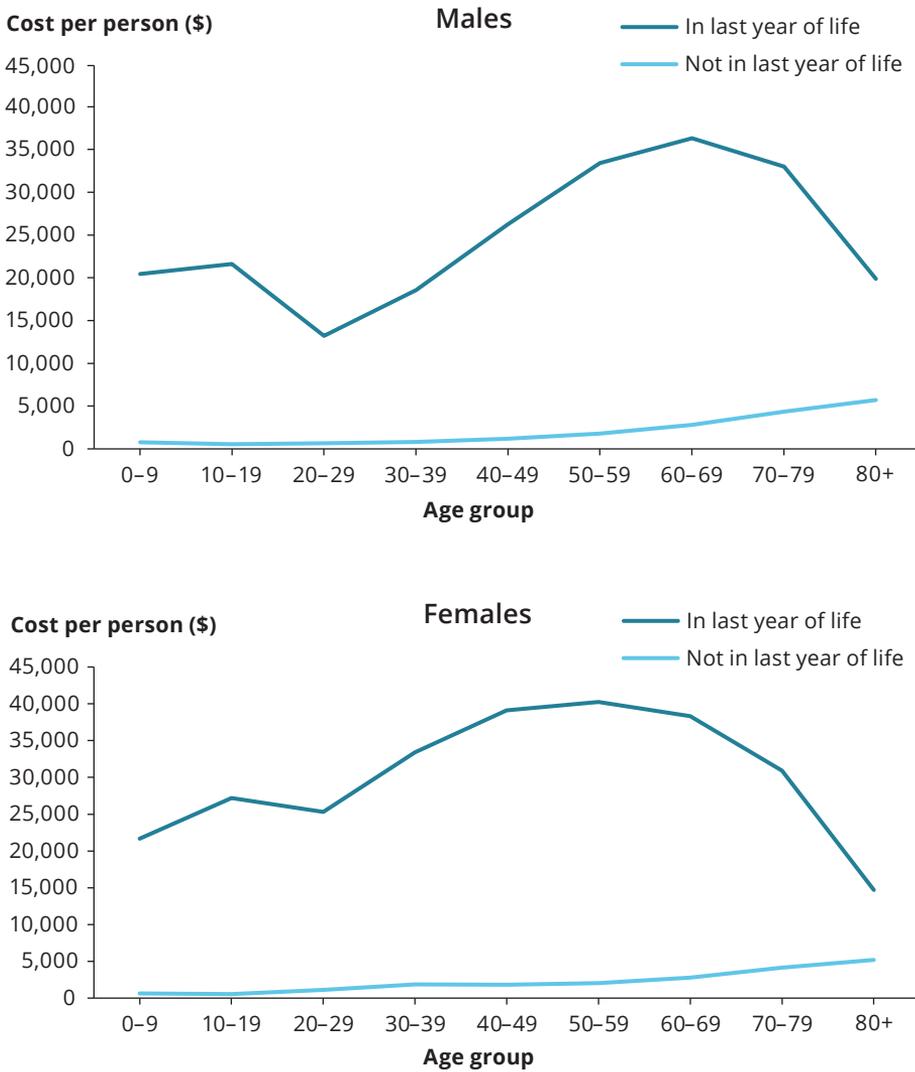
Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

Average healthcare costs in the last year of life vary by age group and sex

Slightly more than half (51%, 582,300 deaths) of all deaths during the study period occurred in males and they accounted for 56% of total health service costs in the last year of life. Overall, the annual average cost of the 4 health services was higher for males than females (\$26,300 and \$21,600 per person, respectively). However, after age-standardising to the 2001 Australian Standard Population, the overall annual average cost was higher for females (\$31,100 per female) than males (\$23,700 per male).

Almost 90% (989,000 deaths) of deaths occurred in people aged 60 and over, with this age group accounting for 83% of total health service costs in the last year of life. Average annual costs of health services per person in the last year of life were lowest among people aged 20–29 (\$16,600); they then increased with age to the 60–69 age group (\$37,100) before declining to around \$17,000 for people aged 80 and over. Average annual health service costs among people not in their last year of life generally increased steadily with age. The lower costs for young adults in both population groups are likely to be largely driven by males dying from sudden causes of death such as traffic accidents which are not associated with prior direct health service use. These patterns for people in and not in their last year of life were similar for females and males (Figure 6.2).

Figure 6.2: Average annual health service cost per person, by sex, age group and whether in last year of life



Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

Among young people, those in their last year of life had higher average annual health service costs than those not in their last year of life

Overall, the crude average annual health costs per person were \$24,000 for people in the last year of life and \$1,700 for people who were not. After adjusting for age, the average annual health cost per person in the last year of life was 17 times as high as that for people not in their last year of life (\$26,200 compared with \$1,600 per person).

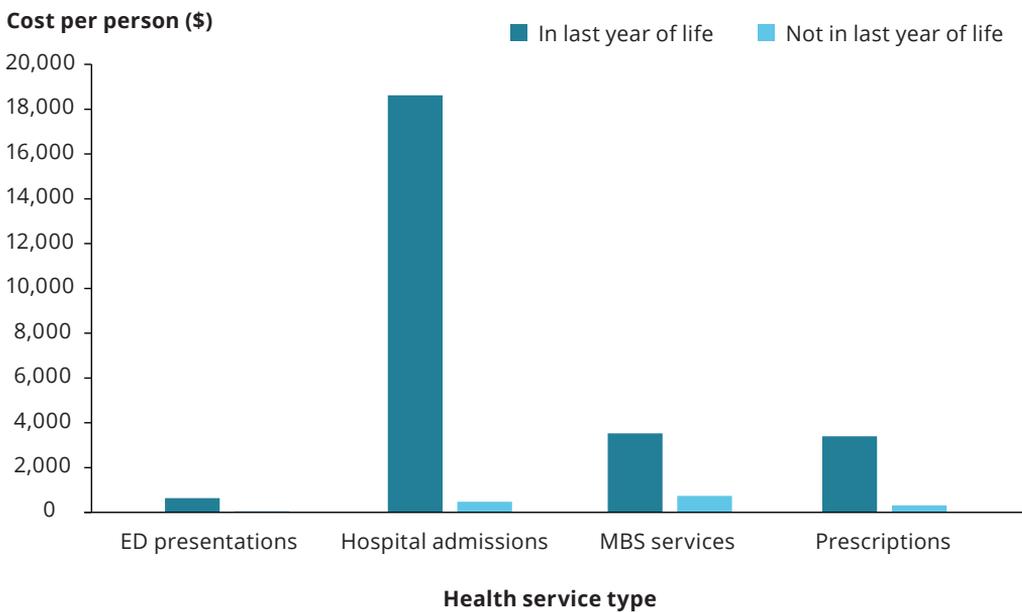
Health care spending for people in their last year of life differs significantly from that for people of similar age who are not in their last year of life. Average annual health

service costs were much higher for young people in their last year of life (up to 43 times as high for people aged 10–19 compared with people of the same age who did not die); however, the differential decreased with age (for example, by age 80, annual average health service costs were only 3 times as high). A similar pattern was evident when looking at costs for each of the health service types individually.

The age-standardised average annual costs for each type of health service were higher for people in their last year of life than for the rest of the population (Figure 6.3). They were:

- 39 times as high for hospital admissions (\$18,600 per person in last year of life compared with \$475 per person not in the last year of life)
- 12 times as high for ED visits (\$640 compared with \$53)
- 11 times as high for prescriptions supplied under the PBS (\$3,400 compared with \$320)
- almost 5 times as high for MBS services (\$3,500 compared with \$740).

Figure 6.3: Age-standardised average annual health service cost per person, by whether in last year of life and health service type



Note: Average annual costs per person are age-standardised to the 2001 Australian Standard Population.

Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

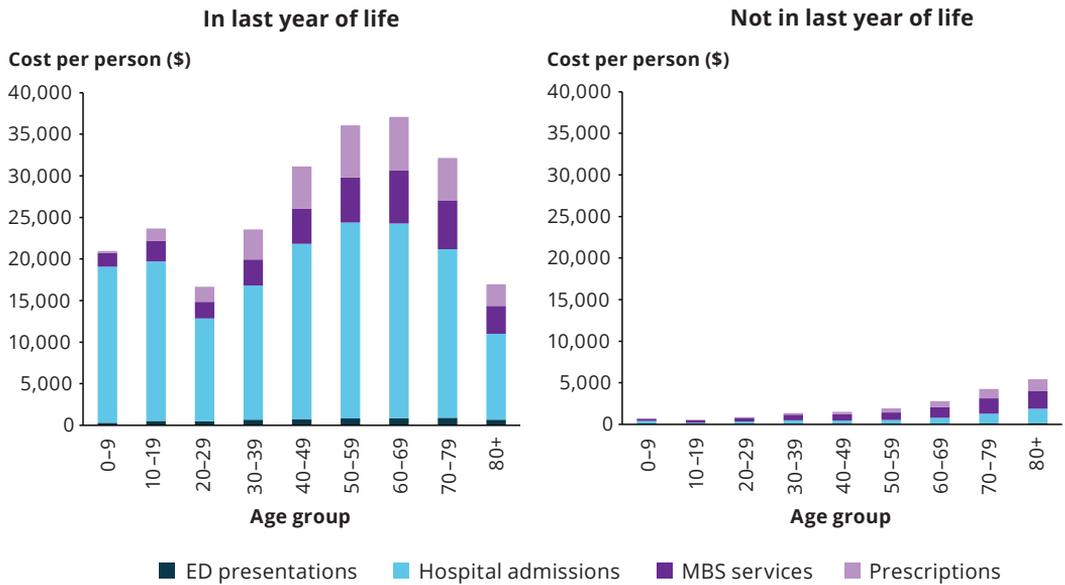
Of the health services included, hospital admissions accounted for the largest average costs per person in the last year of life in each age group, being highest in people aged 50–59 and 60–69. For both MBS services and for prescriptions supplied under the PBS, average costs in the last year of life were highest in the 60–69 age group. The average cost of ED attendances per person in the last year of life increased between the ages of 20 and 79 (by 78%) (Figure 6.4a).

For the rest of the population (people not in their last year of life), from the age of 10, average annual costs per person for hospital admissions, MBS services and prescriptions supplied under the PBS, increased with age (Figure 6.4a). Of these health services, the highest average annual costs per person in each age group were for MBS services.

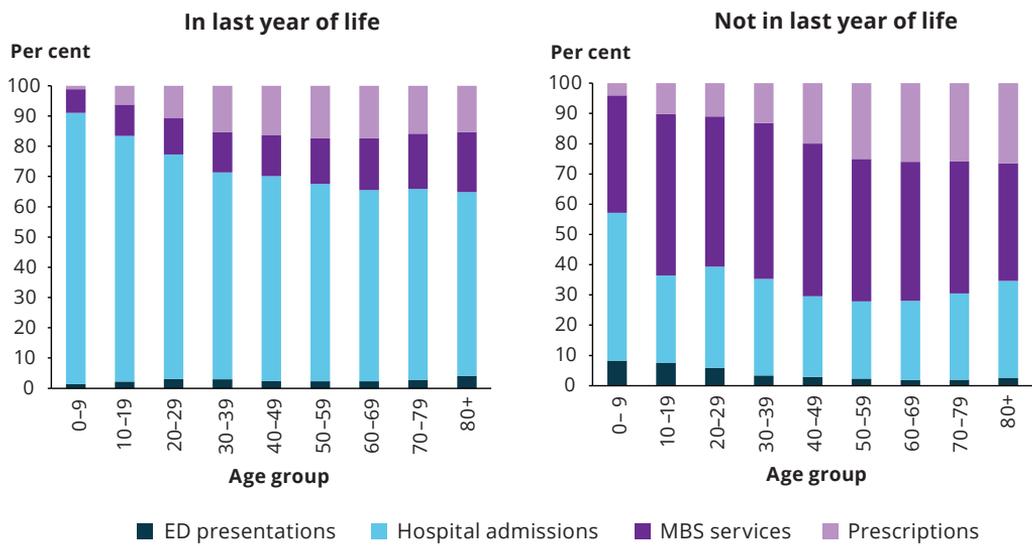
Patterns in the relative proportion of total average annual health service costs per person for the 4 health services differed between people who were in their last year of life and people who were not (Figure 6.4b). In each age group, hospital admissions accounted for the largest proportions of total average annual costs per person among people in their last year of life, while the relative costs of MBS services dominated for people not in their last year of life. As age increased, prescriptions supplied under the PBS generally accounted for an increasing proportion of the total average annual costs per person, irrespective of whether or not the person was in their last year of life.

Figure 6.4: Average annual health service cost (a) and relative proportion of total average annual health service cost (b) per person, by age group, health service type, and whether in the last year of life

(a) Average annual cost per person



(b) Relative proportion of total average annual cost per person



Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

Health service costs in the last year of life were highest for people dying from cancer

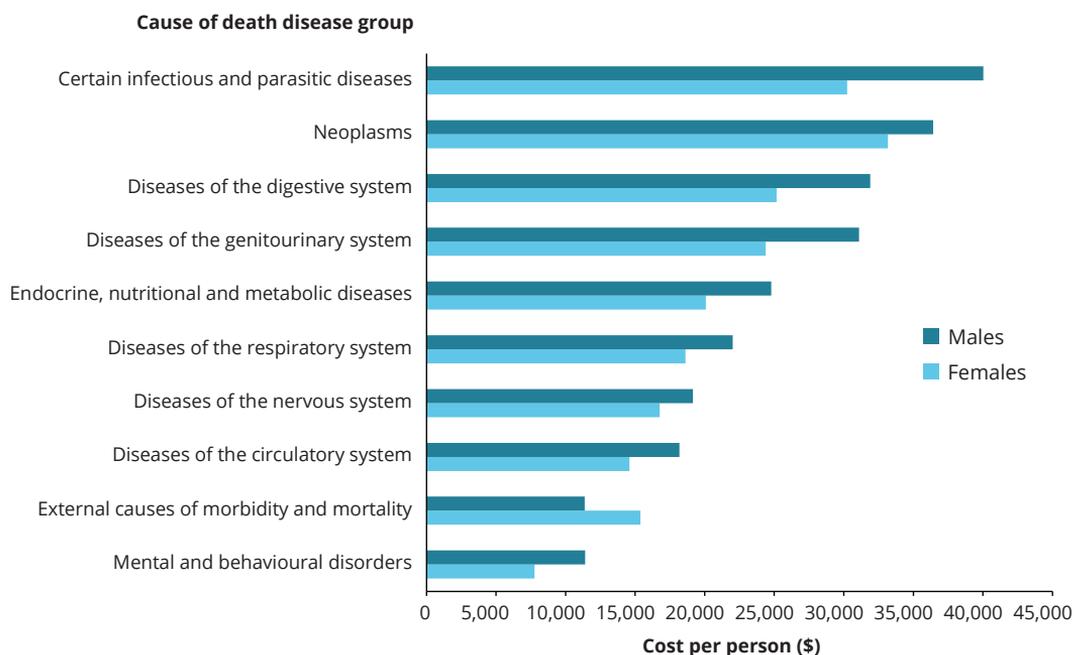
This section examines how health service costs in the last year of life differ by underlying cause of death. It should be noted that the cost data included in this section have not been adjusted for age. However, it is acknowledged that health care costs vary greatly by age for many causes of death, and more detailed analysis by age and cause of death (as well as age-adjustment) is planned as part of future work on this topic.

The total health service costs over the study period were highest among people who died from cancer, followed by cardiovascular diseases. These disease groups had the highest number of deaths over the period (335,000 and 331,000, respectively).

The average annual cost per person of health services in the last year of life was highest among people who died from infectious diseases (\$35,200 per person) followed by cancer (\$35,000). Deaths among women from pregnancy and childbirth had an average cost of \$35,400 per female. Average health service costs were lowest for people who died from mental and behavioural disorders (\$9,100 per person) and external causes (injury and poisoning) (\$12,800).

By sex, average costs of health services in the last year of life were highest for females who died from cancer and males who died from infectious diseases (Figure 6.5).

Figure 6.5: Average annual health service cost per person in the last year of life, by sex and selected cause of death disease groups



Notes:

1. Disease groups are based on the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) chapter level groupings.
2. Only disease groups with a total of more than 15,000 deaths among people who died during the study period and used at least one health service in their last year of life are shown.
3. Average health service costs per person have not been adjusted for age.
4. Costs for women who died from Pregnancy and childbirth related conditions are not shown in this figure due to the small number of deaths in the period of analyses (75 deaths). However, this group incurred high health service costs.

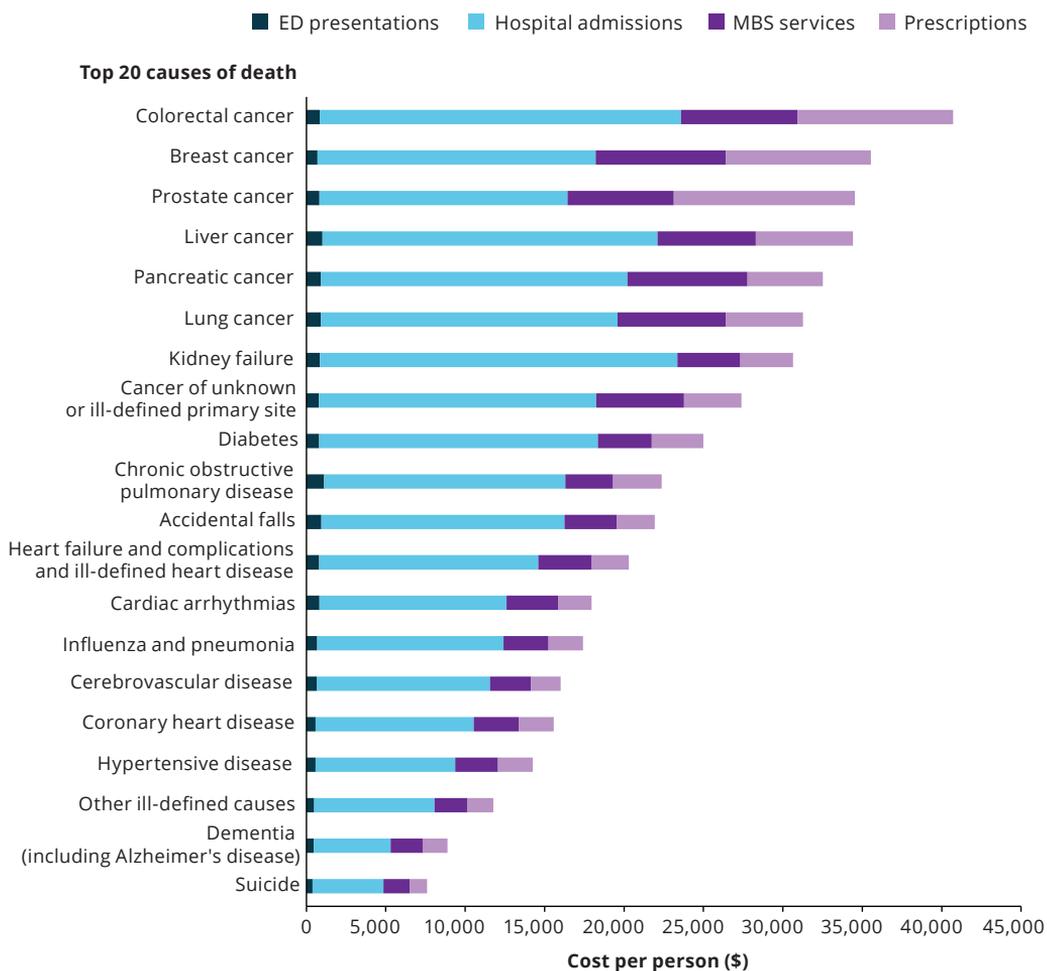
Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

Considering the leading 20 specific causes of death, the average annual cost of health services in the last year of life was highest among 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). Average costs were lowest for suicide (\$7,600 per person) and dementia (including Alzheimer’s disease) (\$8,900). It should be noted that many of these conditions are associated with longer term health service costs (not just in the last year of life).

The low costs for suicide should also 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), and some costs borne privately and/or through 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.

Looking at service type, deaths from cancers tended to have the highest average annual costs per person for hospital admissions, MBS services and prescriptions supplied under the PBS, while deaths from chronic obstructive pulmonary disease (COPD) had the highest average ED costs (Figure 6.6). Deaths by suicide had the lowest average costs per person in the last year of life for all 4 service types examined.

Figure 6.6: Average annual health service cost per person in the last year of life, by health service type and the top 20 causes of death



Notes:

1. Average health service costs per person have not been adjusted for age.
2. Data have been sorted by average total cost of the 4 health services.

Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

Health service use and costs for people who used residential aged care

Previous research suggests that people's use of health services can change after entering permanent residential aged care (AIHW 2020a). This analysis uses a flag to identify people who used residential aged care (permanent residential and/or respite care) in their final year, not all of whom would have spent the entire 12 months in aged care or would necessarily have died in a residential aged care facility. Some people residing in aged care could have died elsewhere, such as in hospital (AIHW 2021c). Furthermore, the analysis was restricted to people aged 85 and over, as most deaths in aged care occur in this age group.

High proportion of deaths among people aged 85 and over who used residential aged care in their last year of life

Over the study period, there were 432,000 people who died and used residential aged care in their last year of life (38% of all deaths in this study). More than two-thirds (68%) of these deaths occurred in people aged 85 and over (291,300 people). In comparison, there were 706,000 deaths among people who did not use residential aged care in their last year of life, and 25% of these deaths occurred in people aged 85 and over (176,200 people).

The remainder of this section describing services and costs by use of residential aged care focuses on people aged 85 and over only.

Women accounted for a greater proportion of deaths among people who used residential aged care in their last year of life (66%, or 192,000 women) than men (34%, 99,400 men). This is consistent with the fact that around two-thirds of people living in permanent residential aged care are women (AIHW 2021d). Women are also more likely to live longer than men and are less likely to have a living spouse/carer.

In contrast, among people who died and did not use residential aged care in their last year of life, the proportion of women (51%, 89,600 women) was only slightly higher than that for men (49%, 86,600 men).

The leading underlying causes of death among people aged 85 and over who used residential aged care in their last year of life were dementia (including Alzheimer's disease) (19%, 54,600 deaths) and coronary heart disease (16%, 47,000). For people of the same age who did not use residential aged care in their last year, the leading causes of death were coronary heart disease (17%, 29,400 deaths) and cerebrovascular disease (8.0%, 14,000).

Among all people aged 85 and over who died from dementia (including Alzheimer's disease), 88% used residential aged care in their last year of life.

More prescriptions were supplied on average for people who used residential aged care in their last year of life

Among people aged 85 and over who died and used residential aged care in their last year of life:

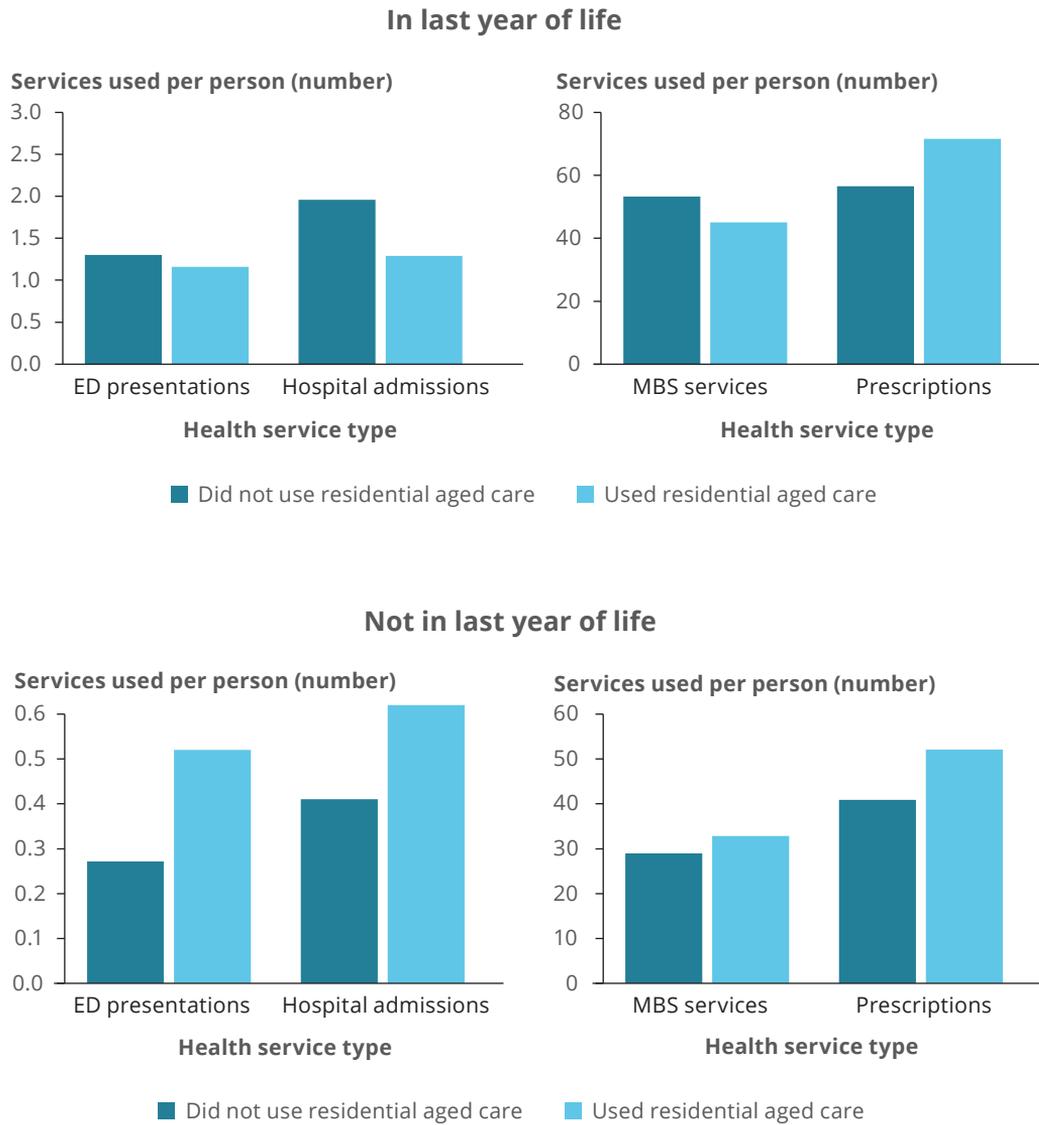
- 45% visited an ED at least once in that last year
- 43% had at least one acute hospital admission
- 90% used at least one MBS service
- almost 100% were supplied at least one prescription under the PBS.

In comparison, among people aged 85 and over who died and did not use residential aged care in their last year of life:

- the proportions with at least one ED visit or at least one acute hospital admission in that last year were higher (50% and 51%, respectively)
- the proportions using at least one MBS service or being supplied with at least one prescription under the PBS were slightly lower (85% and 96%, respectively).

On average, people aged 85 and over who died and used residential aged care in their last year of life used fewer hospital and MBS services (34% and 16% lower respectively), but had more prescriptions supplied under the PBS (27% higher), than people of the same age who did not use residential aged care in their last year of life (Figure 6.7). There was very little difference in the average number of ED visits for people who used residential aged care in their last year of life (1.2 per person) and people who did not (1.3 per person).

Figure 6.7: Average annual number of health services used per person aged 85 and over, by whether in last year of life, use of residential aged care and health service type



Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

One explanation for the lower use of MBS services among people who used residential aged care is that some of these people may access GPs by other channels – such as through DVA health care services which are not included in MBS claims.

In each year from 2012–13 to 2016–17, around 10% of people living in residential aged care had no MBS claims for GP visits while in care but most of these people probably received GP care through other means, such as DVA arrangements (AIHW 2020b). In addition, some health care services would be provided within the residential aged care facilities and are not captured in NIHSI AA. Furthermore, people who use residential aged care may not always be able to receive the care they need for reasons such as:

- increasing health care needs
- care needs not being identified or identified late
- not being able to access relevant health care services, particularly among people who are older, frail or living with disability (Royal Commission into Aged Care Quality and Safety 2021).

Thus, health service costs for people who used residential aged care are likely to be much higher than reported here.

In contrast, among people aged 85 and over who were not in the last year of life, people who used residential aged care had higher average annual service use than people who did not use residential aged care for each of the health service types examined (Figure 6.7).

Health service costs were lower for people who used residential aged care services

Around one-quarter (26%, or \$6.1 billion) of the total health care costs (for the health service types examined) spent on people in their last year of life were for people who used residential aged care in their last year. For people who died aged 85 and over, 55% of health care costs or \$3.2 billion were for people who used residential aged care in their last year. Note that costs of aged care or any healthcare (and associated costs) delivered as part of community aged care and the residential aged care service (and not through the MBS, PBS or hospital care) as well as outpatient care are not included in the estimates presented.

Average annual health service costs for people aged 85 and over who used residential aged care in their last year of life were:

- 27% lower than costs for people of the same age who did not use residential aged care in their last year (\$12,500 and \$17,000 per person, respectively) (Table 6.1)

- lower for each of the 4 health service types:
 - 32% lower for hospital admissions (\$7,100 per person for people who used residential aged care compared with \$10,400 for people who did not)
 - 16% lower for ED visits (\$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 (\$2,200 per person compared with \$2,500)
- higher for men than women (\$14,600 compared with \$11,400 per person)
- higher than costs for people who used residential aged care and were not in their last year of life (Table 6.1).

Table 6.1: Average annual health service costs per person aged 85 and over, by whether in last year of life and use of residential aged care

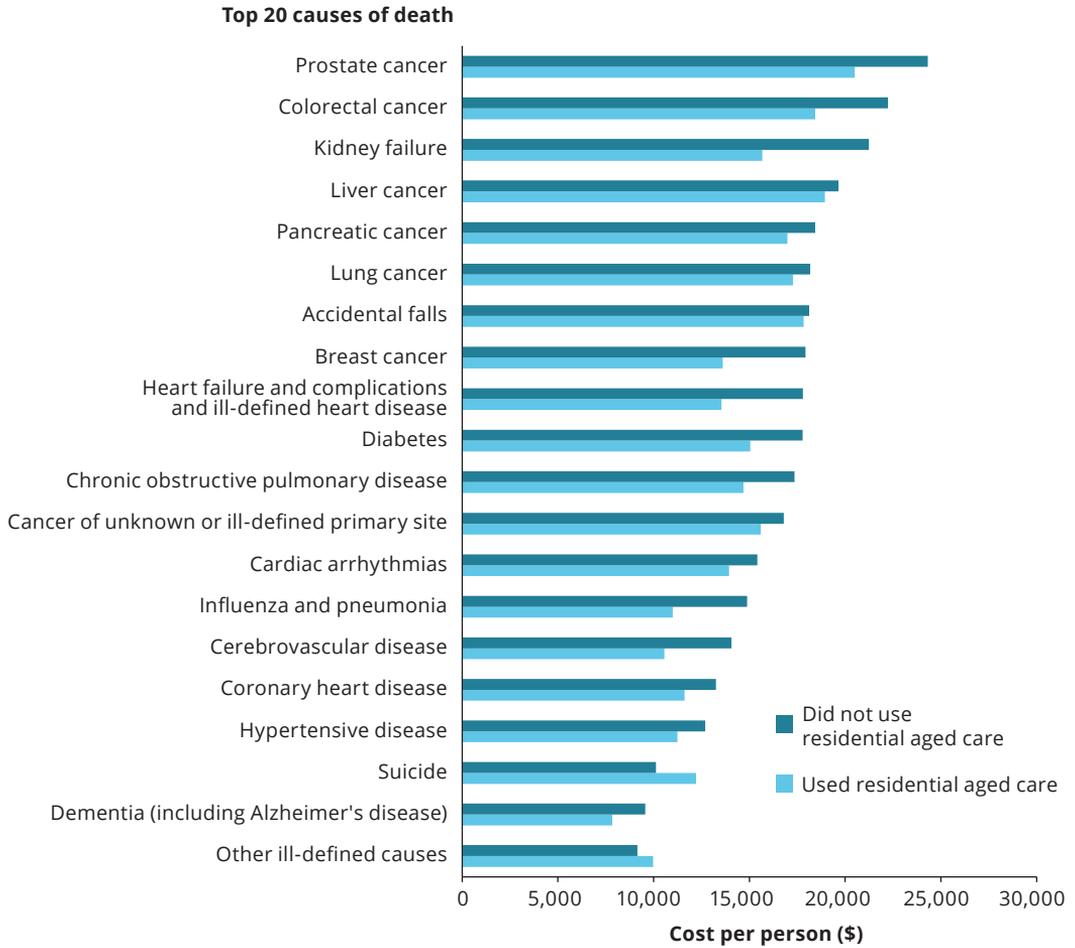
	In last year of life	Not in last year of life	Ratio
Used residential aged care	\$12,488	\$6,852	1.8
Did not use residential aged care	\$17,023	\$5,126	3.3
Ratio	0.7	1.3	..

Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

Health service costs were lower for people who used residential aged care for most leading causes of death

Average annual health service costs per person among people aged 85 and over who died and used residential aged care in their last year of life were lower than costs for people of the same age who died and did not use these services for most of the 10 disease groups (with more than 15,000 deaths in total over the study period) and the leading causes of death except for suicide and other ill-defined causes (such as senility and unspecified cardiac arrest) (Figure 6.8).

Figure 6.8: Average annual health service cost per person aged 85 and over in the last year of life for the top 20 causes of death, by use of residential aged care



Note: Data have been sorted by average total cost for people who did not use residential aged care in their last year of life.

Source: AIHW analysis of the National Integrated Health Services Information Analysis Asset (version 0.5).

Future directions

This study demonstrates the value of using linked administrative health data, such as the NIHSI AA, to analyse health care service use and costs. The findings in this article provide new insights on this topic, filling information gaps not examined in previous research to date.

Future work planned to update and extend the analysis presented in this article includes:

- more detailed disaggregation by age group and adjusting all estimates (including those by cause of death) by age
- updating the health service use and cost information to include later years of data
- examining several additional factors, such as multi-morbidity, which may help to explain the drivers of high service use and costs in the last year of life (and in the Australian population more generally). For example, the following could be examined:
 - differences by socioeconomic group and remoteness area to provide information on equitable access to health services
 - different time intervals for proximity to death (for example, last 6 months, 3 months, 1 month before death).

More detailed disaggregations within each health service type for different causes of death would provide additional insights (for example, mental health services for deaths from suicide, and chemotherapy and radiation therapy services for deaths from cancer). A closer analysis of the diagnoses for hospitalisation and ED admissions in the last year of life could also be undertaken to identify costs directly associated with the cause of death.

More detailed analyses of the characteristics of people who have little interaction with the health system before death would also be of value in providing additional insights into unmet or no need for health services. It may also be possible to explore the costs of residential aged care in the last year of life using methods that have been applied in estimating expenditure for dementia.

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