Cause of death patterns and people's use of aged care

Cause of death patterns and people's use of aged care

A Pathways in Aged Care analysis of 2012–14 death statistics

Contents

Acknowledgments

Abbreviations

ACAP	Aged Care Assessment Program
ACAT	Aged Care Assessment Team
ACFI	Aged Care Funding Instrument
AIHW	Australian Institute of Health and Welfare
COPD	chronic obstructive pulmonary disease
HACC	Home and Community Care
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th revision
PIAC	Pathways in Aged Care [link map]
PRAC	permanent residential aged care
RRAC	respite residential aged care
TCP	Transition Care Programme
UCOD	underlying cause of death

Symbols

n.a.	not available
no.	number

Summary

Nearly 245,000 older people (Indigenous Australians aged 50 and over, and non-Indigenous Australians aged 65 and over) died between July 2012 and June 2014. This report presents information on the cause of death patterns, and any aged care services they used before their death. This is the first time this analysis has been done in Australia.

Main causes of death

The leading causes of death for these older Australians were *Coronary heart disease* (14% of deaths), *Dementia* (9%), *Cerebrovascular disease (stroke)* (8%), *Lung cancer* (5%), *Chronic obstructive pulmonary disease* (5%) and *Diabetes* (3%).

These 6 conditions also account for more than 40% of the total burden of disease for older Australians.

Cause of death patterns varied depending on whether people had used aged care

Four in 5 (80%) of people in the study cohort had used an aged care program sometime before their death. Cause of death patterns differed somewhat between this group and people who had not used any aged care.

Coronary heart disease (14%) was the leading underlying cause of death for people who had used aged care, followed by *Dementia* (11%). For people who had not used aged care, *Coronary heart disease* was also the leading underlying cause of death (16%), but this was followed by *Lung cancer* (9%). Cancer-related causes were more common among those who had not used any aged care.

Causes of death patterns varied depending on the last aged care program used

While the leading underlying causes of death were relatively similar across each group, there were some differences.

Coronary heart disease was the leading underlying cause of death for people who had last used respite residential aged care (RRAC), Home and Community Care (HACC), aged care packages, or Transition Care Programme (TCP). But *Dementia* was the leading cause of death for people who had last used permanent residential aged care (PRAC) (Figure S1).

Cancer-related causes were more common among people who had last used community-based aged care programs.

These differences might reflect not only the way death rates vary by age for various diseases, but also the age at which particular aged care programs are commonly used.

The interaction with age was looked at in closer detail for the 3 largest groups—people who had last used PRAC, those who had last used HACC, and those who had never used aged care. Underlying cause-of-death patterns varied further—cancer-related causes were more commonly reported for younger people, while *Dementia* and *Coronary heart disease* were more common among older ages.

	PRAC (44%)	HACC (29%)	Aged care packages (4%)	RRAC (2%)	TCP (1%)	Any aged care (80%)
1	Dementia (18.2%)	Coronary heart disease (12.9%)	Coronary heart disease (14.7%)	Coronary heart disease (14.7%)	Coronary heart disease (14.5%)	Coronary heart disease (14.0%)
2	Coronary heart disease (14.7%)	Lung cancer (8.0%)	Cerebrovascular disease (7.7%)	Cerebrovascular disease (7.5%)	Cerebrovascular disease (7.2%)	Dementia (11.0%)
3	Cerebrovascular disease (11.1%)	COPD (5.6%)	COPD (7.5%)	COPD (6.0%)	COPD (6.1%)	Cerebrovascular disease (8.7%)
4	COPD (4.6%)	Cerebrovascular disease (5.2%)	Dementia (5.4%)	Lung cancer (5.8%)	Lung cancer (4.3%)	COPD (5.1%)
5	Diabetes (3.7%)	Colorectal cancer (4.2%)	Lung cancer (3.5%)	Dementia (5.4%)	Diabetes (3.8%)	Lung cancer (4.3%)
6	Heart failure and complications (3.1%)	Cancer, unknown, ill defined (3.6%)	Diabetes (3.4%)	Prostate cancer (3.5%)	Heart failure and complications (3.4%)	Diabetes (3.3%)
7	Influenza and pneumonia (2.8%)	Prostate cancer (3.1%)	Heart failure and complications (3.0%)	Cancer, unknown, ill defined (3.1%)	Dementia (3.3%)	Heart failure and complications (2.8%)
8	Parkinson disease (2.2%)	Diabetes (2.8%)	Accidental falls (2.9%)	Heart failure and complications (3.0%)	Kidney failure (3.1%)	Cancer, unknown, ill defined (2.4%)
9	Hypertensive diseases (2.1%)	Pancreatic cancer (2.5%)	Cancer, unknown, ill defined (2.4%)	Diabetes (2.9%)	Accidental falls (3.0%)	Colorectal cancer (2.4%)
10	Accidental falls (2.1%)	Heart failure and complications (2.3%)	Kidney failure (2.3%)	Colorectal cancer (2.9%)	Prostate cancer (2.9%)	Prostate cancer (2.3%)

Source: AIHW analysis of Pathways in Aged Care (PIAC) 2014 link map.

Figure S1: Leading underlying causes of death for older people (%), by last aged care program used, 2012–14

1   Introduction

A variety of factors affect the care needs of older Australians—usually people will need more care as they age, and particularly as they approach the end of their lives (Calver et al. 2006; Reeve et al. 2017).

Some of these care needs can be planned for better than others, depending on their cause. For example, cancer patients might have a fairly predictable, if increasing, need for pain relief, while someone with heart disease might unexpectedly and urgently require hospital care. Cause of death data can provide valuable insight into the way service requirements and needs might vary as people near the end of life.

Causes of death are distinguished between underlying causes of death (UCODs) and associated causes of death, which together are referred to as multiple causes of death. UCOD data describe the proportion of people whose death was considered to be due to a particular condition.

While cause of death data and aged care data have been reported for decades, the 2 dimensions together—people's causes of death in relation to their prior aged care service use—have not been reported before.

This report focuses on older Australians (Indigenous people aged 50 and over, and non-Indigenous people aged 65 and over) who died between 1 July 2012 and 30 June 2014. It looks at the way the patterns in people's causes of death varied depending on which aged care program they last used.

This new analysis should be considered in the context of existing research and reporting on aged care recipients and their care needs, adding to the understanding of the interactions between health conditions and the use of aged care.

1.1 Pathways in Aged Care

Information on how people use aged care is largely collected in separate data sets for each program, and although people commonly use more than 1 program over time, it is not normally possible to follow a person's path into, through, and beyond aged care services, or identify at what stage they died.

The Pathways in Aged Care (PIAC) link map is an AIHW resource that enables these analyses, by connecting aged care program data with mortality data.

Aged care services in Australia are provided through various programs. These can be broadly divided into services delivered in the community through home-based care and support, or in residential aged care facilities. People can use a mix of aged care services and other formal or informal support. They might also frequently move between aged care and the health system, but this level of movement is out of scope for this report, as the data available for this report only include aged care program use (Figure 1.1).

Using data linkage methods, PIAC brings together data from different aged care service programs, assessments done under the Aged Care Assessment Program (ACAP), and death data from the National Death Index.

The PIAC link map was recently updated and expanded (referred to here as 'PIAC 2014'), and now includes all people who died between July 1997 and September 2015, and any aged care use between July 1997 and June 2014.

More detail on the PIAC link map is available in *Introduction to Pathways in Aged Care 2014* (AIHW 2016b), and *Patterns in use of aged care 2002–03 to 2010–11* (AIHW 2014).

(a) Includes Community Aged Care Packages, Extended Aged Care at Home, Extended Aged Care at Home—Dementia, and Home Care Packages.
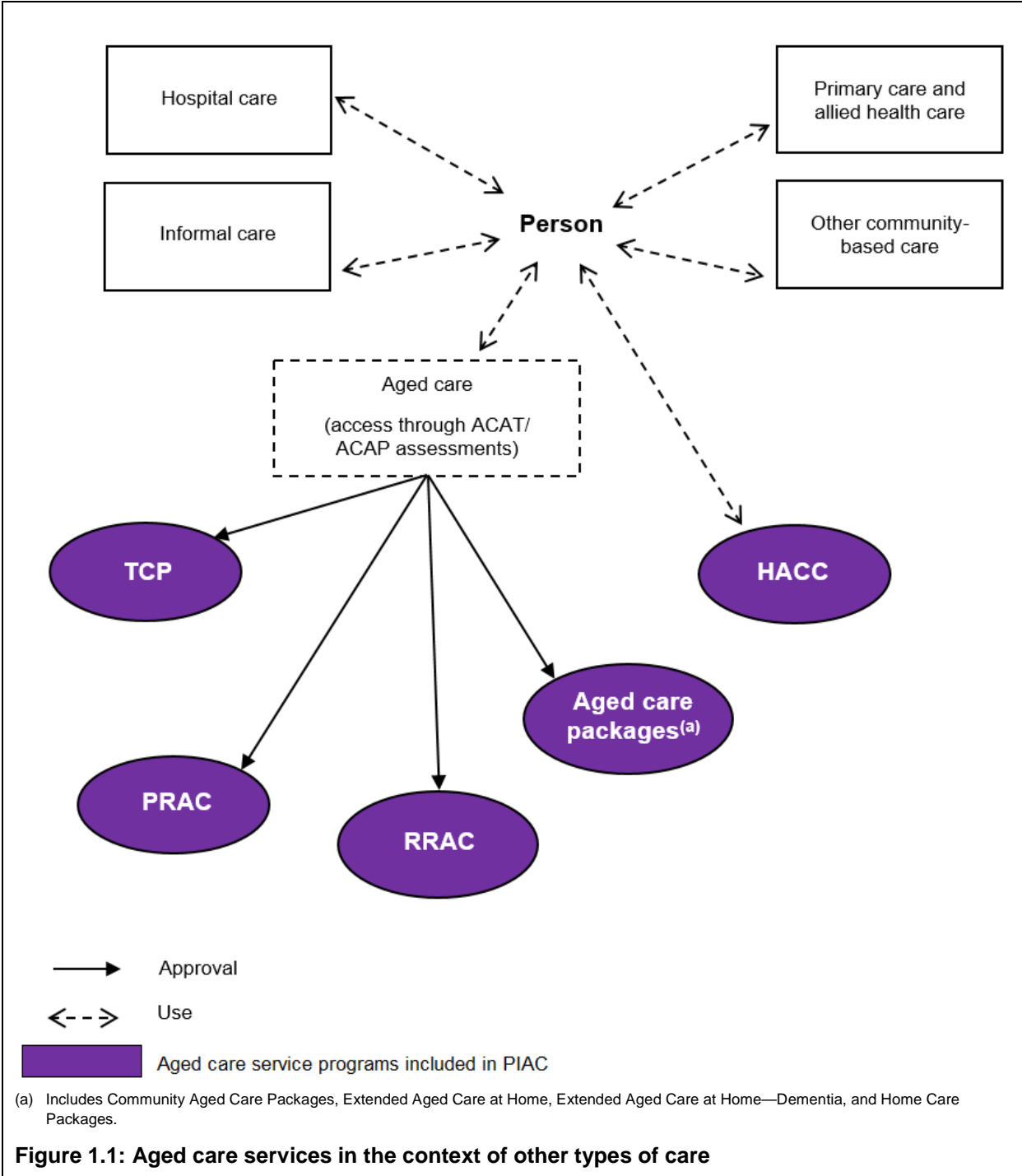
Figure 1.1: Aged care services in the context of other types of care

This report draws on most of the aged care programs included in PIAC, except for ACAP data. The programs included relate to aged care service use: residential aged care, which is provided on either a permanent or respite basis; Home and Community Care; aged care packages (these include the Home Care Packages Program and equivalent forerunners); and the Transition Care Programme (Box 1.1).

Box 1.1: Aged care programs included in this report

Permanent residential aged care (PRAC)

People who require a high level of care, and can no longer be supported to live at home might enter PRAC. Assessments using the Aged Care Funding Instrument collect information on care needs in PRAC, and determine the relevant subsidy amounts paid to the provider.

Respite residential aged care (RRAC)

Respite care is provided on a short-term basis in residential aged care facilities for people who otherwise still live at home.

Home and Community Care (HACC)

The Commonwealth HACC program provided various 'entry-level' services to support older people living at home (from 1 July 2014, the HACC program for people aged 65 and over was replaced by the Commonwealth Home Support Programme).

Aged care packages

The Home Care Packages Program provides support at 4 levels of care for people living at home. It replaced 3 programs in August 2013: Community Aged Care Packages (corresponding to Home Care Packages level 2), Extended Aged Care at Home, and Extended Aged Care at Home—Dementia, both of which correspond to Home Care Packages level 4). These 4 programs are collectively referred to as 'aged care packages'. In some sections of the report, the programs are grouped as 'low level' (those who last used Community Aged Care Packages and Home Care Packages levels 1–2) and 'high level' (Extended Aged Care at Home, Extended Aged Care at Home—Dementia, and Home Care Packages levels 3–4).

Transition Care Programme (TCP)

The TCP provides short-term care to older people leaving hospital to improve people's independence and functioning, and to delay entry into permanent care.

1.2 Method

The study cohort was non-Indigenous Australians aged 65 and over, and Indigenous Australians aged 50 and over (together termed 'older people' throughout this report) who died between July 2012 and June 2014. For each person in this group, their use of aged care was identified, focusing on the aged care service program they used most recently before death or at the time of death.

With approval from the AIHW Ethics Committee, the PIAC link map was used to import cause of death details for the study cohort. This additional linkage enabled the identification of the leading or most common causes of death for people who have used particular aged care programs.

Additional information was derived by importing data from the AIHW National Aged Care Data Clearinghouse tables for people who:

- were identified as needing palliative care through an Aged Care Funding Instrument (ACFI) assessment (for those who had last used PRAC)
- had taken hospital leave (for those who had last used aged care packages or PRAC).

For this report, underlying and multiple causes of death analyses were used. The UCOD analysis provides information about the number or proportion of deaths that were due to a disease or injury that initiated the train of events leading directly to death.

Analysis of multiple causes of death provides additional information on the number or proportion of deaths for which particular causes are listed on death certificates (as either the underlying or an associated cause).

UCODs were identified, and the proportion of deaths due to each cause was calculated as a percentage of total deaths in the relevant group. The same process was followed for calculating multiple causes of death proportions for selected conditions of interest.

More detail on methods are provided in Appendix A.

2   Aged care program use

Nearly 245,000 older people died in the 2 financial years included in this study: 2012–13 and 2013–14.

The majority of those (80%) had used at least 1 aged care program. This is similar to findings from previous PIAC research—using the earlier version of the link map—which reported that 4 in 5 people who died in 2010–11 had used aged care (AIHW 2014, 2015). While the remaining 20% had no recorded use of these programs, some might have been assessed for aged care and not taken it up.

Women made up just over half of the total number of deaths (51%), but more than half (56%) of the deaths among people who had used aged care, and only 35% of the deaths among those who had not.

Age also affected aged care use, with more than half (54%) of those who had used aged care being 85 and over, compared with only 22% of those who had not used aged care (Figure 2.1).

Source: Appendix Table B1.

Figure 2.1: Proportion of deaths of older people (%), by use of aged care and age group (years), 2012–14
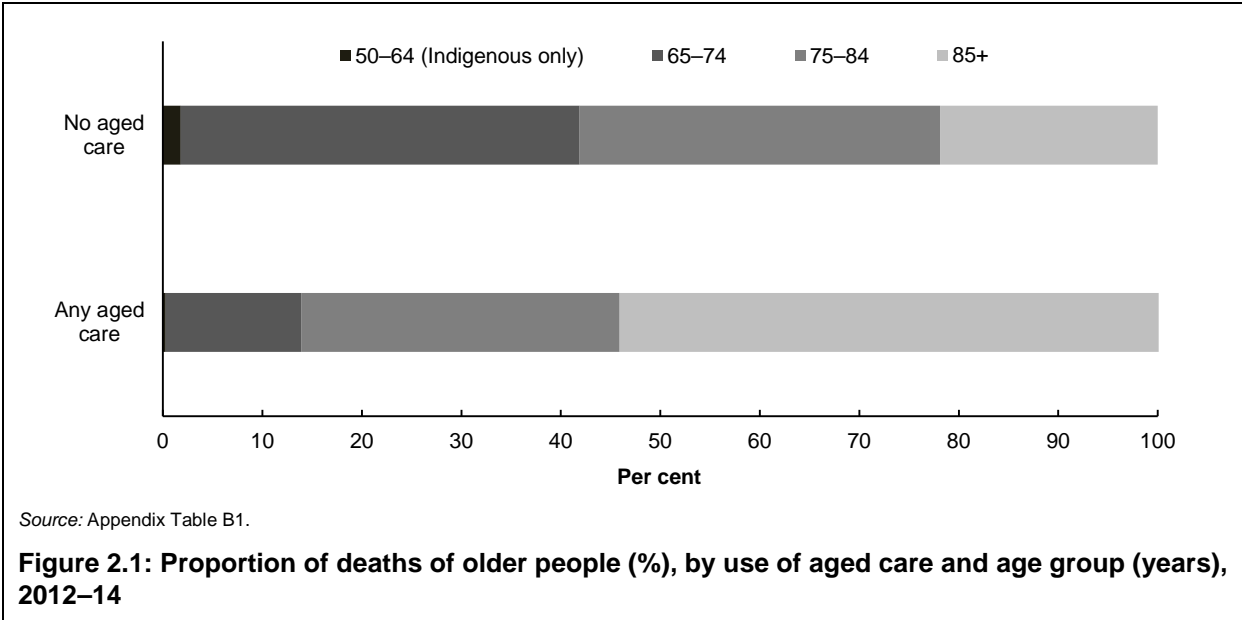
Overall, Aboriginal and Torres Strait Islander people made up 1.4% of the 245,000 deaths—just 1% of people who had used any aged care were Indigenous, and 3% of those who had not used aged care. This might reflect underuse of aged care by Indigenous Australians, as well as under-reporting of Indigenous status, and the use of other services that were not included in this study (see Appendix A for more information).

2.1 Comparison by last aged care program used

Considering the aged care program people had used most recently before their death, the largest proportion of deaths was among people who had last used PRAC (44% of all deaths), followed by HACC (29%). Collectively, people who had last used aged care packages represented 4% of all deaths in the study cohort, RRAC 2%, and TCP 1% (Table B1).

Among people who died having last used PRAC, 62% were women, compared with 47% among those who last used HACC (Table 2.1).

The distribution of deaths across age groups also varied by program. Among those who last used PRAC:

- 7% were aged 65–74
- 26% were aged 75–84
- 67% were aged 85 and over.

Among those who last used HACC:

- 24% were aged 65–74
- 40% were aged 75–84
- 35% were aged 85 and over.

Among those who last used aged care packages:

- 12% of those on low-level packages, and 16% on high-level packages were aged 65–74
- 35% of those on low-level packages, and 36% on high-level packages were aged 75–84
- 52% of those on low-level packages, and 48% on high-level packages were aged 85 and over (Table 2.1).

Table 2.1: Proportion of deaths for older people who use aged care (%), by program type, sex, and age group, 2012–14

	PRAC	RRAC	HACC	Low-level aged care packages	High-level aged care packages	TCP
Sex						
Men	38.1	51.4	53.4	44.1	46.4	51.1
Women	61.9	48.6	46.6	55.9	53.6	48.9
Age group (years)						
50–64 (Indigenous only)	0.1	0.2	0.6	0.9	0.5	0.2
65–74	6.5	11.5	24.4	12.3	16.1	14.7
75–84	26.3	30.9	40.0	34.6	36.0	40.9
85+	67.1	57.4	35.0	52.2	47.5	44.3
Total deaths (%)	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Total deaths (number)	**107,723**	**5,211**	**70,289**	**6,005**	**4,181**	**2,411**

Note: Indigenous status not known for 534 people (included in total).

Source: Appendix Table B1.

As could be expected, age affects whether a person uses aged care, and the type of program that is used.

Older Indigenous Australians use of aged care

Planning for and reporting on aged care services commonly takes into account the Aboriginal and Torres Strait Islander population aged 50 and over.

In general, the chronic health conditions associated with ageing affect Aboriginal and Torres Strait Islander people at younger ages. The lower life expectancy for Aboriginal and Torres Strait Islander people is also reflected in their younger age profile in aged care. Indigenous Australians who died having last used PRAC (12%) were more likely to be aged under 65 than non-Indigenous Australians (1.4%), and considerably less likely to be aged 85 and over (31% compared with 66%) (Table B2).

Among those who had last used HACC, Indigenous Australians (35%) were more likely to be aged under 65 than non-Indigenous Australians (12%).

Almost two-thirds (62%) of Indigenous Australians who died and had not used aged care were aged under 65, compared with under one-third (30%) of non-Indigenous Australians. This might reflect their younger age at death, and particular patterns of care needs, but it might also be influenced by use of programs that fall outside the scope of this study, such as the National Aboriginal and Torres Strait Islander Flexible Aged Care Program.

2.2 Hospital leave from permanent residential aged care or aged care packages

Hospital leave is recorded where people were absent from PRAC or aged care packages for at least 1 night due to a hospital admission.

Hospitalisation was common in the lead up to death for both of these groups. In 2012–14, almost 108,000 people who had last used PRAC, and 10,200 people who last used aged care packages died. For both of these groups, more than two-thirds (69% and 70%, respectively) had taken hospital leave some time before their death.

For people who used PRAC, almost 29% had taken hospital leave within the month before their death, and half of them died while on hospital leave (Table 2.2). Put another way, half of people who last used PRAC and who took hospital leave within 30 days of their death died in hospital.

While a similar proportion of both groups had no record of hospital leave, among those who last used aged care packages, hospital leave was more common within 30 days of their death than among those who last used PRAC (47%, compared with 29% for PRAC). For about one-third of those who last used aged care packages, the death occurred while on hospital leave.

Table 2.2: Number of deaths for older people who used aged care, by record of hospital leave and last program used, 2012–14

	PRAC		Aged care packages	
	No.	%	No.	%
Died on hospital leave	15,178	14.1	3,343	32.8
Hospital leave 1–30 days before death	15,474	14.4	1,451	14.2
Hospital leave within 30 days of death subtotal	30,652	28.5	4,794	47.1
Hospital leave more than 30 days before death	43,409	40.3	2,351	23.1
No record of hospital leave	33,662	31.2	3,041	29.9
Total deaths	**107,723**	**100.0**	**10,186**	**100.0**

Note: Hospital leave is recorded only for PRAC and aged care packages.

Source: AIHW analysis of PIAC 2014.

3   Patterns in causes of death

3.1 Underlying causes of death

The most common UCODs of older people who died in 2012–14 were *Coronary heart disease* (14% of deaths), *Dementia* (9%), and *Cerebrovascular disease* (mostly stroke) (8%) (Table 3.1).

Many of the leading UCODs were the same as those for people aged 75 and over in the general population (AIHW 2016d), and the leading 6 UCODs were the same as those that most contribute to the overall burden of disease (measured by the number of years lost due to ill health, disability, or early death) in people aged 65 and over in the wider Australian population. These 6 UCODs—*Coronary heart disease*, *Dementia*, *Chronic obstructive pulmonary disease (COPD)*, *Stroke*, *Lung cancer*, and *Diabetes*—account for more than 40% of the total burden of disease for older Australians (AIHW 2016a, 2017b).

These causes are the focus for the analysis of multiple causes of death in Section 3.2.

Table 3.1: Leading underlying causes of death for older people (%), 2012–14

Rank	Cause of death	%
1	Coronary heart disease	14.4
2	Dementia	9.0
3	Cerebrovascular disease (stroke)	8.2
4	Lung cancer	5.2
5	COPD	4.9
6	Diabetes	3.1
7	Cancer, unknown, ill-defined	2.6
8	Colorectal cancer	2.6
9	Heart failure and complications	2.6
10	Prostate cancer	2.4
	All other causes	45.1
	Total deaths (number)	**244,854**

Source: AIHW analysis of PIAC 2014.

The leading UCOD (*Coronary heart disease*) was the same, and accounted for as similar proportion, for people who had used any aged program in the years before their death (14%), and those who had not used any aged care (16%) (Figure 3.1).

But while *Dementia* was the second leading UCOD among people with any aged care program use (11%), it was not among the leading UCODS for people who had no program use—this is consistent with the known higher care needs of people with *Dementia*.

For people who had no program use, the second leading UCOD was *Lung cancer* (9%). The proportion of deaths due to *Lung cancer* among people who had no program use was twice that of people who had used aged care (4%). Cancer-related causes were more common for those who had not used aged care.

Any use of aged care

Source: Appendix Table C1.

Figure 3.1: Leading underlying causes of death for older people (%), by any use of aged care, 2012–14
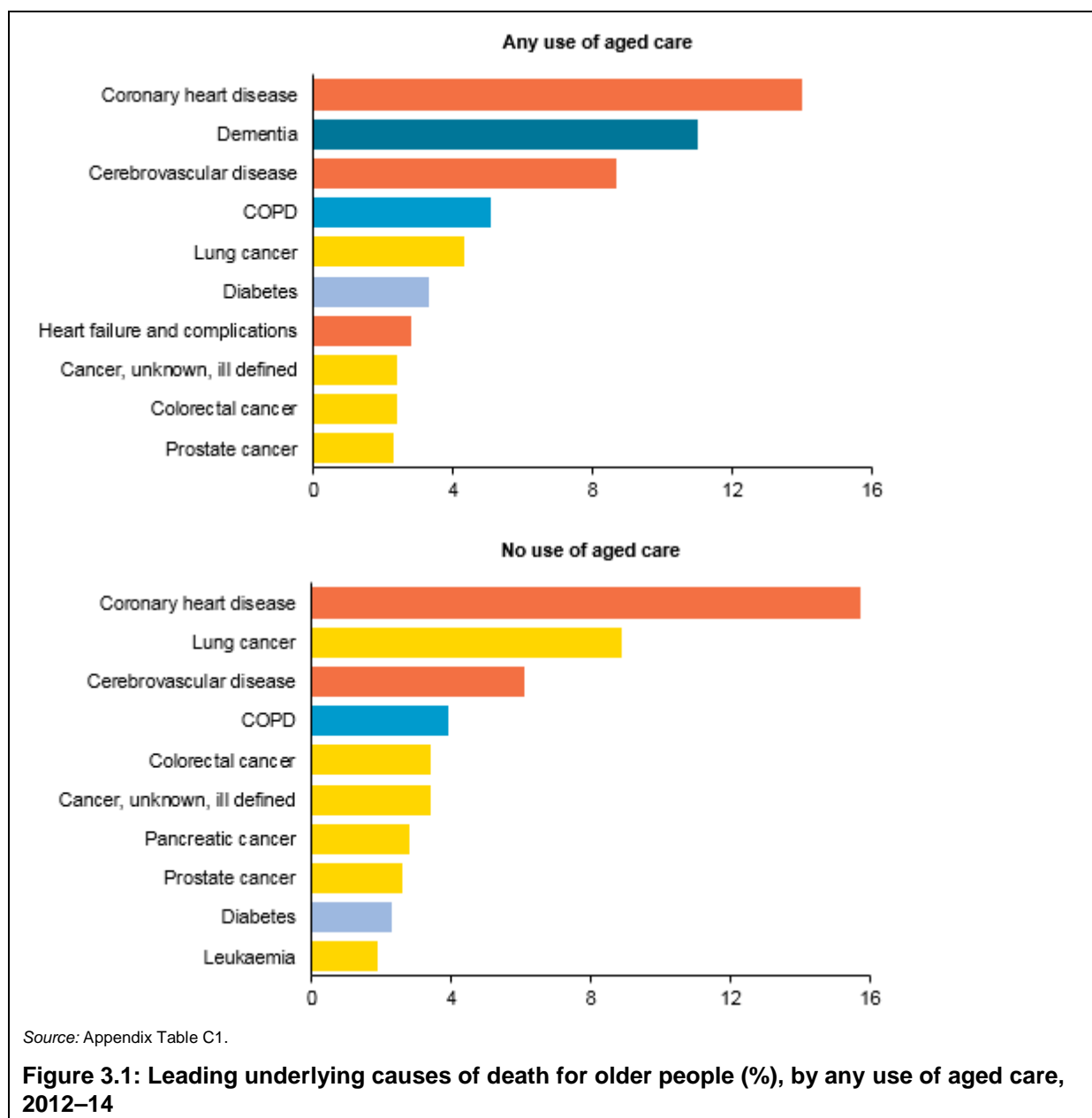
Among people who had used aged care, *Coronary heart disease* was still the leading UCOD (ranging from 12% to 17% depending on the last program used before death). The exception was for people who had last used PRAC, for whom the leading UCOD was *Dementia* (18% of deaths). *Dementia* was also among the 10 most common UCODs for other groups, except for people who died having last used HACC, and those who had never used aged care (figures 3.1 and 3.2).

Coronary heart disease, *Cerebrovascular disease*, and *COPD* were leading UCODs for most groups. For people who had last used PRAC, they also accounted for a larger proportion of deaths—more than 4 in 10, compared with 3 in 10 or fewer for each of the other groups.

People who died having last used a program that delivered care in the community (HACC or aged care packages), or having used no aged care were more likely to have a cancer-related UCOD than people who died having last used PRAC. In this group, cancer-related UCODs were not among the 10 most common UCODs (Figure 3.2).

	PRAC (44%)	HACC (29%)	Aged care packages (4%)	RRAC (2%)	TCP (1%)	No aged care (20%)
1	Dementia (18.2%)	Coronary heart disease (12.9%)	Coronary heart disease (14.7%)	Coronary heart disease (14.7%)	Coronary heart disease (14.5%)	Coronary heart disease (15.7%)
2	Coronary heart disease (14.7%)	Lung cancer (8.0%)	Cerebrovascular disease (7.7%)	Cerebrovascular disease (7.5%)	Cerebrovascular disease (7.2%)	Lung cancer (8.9%)
3	Cerebrovascular disease (11.1%)	COPD (5.6%)	COPD (7.5%)	COPD (6.0%)	COPD (6.1%)	Cerebrovascular disease (6.1%)
4	COPD (4.6%)	Cerebrovascular disease (5.2%)	Dementia (5.4%)	Lung cancer (5.8%)	Lung cancer (4.3%)	COPD (3.9%)
5	Diabetes (3.7%)	Colorectal cancer (4.2%)	Lung cancer (3.5%)	Dementia (5.4%)	Diabetes (3.8%)	Colorectal cancer (3.4%)
6	Heart failure and complications (3.1%)	Cancer, unknown, ill defined (3.6%)	Diabetes (3.4%)	Prostate cancer (3.5%)	Heart failure and complications (3.4%)	Cancer, unknown, ill defined (3.4%)
7	Influenza and pneumonia (2.8%)	Prostate cancer (3.1%)	Heart failure and complications (3.0%)	Cancer, unknown, ill defined (3.1%)	Dementia (3.3%)	Pancreatic cancer (2.8%)
8	Parkinson disease (2.2%)	Diabetes (2.8%)	Accidental falls (2.9%)	Heart failure and complications (3.0%)	Kidney failure (3.1%)	Prostate cancer (2.6%)
9	Hypertensive diseases (2.1%)	Pancreatic cancer (2.5%)	Cancer, unknown, ill defined (2.4%)	Diabetes (2.9%)	Accidental falls (3.0%)	Diabetes (2.3%)
10	Accidental falls (2.1%)	Heart failure and complications (2.3%)	Kidney failure (2.3%)	Colorectal cancer (2.9%)	Prostate cancer (2.9%)	Leukaemia (1.9%)

Notes

1. *Heart failure and complications* also includes ill-defined heart diseases.

2. Calculated as a proportion of total deaths for people who last used a particular aged care program/did not use aged care before death.

Sources: Appendix tables C2–C7.

Figure 3.2: Top 10 causes of death for older people, by last aged care program used (%), 2012–2014

As with deaths among people who had last used PRAC, UCODS related to neurological disease were common among those who had last used high-level aged care packages. This might have in part been because, at the time, high-level aged care packages included Extended Aged Care at Home—Dementia. To access this program, a diagnosis of *Dementia* or a related disorder was required. Three common neurological diseases (*Dementia*, *Parkinson disease*, and *Spinal muscular atrophy*) accounted for 15% of deaths for this group.

Some causes of death that are selected as the UCOD are non-specific. For example, *Cancer, unknown, ill-defined* often arises when there is insufficient information to code a more specific cause of death. As well, some causes of death recorded as UCODs are more appropriately reported as the associated cause of death.

For example, *Heart failure* is a mode of dying, or the immediate and final cause of death. Some other condition likely led to the heart failure, and should be recorded as the UCOD, but *Heart failure and complications* can also include ill-defined heart diseases, where information was not available to code a more specific cause.

Other factors affecting UCOD patterns

Age and sex

UCOD patterns varied depending on people's age, sex, and which aged care program they had last used before death. This section presents the largest groups—people who last used PRAC, HACC, or no aged care—with a focus on the leading underlying causes.

For people who had last used PRAC, *Dementia*, *Coronary heart disease*, and *Cerebrovascular disease* were the most common UCODs for men and women across each of the 3 age groups (65–74, 75–84, and 85 and over) (Figure 3.3).

But for the 2 younger age groups, cancer-related UCODs were more common than for those who died at older ages. They accounted for 14% of deaths among men aged 65–74, 8% among those aged 75–84, and 5% among those aged 85 and over. For women in the 2 younger age groups, the proportions were similar to men of the same ages (14% and 7%), but were absent from the 10 leading causes for women aged 85 and over.

Cancer-related UCODs were more common across all ages for both men and women who had last used HACC than for those in other groups (Figure 3.4).

By age group, cancer-related UCODs were most common among those aged 65–74 for both men (36% of death) and women (40%). Cancer-related UCODs fell with increasing age, accounting for 26% of deaths among men aged 75–84, and 27% among women of that age, then falling 16% among men aged 85 and over, and 9% among women of that age.

For both men and women in the oldest age group, common non-cancer related UCODs were *Coronary heart disease*, *Cerebrovascular disease*, *COPD*, and *Accidental falls*.

The pattern of UCODs among people who had not used aged care before death was similar to those who had last used HACC, with cancer-related causes common for both men and women of all 3 age groups.

Again, there was a higher proportion of cancer-related UCODs in the younger age groups, while cardiovascular disease-related causes, *COPD*, and *Accidental falls* were more common among people who died aged 85 and over (Figure 3.5).

	Men			Women		
	65–74	75–84	85+	65–74	75–84	85+
1	Dementia (10.4%)	Dementia (16.1%)	Coronary heart disease (17.3%)	Dementia (13.7%)	Dementia (19.6%)	Dementia (20.5%)
2	Cerebrovascular disease (9.2%)	Coronary heart disease (11.9%)	Dementia (15.9%)	Cerebrovascular disease (8.6%)	Cerebrovascular disease (11.2%)	Coronary heart disease (16.4%)
3	Coronary heart disease (8.5%)	Cerebrovascular disease (9.7%)	Cerebrovascular disease (9.9%)	COPD (7.7%)	Coronary heart disease (11.0%)	Cerebrovascular disease (12.5%)
4	COPD (7.2%)	COPD (6.5%)	COPD (5.3%)	Coronary heart disease (6.3%)	COPD (5.7%)	Heart failure and complications (3.9%)
5	Lung cancer (6.1%)	Prostate cancer (4.8%)	Prostate cancer (4.8%)	Lung cancer (5.3%)	Diabetes (4.7%)	Influenza and pneumonia (3.3%)
6	Diabetes (5.6%)	Diabetes (4.8%)	Diabetes (3.5%)	Diabetes (4.7%)	Parkinson disease (2.6%)	Diabetes (3.0%)
7	Parkinson disease (3.8%)	Parkinson disease (4.7%)	Influenza and pneumonia (3.2%)	Breast cancer (3.9%)	Lung cancer (2.5%)	Hypertensive diseases (3.0%)
8	Prostate cancer (3.2%)	Lung cancer (3.3%)	Heart failure and complications (3.2%)	Parkinson disease (2.9%)	Heart failure and complications (2.3%)	COPD (2.9%)
9	Colorectal cancer (2.8%)	Heart failure and complications (2.1%)	Accidental falls (2.5%)	Brain cancer (2.3%)	Breast cancer (2.1%)	Accidental falls (2.5%)
10	Cancer, unknown, ill defined (2.3%)	Influenza and pneumonia (1.9%)	Parkinson disease (2.3%)	Cancer, unknown, ill defined (2.0%)	Cancer, unknown, ill defined (2.0%)	Cardian arrhythmias (2.1%)

Notes

1. *Heart failure and complications* also includes ill-defined heart diseases.

2. Calculated as a proportion of total deaths for people who last used PRAC.

Source: AIHW analysis of PIAC 2014.

Figure 3.3: Leading underlying causes of death for older people who last used PRAC (%), by age group (years) and sex, 2012–14

Figure 3.4: Leading underlying causes of death for older people who last used HACC (%), by age group (years) and sex, 2012–14

	Men 65–74	Men 75–84	Men 85+	Women 65–74	Women 75–84	Women 85+
1	Lung cancer (12.7%)	Coronary heart disease (13.4%)	Coronary heart disease (17.6%)	Lung cancer (12.5%)	Coronary heart disease (10.5%)	Coronary heart disease (16.2%)
2	Coronary heart disease (9.9%)	Lung cancer (9.2%)	Prostate cancer (5.7%)	Cerebrovascular disease (8.5%)	Lung cancer (8.0%)	Cerebrovascular disease (9.4%)
3	COPD (6.2%)	COPD (6.3%)	Cerebrovascular disease (5.7%)	COPD (7.0%)	Coronary heart disease (6.1%)	Heart failure and complications (3.8%)
4	Colorectal cancer (5.9%)	Prostate cancer (6.2%)	COPD (5.5%)	Coronary heart disease (6.6%)	COPD (5.7%)	Accidental falls (3.5%)
5	Prostate cancer (5.4%)	Colorectal cancer (4.2%)	Lung cancer (4.8%)	Colorectal cancer (5.1%)	Colorectal cancer (4.8%)	Cancer, unknown, ill defined (3.4%)
6	Cancer, unknown, ill defined (3.8%)	Cerebrovascular disease (4.1%)	Cancer, unknown, ill defined (3.1%)	Ovarian cancer (4.0%)	Breast cancer (4.5%)	COPD (3.3%)
7	Diabetes (3.7%)	Cancer, unknown, ill defined (3.6%)	Heart failure and complications (3.0%)	Cancer, unknown, ill defined (4.0%)	Cancer, unknown, ill defined (4.1%)	Colorectal cancer (3.1%)
8	Pancreatic cancer (3.3%)	Diabetes (3.2%)	Accidental falls (2.9%)	Pancreatic cancer (3.9%)	Pancreatic cancer (3.2%)	Cardian arrhythmias (2.9%)
9	Liver cancer (2.3%)	Pancreatic cancer (2.3%)	Colorectal cancer (2.8%)	Diabetes (2.6%)	Diabetes (2.6%)	Lung cancer (2.9%)
10	Melanoma (2.2%)	Heart failure and complications (2.1%)	Kidney failure (2.7%)	Uterine cancer (2.3%)	Ovarian cancer (2.1%)	Dementia (2.7%)

Notes

1. Heart failure and complications also includes ill-defined heart diseases.
2. Calculated as a proportion of total deaths among people who last used HACC.

Source: AIHW analysis of PIAC 2014.

	Men			**Women**		
	65–74	75–84	85+	65–74	75–84	85+
1	Coronary heart disease (17.4%)	Coronary heart disease (17.1%)	Coronary heart disease (19.3%)	Lung cancer (12.7%)	Coronary heart disease (12.2%)	Coronary heart disease (16.3%)
2	Lung cancer (11.9%)	Lung cancer (9.0%)	Cerebrovascular disease (7.3%)	Coronary heart disease (8.6%)	Cerebrovascular disease (8.7%)	Cerebrovascular disease (10.6%)
3	Colorectal cancer (3.9%)	Cerebrovascular disease (5.4%)	Lung cancer (4.9%)	Breast cancer (7.4%)	Lung cancer (7.1%)	Dementia (4.7%)
4	COPD (3.9%)	COPD (4.5%)	Prostate cancer (4.5%)	Cerebrovascular disease (5.6%)	Cancer, unknown, ill defined (3.9%)	Accidental falls (3.5%)
5	Cerebrovascular disease (3.8%)	Prostate cancer (4.4%)	COPD (4.3%)	Colorectal cancer (4.1%)	Colorectal cancer (3.8%)	Cancer, unknown ill defined (3.3%)
6	Cancer, unknown, ill defined (3.4%)	Colorectal cancer (3.5%)	Cancer, unknown, ill defined (2.8%)	COPD (4.0%)	COPD (3.7%)	Cardian arrhythmias (3.3%)
7	Prostate cancer (3.4%)	Cancer, unknown ill defined (3.4%)	Accidental falls (2.8%)	Pancreatic cancer (3.9%)	Breast cancer (3.7%)	Heart failure and complications (3.3%)
8	Pancreatic cancer (3.3%)	Pancreatic cancer (2.5%)	Heart failure and complications (2.7%)	Cancer, unknown, ill defined (3.7%)	Pancreatic cancer (3.3%)	Influenxa and pneumonia (3.0%)
9	Diabetes (2.4%)	Diabetes (2.2%)	Colorectal cancer (2.3%)	Ovarian cancer (3.1%)	Diabetes (2.5%)	Lung cancer (2.8%)
10	Leukaemia (2.2%)	Leukaemia (2.1%)	Non-rheumatic valve disorders (2.2%)	Leukaemia (2.2%)	Lymphomas (2.0%)	Colorectal cancer (2.4%)

Notes

1. Heart failure and complications also includes ill-defined heart diseases.

2. Calculated as a proportion of total deaths among people who did not use aged care before death.

Source: AIHW analysis of PIAC 2014.

Figure 3.5: Leading underlying causes of death for older people who had not used aged care (%), by age group (years) and sex, 2012–14

Death rates vary by age for various diseases, and this might have affected the UCOD patterns between the groups. These might also be influenced by the age at which particular programs are commonly used. For example, as the common point of entry into the aged care system, HACC is often used by those in the younger age groups (AIHW 2014, 2017c).

In the study cohort, 7% of those who last used PRAC, and 24% of those who last used HACC were aged 65–74, but this rose to 40% among those who had not used any aged care before death.

In addition, as is common with many other conditions, cancer more often results in death for older people—for example, those aged 75 and over recorded the lowest 5-year relative survival rate (50%) for all cancers combined for 2009–2013.

In 2017, the risk of dying from cancer by the age of 75 will be an estimated 1 in 10 for males, and 1 in 13 for females, rising to 1 in 4 for males, and 1 in 6 for females by the age of 85 (AIHW 2017a). The differences in survival for older people could be due to various reasons, including comorbidities, and these might also influence the services people use.

Indigenous status

The UCODs for Indigenous Australians aged 50 and over differed from those for non-Indigenous Australians aged 65 and over according to the aged care program they last used before death. Again, the largest groups were chosen for analysis—people who were recorded as having last used PRAC or HACC, and those who had never used aged care.

For both Indigenous and non-Indigenous Australians who had last used PRAC, the most common UCOD was *Dementia* (15% of Indigenous deaths, and 18% of non-Indigenous deaths (tables 3.2 and D1).

But *Diabetes* was the next most common UCOD for Indigenous Australians (12% of deaths), 3 times the rate for non-Indigenous Australians (4%). This reflects the higher rate of deaths from *Diabetes* that Indigenous Australians generally experience.

Table 3.2: Leading underlying causes of death for older people who last used PRAC (%), by Indigenous status, 2012–14

Rank	Cause of death	UCOD (%)	Cause of death	UCOD (%)
	Indigenous 50+		**Non-Indigenous 65+**	
1	Dementia	15.3	Dementia	18.2
2	Diabetes	11.9	Coronary heart disease	14.7
3	Coronary heart disease	9.6	Cerebrovascular disease	11.1
4	Cerebrovascular disease	9.6	COPD	4.5
5	COPD	7.5	Diabetes	3.7
6	Lung cancer	3.5	Heart failure and complications	3.1
7	Cancer, unknown, ill-defined	2.5	Influenza and pneumonia	2.8
8	Influenza and pneumonia	2.3	Parkinson disease	2.2
9	Hypertensive diseases	1.8	Accidental falls	2.1
10	Parkinson disease	1.8	Hypertensive diseases	2.1
	All other causes	34.2	All other causes	35.3
	Total deaths (number)	**570**	**Total deaths (number)**	**107,151**

Source: AIHW analysis of PIAC 2014.

The lower proportion of Indigenous Australians who last used PRAC and died of *Coronary heart disease* (10%), compared with non-Indigenous Australians (15%) might be influenced by broader patterns in Indigenous Australians' health and access to or use of services, as well as their age at death.

Together, *Lung cancer* and *Cancer, unknown, ill-defined* accounted for 6% of deaths for Indigenous Australians who last used PRAC, but were absent from the 10 leading UCODs for non-Indigenous Australians (Table 3.2).

For people who had used HACC as their last program before death, the most common UCODs were similar regardless of Indigenous status. The leading UCOD for Indigenous Australians was *Coronary heart disease* (14% of deaths compared with 13% for non-Indigenous Australians), followed by *Lung cancer* (10% compared with 8%) (tables 3.3 and D2).

Diabetes was also a more common UCOD among Indigenous Australians who last used HACC (8%) than among non-Indigenous Australians (3%), while *Liver disease* was the UCOD for 3% of Indigenous deaths compared with 0.8% of non-Indigenous deaths.

Table 3.3: Leading underlying causes of death for older people who last used HACC (%), by Indigenous status, 2012–14

Rank	Cause of death	UCOD (%)	Cause of death	UCOD (%)
	Indigenous 50+		**Non-Indigenous 65+**	
1	Coronary heart disease	13.7	Coronary heart disease	12.9
2	Lung cancer	9.8	Lung cancer	7.9
3	Diabetes	8.3	COPD	5.5
4	COPD	8.3	Cerebrovascular disease	5.2
5	Cerebrovascular disease	3.8	Colorectal cancer	4.2
6	Liver disease	3.0	Cancer, unknown, ill-defined	3.6
7	Colorectal cancer	2.8	Prostate cancer	3.1
8	Cancer, unknown, ill-defined	2.7	Diabetes	2.7
9	Pancreatic cancer	2.6	Pancreatic cancer	2.5
10	Kidney failure	2.6	Heart failure and complications	2.3
	All other causes	42.4	All other causes	50.0
	Total deaths (number)	**1,135**	**Total deaths (number)**	**69,137**

Source: AIHW analysis of PIAC 2014.

Among Indigenous Australians who had not used aged care, the most common UCOD was also *Coronary heart disease*, at 18% of deaths, compared with 16% for non-Indigenous Australians (tables 3.4 and D3).

Liver disease and *Liver cancer* were in the top 10 causes for deaths among Indigenous Australians, but not for non-Indigenous Australians (both fewer than 1% of deaths among non-Indigenous Australians who had not used aged care).

Table 3.4: Leading underlying causes of death for older people who did not use aged care (%), by Indigenous status, 2012–14

Rank	Cause of death	UCOD (%)	Cause of death	UCOD (%)
	Indigenous 50+		**Non-Indigenous 65+**	
1	Coronary heart disease	17.5	Coronary heart disease	15.7
2	Diabetes	8.0	Lung cancer	9.0
3	Lung cancer	7.8	Cerebrovascular disease	6.2
4	COPD	4.5	COPD	3.9
5	Cerebrovascular disease	4.5	Colorectal cancer	3.5
6	Liver disease	4.0	Cancer, unknown, ill-defined	3.5
7	Liver cancer	2.7	Pancreatic cancer	2.9
8	Cancer, unknown, ill-defined	2.7	Prostate cancer	2.6
9	Land transport accidents	1.9	Diabetes	2.1
10	Hypertensive diseases	1.9	Leukaemia	1.9
	All other causes	44.5	All other causes	48.7
	Total deaths (number)	**1,390**	**Total deaths (number)**	**47,129**

Source: AIHW analysis of PIAC 2014.

Hospital leave from PRAC

Among people who died having last used PRAC, about 30,700 had taken hospital leave in the month before their death.

Dementia was the leading UCOD (13%) for this group, as it was with people who had last used PRAC, regardless of hospital leave (18%).

Other UCODs were more common in this group than among the overall group of people who last used PRAC: *Accidental falls* were 2.4 times as common, *Septicaemia* was twice as common, and *Influenza/pneumonia* was 1.5 times as common (tables C2 and D4).
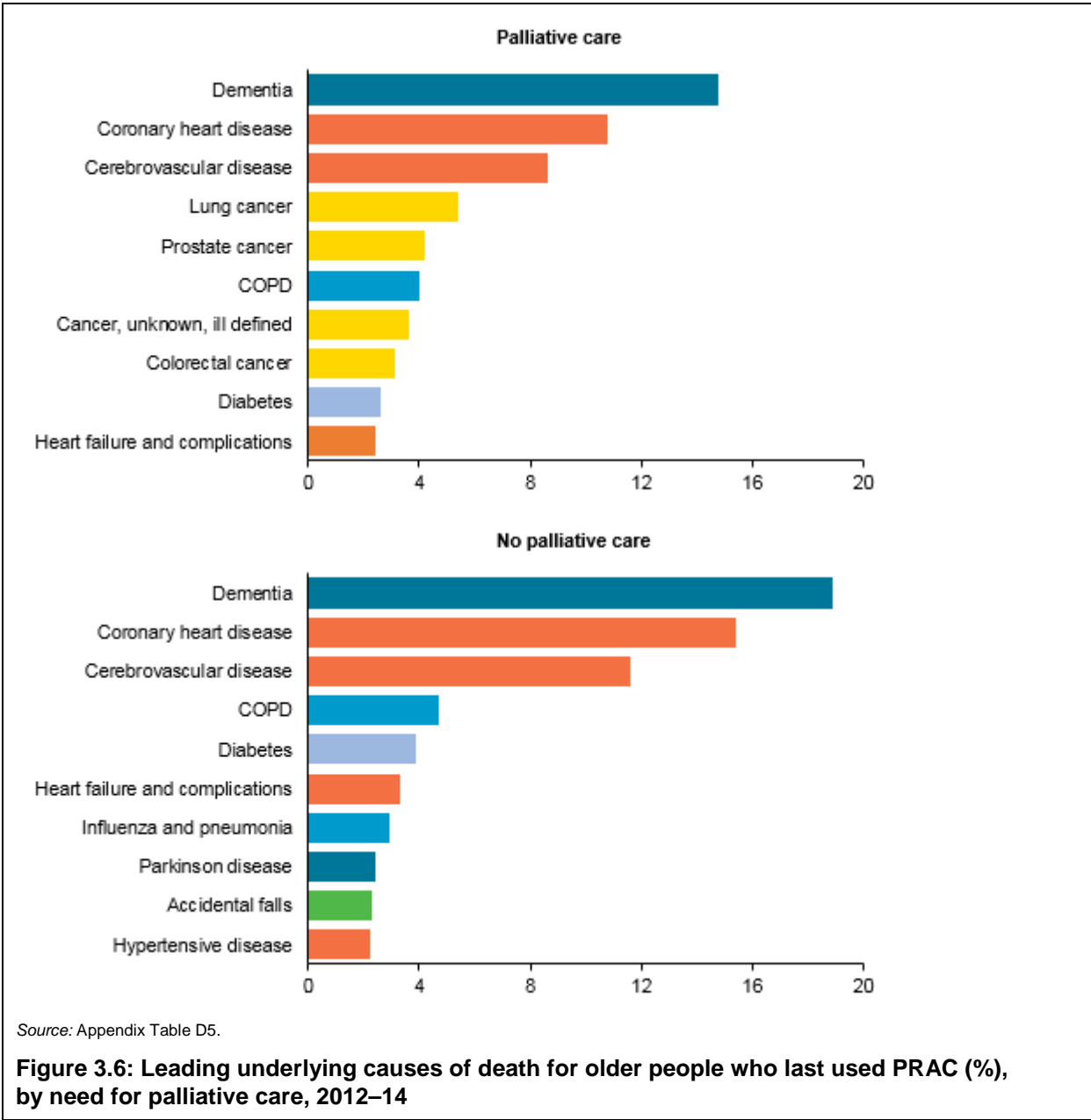
Palliative care in PRAC

Data on people identified as needing palliative care was only available for people in PRAC who had an ACFI assessment. About 16,000 people who died in 2012–14 (15%) having last used PRAC had previously been identified through an ACFI assessment as needing palliative care.

The most common leading UCODs did not vary between people who last used PRAC depending on whether or not they had been identified as needing palliative care: *Dementia*, *Coronary heart disease*, and *Cerebrovascular disease* were the most common. But for those not identified as needing palliative care, these accounted for larger proportions (Figure 3.6).

For the less common leading UCODs, there were some differences, with cancer-related UCODs in particular being more common among people who had been identified as needing

palliative care. *Lung cancer*, *Prostate cancer*, *Cancer, unknown, ill-defined*, and *Colorectal cancer* together accounted for 16% of deaths for people needing palliative care, but were not in the top 10 leading UCODs for those who did not.

Figure 3.6: Leading underlying causes of death for older people who last used PRAC (%), by need for palliative care, 2012–14

3.2 Multiple causes of death

Cause of death analysis is often focused only on UCOD, which is selected from all the conditions mentioned on the death certificate, using an internationally agreed set of coding rules. However, in most cases, more than 1 condition contributes to death. For some diseases—particularly chronic conditions, such as *Diabetes* and *COPD*—reporting UCOD alone can lead to underestimating the overall mortality for that disease (AIHW 2012b).

Counting the multiple causes of death (all conditions mentioned on the death certificate) provides extra information on what causes contributed to death. For some causes mentioned on the death certificate, the disease might not necessarily have been present at the time of death, but might have occurred in the past. For example, a disease could have previously damaged tissues or impaired function, which then contributed to the death.

As the aim of this work was to more fully describe the causes that most commonly contribute to deaths among older people—with particular focus on their preceding use of aged care—both the UCOD and the associated causes of death were looked at.

Analysis of multiple causes of death showed that the 6 most common UCODs for the full study cohort were also the 6 leading multiple causes of death (Table 3.5). Cardiovascular diseases and *Dementia* were commonly reported on the death certificate (for at least 1 in 4 deaths), and were recorded as the UCOD in about half of all deaths involving these causes.

Table 3.5: Selected causes of death for older people (%), by underlying or multiple causes of death, 2012–14

Cause of death	UCOD	Multiple causes of death[a]
Coronary heart disease	14.4	26.4
Dementia	9.0	18.5
Cerebrovascular disease	8.2	15.3
Diabetes	3.1	11.2
COPD	4.9	11.1
Lung cancer	5.2	5.7
All other causes	55.3	n.a.
Total deaths (number)	**244,854**	**244,854**

(a)   Reported as either underlying or associated cause of death in proportion of total deaths.

Source: AIHW analysis of PIAC 2014.

Some causes emerged as more common leading causes of death when multiple causes of death were considered—overall, *Coronary heart disease* was involved in causing 26% of deaths, *Dementia* in 19% of deaths, and *Cerebrovascular disease* in 15% of deaths.

The order then changed slightly, with *Diabetes* and *COPD* contributing to 11% of deaths each (by UCOD only, *COPD* was the 5th, and *Diabetes* the 6th leading cause), followed by *Lung cancer* (6%). *Diabetes* and *COPD* are more commonly reported as the associated causes of death, so if only UCOD are reported, their role in deaths might be underestimated.

When considering multiple causes of death, based on whether people used any or no aged care before death, patterns reflected the UCODs.

Coronary heart disease was the most common, mentioned in more than 1 in 4 deaths for both groups (Table 3.6).

Among people who had used aged care:

- *Dementia* was the second most common (23% of deaths, compared with 3% of deaths among those who had not used aged care)

- a higher proportion of deaths mentioned *Cerebrovascular disease* (16% compared with 11% among those who had not used aged care)

- *Lung cancer* was less common (5% compared with 10% among those who had not used aged care).

Diabetes and COPD were reported in similar proportions for both groups.

Table 3.6: Selected multiple causes of death[(a)] for older people (%), by use of aged care, 2012–14

Cause of death	Any use of aged care	No use of aged care
Coronary heart disease	26.3	26.6
Dementia	22.5	2.7
Cerebrovascular disease	16.4	10.8
Diabetes	11.6	9.2
COPD	11.3	10.2
Lung cancer	4.7	9.5
All other causes	n.a.	n.a.
Total deaths	**195,820**	**49,034**

(a)   Reported as either underlying or associated cause of death as a proportion of total deaths.

Source: AIHW analysis of PIAC 2014.

Comparison by last aged care program used

Further comparing multiple causes of death among people who had used any aged care before death, based on which aged care program they had last used, *Coronary heart disease* was still the leading cause for those who had last used an aged care program delivered in the community. It was recorded for 25%–36% of deaths for these groups—about double the proportion of deaths based on UCODs only (Table 3.7).

When considering multiple causes of death, *Dementia* was the leading cause for people who had last used PRAC, at 36% of deaths, about double the proportion based on UCODs only. *Dementia* was recorded among multiple causes of death in 21% of deaths for people who had last used high-level aged care packages, and 15% of deaths for those who used RRAC, but only 4% of deaths for those who had last used HACC.

There were further differences between residential and community-based aged care in some of the other multiple causes of death—the proportion of deaths where *COPD* or *Lung cancer* was mentioned as a cause was lower among people who had last used PRAC than for the other groups, while the proportion of deaths where *Cerebrovascular disease* was mentioned was higher.

Table 3.7: Selected multiple causes of death[(a)] **for older people (%), by last aged care program used, 2012–14**

Cause of death	PRAC	RRAC	HACC	Low-level aged care packages	High-level aged care packages	TCP
Coronary heart disease	26.6	27.4	25.3	31.4	25.7	29.2
Dementia	36.1	15.0	4.1	7.7	21.0	8.3
Cerebrovascular disease	20.5	15.2	10.5	13.5	17.1	15.4
Diabetes	12.2	11.1	10.9	11.5	11.7	11.7
COPD	9.5	13.1	13.2	15.4	13.2	13.6
Lung cancer	2.1	6.3	8.7	4.6	3.3	4.8
Total deaths (number)	**107,723**	**5,211**	**70,289**	**6,005**	**4,181**	**2,411**

(a)   Reported as either underlying or associated cause of death as a proportion of total deaths.

Source: AIHW analysis of PIAC 2014.

Comparison by Indigenous status

Some of the 6 most common multiple causes of death showed considerable variation by Indigenous status regardless of program group. For example, *Diabetes* was mentioned as a cause of death for about 1 in 4 deaths (23%–27%) for Indigenous Australians, but only for about 1 in 10 deaths (9%–12%) for non-Indigenous Australians.

Similarly, *COPD* was more likely to be reported in the deaths of Indigenous Australians (15%–20%) than in the deaths of non-Indigenous Australians (10%–13%) (Table 3.8).

Table 3.8: Selected multiple causes of death[(a)] **for older people (%), by Indigenous status and type of aged care used, 2012–14**

Cause of death	Indigenous 50+			Non-Indigenous 65+		
	PRAC	HACC	No aged care	PRAC	HACC	No aged care
Coronary heart disease	23.9	29.9	31.1	26.6	25.2	26.6
Dementia	31.4	4.2	2.6	36.1	4.1	2.7
Cerebrovascular disease	20.5	9.4	9.2	20.5	10.5	10.9
Diabetes	27.0	25.1	23.2	12.1	10.7	8.9
COPD	15.4	19.8	15.0	9.5	13.1	10.1
Lung cancer	3.9	10.5	8.3	2.1	8.6	9.6
Total	**570**	**1,135**	**1,390**	**107,151**	**69,137**	**47,129**

(a)   Reported as either underlying or associated cause of death as a proportion of total deaths.

Source: AIHW analysis of PIAC 2014.

4   What next?

This report has looked at the use of aged care services, and patterns of death among older Australians who died between July 2012 and June 2014. The overall cause-of-death patterns in this study cohort reflect those of the general population, with further analysis between aged care programs people used last before they died identifying some differences.

4.1   Understanding cause of death patterns better

The results showed that cause of death patterns varied by age—cancer-related UCODs were more common among people who died at younger ages, and *Dementia* and heart disease-related UCODs were more common at older ages.

The effect of age might also have contributed to the UCOD patterns for each group, depending on the last program they used before death. For example, people often take up HACC at an earlier age than many of the other aged care programs, while PRAC is commonly used and they use PRAC at an older age. These patterns might reflect the age at which people died. More detailed analyses are needed to assess this effect in full.

At the population level, people's causes of death can often be taken to reflect their care needs well before death, and various UCOD patterns were identified for different aged care programs. This is not unexpected, as the choice of an aged care program is often, among other things, guided by people's care needs. Further analysis of assessment data for various care needs, combined with cause of death data, would develop a more comprehensive picture.

Additional analyses were performed for patterns in multiple causes of death for selected causes. These should only be considered a first step towards understanding the interactions between all causes—whether underlying or associated—that contributed to a death. For example, the common associated causes of death for people who last used PRAC, and whose UCOD was *Dementia* would add important information to better understand their care needs before death.

In addition, care needs influence service use beyond aged care—people move through the aged care system as their needs and situations change, and for many people this means more involvement of other services, such as those provided through the health-care system through primary care and hospital services. Despite the known interaction between these 2 systems, PIAC cannot answer questions on how people use health care in combination with aged care without additional linkage work being done (AIHW 2013).

4.2 Where do people die?

This study found that 80% of older people who died in 2012–14 had used an aged care program before their death. But this was not limited to use at the time of their death, and the place where they actually died might have been at home, a hospice, a hospital or in PRAC.

Indicative data used in this report on palliative care in PRAC, and hospital leave for people who last used PRAC or aged care packages highlight the potential interactions between different care settings as people near the end of their life. Extending the PIAC link map to include other data sources—such as hospital admission data—would answer these questions using more robust data than were available for this study. Currently there is considerable overlap between the possible data sources, while the location of death is only known for deaths that took place when people were admitted to hospital (Figure 4.1).

Figure 4.1: Conceptual diagram of deaths among older people, by broad service type, 2012–14
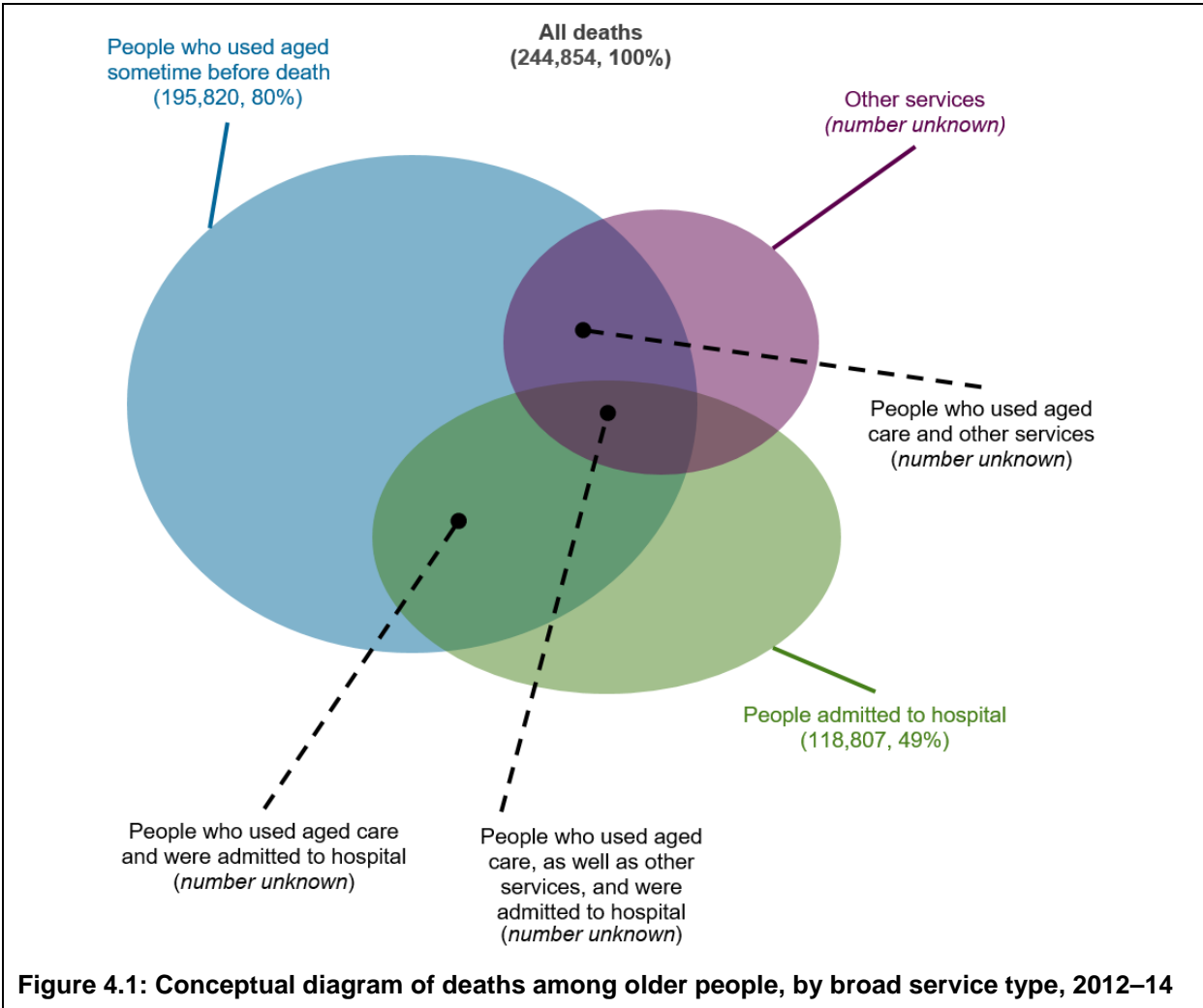
People often use a combination of service types, but current data sources do not readily enable the identification of the way different services interact, or which of them provided care at death. In addition, as people near the end of their lives, they often move between care settings. Currently these movements cannot be monitored accurately to clearly identify where deaths occur outside hospital, or whether people dying in hospital were also using services like aged care. Person-level data linkage across these data sets would enable analyses of where older Australians die.

Within the aged care system alone, people follow a wide array of possible pathways as they use aged care services (a subset of these have been described in the related publication *Pathways to permanent residential aged care in Australia*). Understanding how people access care across different systems in the time before their death enables areas of particular need or interest to be identified. This in turn will better support the planning of future services.

Appendix A: Methods

Aged care data

The PIAC linkage map uses a statistical data linkage process to bring together longitudinal administrative data for various nationwide aged care programs and national death data, together with demographic and mortality data. Aged care program use data is originally sourced from the National Aged Care Data Clearinghouse, and death data from the National Death Index.

Detail on the creation of the PIAC map is documented in *Introduction to Pathways in Aged Care 2014* (AIHW 2016c), and *Patterns in use of aged care 2002–03 to 2010–11* (AIHW 2014).

Aged care service use

In Australia aged care is provided in the community (often at people's homes) or residential facilities. Most aged care data held by the National Aged Care Data Clearinghouse relates to mainstream programs operating under the *Aged Care Act 1997*. Data from the following aged care programs were used in this study.

Home and Community Care

The HACC program assisted people to live at home through basic support services and some allied health and nursing care. Before 2015, HACC provided various basic maintenance and support services for older people living in the community—such as allied health and home nursing—to help them continue to live at home, and prevent premature or inappropriate entry to residential care.

An assessment under ACAP was not required to access HACC services. HACC was jointly funded by the Australian Governments and state and territory governments until 1 July 2012, when the Australian Government assumed full policy, funding, and day-to-day responsibility for HACC services for people aged 65 and over, and Aboriginal and Torres Strait Islander people aged 50 and over in all states and territories except Victoria and Western Australia. HACC became the main part of the Commonwealth Home Support Programme from July 2015.

Aged care packages

Before August 2013, 3 programs provided tailored packages of support for people living at home—Community Aged Care Packages, Extended Aged Care at Home, and Extended Aged Care at Home—Dementia.

Community Aged Care Packages provided support services for people with complex care needs who were otherwise eligible to enter low-level residential aged care. The program provided various home-based services, excluding allied health and home nursing.

Extended Aged Care at Home provided similar services to people who were otherwise eligible for high-level residential aged care, while Extended Aged Care at Home—Dementia supported people with dementia and associated behavioural and psychological symptoms who required a high level of care.

In August 2013, these 3 programs were consolidated into the Home Care Packages Program, which supports people living at home through 4 levels of care, from basic care at Level 1 to the highest level of care at Level 4.

In this report, these 4 are collectively referred to as 'aged care packages'. In some sections, aged care packages have been further distinguished based on the level of care provided.

Home Care Packages Level 1 and 2 are grouped as 'low-level aged care packages', and Level 3 and 4 with Extended Aged Care at Home and Extended Aged Care at Home—Dementia as 'high-level aged care packages'. As the Home Care Packages Program was only active from mid-2013, many of the people who died between 2012 and 2014 and last used aged care packages could be expected to have, in fact, used Community Aged Care Packages, Extended Aged Care at Home or Extended Aged Care at Home—Dementia.

Transition Care Programme

The TCP provides short-term care to increase people's functioning after a hospital stay. It is targeted towards people who were assessed as otherwise being eligible for permanent residential aged care, to delay or reduce inappropriate entry into permanent care.

Residential aged care

RRAC is provided for people who require short-term temporary care in a residential aged care facility (either planned or emergency), but who still intend to return home. It supports people in transition stages of health, as well as providing carers with a break from their caring responsibilities. Respite care is offered as either low or high care.

PRAC provides accommodation and care for people who can no longer be supported to live independently at home. The Aged Care Funding Instrument is used to confirm their care needs, and the level of care they require in permanent residential aged care, and it determines the amount of government subsidy the provider will receive. Reassessments can take place as people's care needs change.

In addition, PIAC holds data on assessments provided under ACAP, but these were not analysed for this report. For more information on other possible analyses using PIAC data, refer to previous publications such as *Pathways to permanent residential aged care in Australia*.

Derivation of key variables

Age and sex

Age and sex were drawn from the 'master' demographic table included as part of the PIAC link map (for more information on how these characteristics were derived, see *Patterns in use of aged care 2002–03 to 2010–11* (AIHW 2014). Where this information was missing, it was obtained through the National Death Index.

Indigenous status

Indigenous status was obtained from the PIAC 'master' demographic table, which captures whether people had ever identified as being of Aboriginal or Torres Strait Islander background in any of the aged care data sets. But PIAC does not include data from the National Aboriginal and Torres Strait Islander Flexible Aged Care Program. This program delivers services specifically for Indigenous Australians as part of a special program, but person-level data are not available through the National Aged Care Data Clearinghouse.

In addition, Indigenous status is often under-identified in data sets, and the number of Indigenous deaths being reported in this report might be less than the actual number occurring. The extent to which Indigenous status in mortality data is under-reported has previously been investigated—on the basis of Indigenous status data in linked aged care and

health data sets, 10% of death records (9% males, 12% females) for Indigenous Australians were found to be misclassified (AIHW 2012a).

Last used program

The beginning and end dates of service use were used to derive the last-used program for each person in the study cohort. Last-used program was defined as the program that was used closest to death (the most recent end date of service use). Where people had concurrent use of different aged care programs that ended on the same date, the most recently began program was chosen.

The analyses excluded ACAP assessments, so some people with no recorded use of aged care service might have been assessed for aged care, but did not take up services before death. People who had begun using aged care before age 50 were also excluded from the study cohort.

Hospital leave

The National Aged Care Data Clearinghouse contains leave records for certain aged care programs—people using permanent residential aged care, or aged care packages can take a period of leave from the facility or package. Hospital leave is recorded for people who are admitted to hospital for at least 1 night.

Palliative care

As people approach the end of life, they might receive palliative care in various settings. It was not possible for this study to clearly identify the use of palliative care services. To indicate the possible need for palliative care, an item in ACFI that records whether people were identified as needing palliative care was used.

Cause of death data

All deaths occurring in Australia require certification by a medical practitioner or coroner. Part of this process is to establish the causes and circumstance of each death. These causes describe a UCOD (the disease or condition that initiated the sequence of events resulting in death), together with a number of associated causes of death (other diseases or conditions that contributed to the death but were not the underlying cause). The term multiple causes of death is used to refer to all causes of death listed on the death certificate, without reference to whether they were underlying or associated causes (AIHW 2012b).

The rules for designating the UCOD and associated causes of death are determined by an internationally agreed set of coding rules. The International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) helps statistical reporting and international comparisons of causes of death.

For this report, mortality data for each in-scope death—in the form of a UCOD code and the associated cause of death codes—were extracted. The detailed ICD-10 coding for these data were grouped according to an AIHW-modified version of a standard list for ranking causes of death (Becker et al. 2006). Using these groupings, UCODs were established for all people, separately for those who had used any or no aged care program before death, and for each group according to the last aged care program used. The proportion of deaths for each UCOD was calculated as a percentage of total deaths in the group.

As cause of death data for a particular death certificate are grouped, it is likely that particular causes will occur more than once. As the focus is on counting deaths (and the proportion of deaths where a particular cause is present), rather than mentions of causes, duplicate data

are removed. The unit being counted is the cause grouping—regardless of how many cause mentions on the death certificate fall into a single cause grouping, the mentions are only counted once. For example, if the death certificate recorded *Heart attack, Atrial septal defect* and *Chronic atherosclerosis*, these would be reported once only as *Coronary heart disease*.

This report uses the standard AIHW cause groupings, which match to specific ICD-10 codes (Table A1).

Table A1: AIHW cause groups (ICD-10 codes) referred to in this report

Disease group	AIHW cause groups (ICD-10 codes)
Infections	Septicaemia (A40–A41)
Cancer	Colorectal cancer (C18–C21)
	Liver cancer (C22)
	Pancreatic cancer (C25)
	Cancer, unknown, ill-defined (C26, C39, C76–C80)
	Lung cancer (C33, C34)
	Melanoma (C43)[a]
	Breast cancer (C50)[a]
	Uterine cancer (C53–C55)[a]
	Ovarian cancer (C56)[a]
	Prostate cancer (C61)
	Brain cancer (C71)[a]
	Lymphomas (C81–C86, C96)[a]
	Leukaemia (C91–C95)
Endocrine	Diabetes (E10–E14)
Neurological	Dementia (F01, F03, G30)
	Spinal muscular atrophy and related syndromes (G12)
	Parkinson disease (G20)
	Other disorders of the nervous system (G90–G99)[a]
Cardiovascular	Hypertensive diseases (I10–I15)
	Coronary heart disease (I20–I25)
	Non-rheumatic valve disorders (I34–I38)[a]
	Heart failure and complications and ill-defined heart disease (I50–I51)
	Cerebrovascular disease (I60–I69)
Respiratory	Influenza and pneumonia (J09–J18)
	Chronic obstructive pulmonary disease (COPD) (J40–J44)
Gastrointestinal	Liver disease (K70–K76)
Kidney/urinary	Kidney failure (N17–N19)
Injury	Accidental falls (either W00–W19 *or* X59 with a code for a fracture of the hip/femur—S72—or lower limb—T12)[b]
Other	Land transport accidents (V01–V89)

(a)   Appears in age and sex distributions.

(b)   For more information on criteria for injury deaths, see AIHW 2014.

Source: AIHW modification of Becker et al. 2006.

Appendix B: Number of deaths

Table B1: Number of deaths for older people, by sex, age group (years), Indigenous status, and last aged care program used, 2012–14

	Any aged care		PRAC		RRAC		HACC		Low-level home care package		High-level home care package		TCP		No aged care		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sex																		
Men	87,105	44.5	41,081	38.1	2,678	51.4	37,524	53.4	2,650	44.1	1,940	46.4	1,232	51.1	31,780	64.8	118,885	48.6
Women	108,715	55.5	66,642	61.9	2,533	48.6	32,765	46.6	3,355	55.9	2,241	53.6	1,179	48.9	17,254	35.2	125,969	51.4
Age group (years)																		
50–64 (Indigenous only)	548	0.3	67	0.1	11	0.2	393	0.6	54	0.9	19	0.5	4	0.2	862	1.8	1,410	0.6
65–74	26,562	13.6	7,017	6.5	600	11.5	17,180	24.4	739	12.3	672	16.1	354	14.7	19,649	40.1	46,211	18.9
75–84	62,624	32.0	28,360	26.3	1,610	30.9	28,084	40.0	2,078	34.6	1,506	36.0	986	40.9	17,763	36.2	80,387	32.8
85+	106,086	54.2	72,279	67.1	2,990	57.4	24,632	35.0	3,134	52.2	1,984	47.5	1,067	44.3	10,760	21.9	116,846	47.7
Indigenous status[a]																		
Indigenous	2,043	1.0	570	0.5	49	0.9	1,135	1.6	209	3.5	62	1.5	18	0.7	1,390	2.8	3,433	1.4
Non-Indigenous	193,758	98.9	107,151	99.5	5,162	99.1	69,137	98.4	5,796	96.5	4,119	98.5	2,393	99.3	47,129	96.1	240,887	98.4
Total (%)	**195,820**	**80.0**	**107,723**	**44.0**	**5,211**	**2.1**	**70,289**	**28.7**	**6,005**	**2.5**	**4,181**	**1.7**	**2,411**	**1.0**	**49,034**	**20.0**	**244,854**	**100.0**

Note: Indigenous status was not known for 534 people, and these are included in the total.

Source: AIHW analysis of PIAC 2014.

Table B2: Number of deaths for people aged 50 and over, by Indigenous status, age group (years), and last aged care program used for selected programs, 2012–14

Age group (years)	PRAC				HACC				No program			
	Indigenous		Non-Indigenous		Indigenous		Non-Indigenous		Indigenous		Non-Indigenous	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
50–54	9	1.6	101	0.1	66	5.8	1,327	1.7	334	24	5,264	7.8
55–59	20	3.5	391	0.4	143	12.6	2,892	3.7	262	18.8	6,689	9.9
60–64	38	6.7	1,032	0.9	184	16.2	4,897	6.3	266	19.1	8,429	12.5
Total 50–64	67	11.8	1,524	1.4	393	34.6	9,116	11.6	862	62	20,382	30.2
65–69	53	9.3	2,351	2.2	190	16.7	7,445	9.5	187	13.5	9,802	14.5
70–74	87	15.3	4,526	4.2	171	15.1	9,367	12.0	132	9.5	9,264	13.7
75–79	92	16.1	9,200	8.5	147	13.0	12,282	15.7	100	7.2	9,051	13.4
80–84	95	16.7	18,972	17.5	126	11.1	15,522	19.8	58	4.2	8,388	12.4
85+	176	30.9	72,102	66.3	108	9.5	24,521	31.3	51	3.7	10,624	15.7
Total 65+	503	88.2	107,151	98.6	742	65.4	69,137	88.4	528	38.0	47,129	69.8
Total 50+	570	100.0	108,675	100.0	1,135	100.0	78,253	100.0	1,390	100.0	67,511	100.0

Source: AIHW analysis of PIAC 2014.

Appendix C: Underlying causes of death

Table C1: Leading underlying causes of death for older people, by use of aged care, 2012–14

Rank	Cause of death	%	Cause of death	%
	Used aged care		**Did not use aged care**	
1	Coronary heart disease	14.0	Coronary heart disease	15.7
2	Dementia	11.0	Lung cancer	8.9
3	Cerebrovascular disease	8.7	Cerebrovascular disease	6.1
4	COPD	5.1	COPD	3.9
5	Lung cancer	4.3	Colorectal cancer	3.4
6	Diabetes	3.3	Cancer, unknown, ill-defined	3.4
7	Heart failure and complications	2.8	Pancreatic cancer	2.8
8	Cancer, unknown, ill-defined	2.4	Prostate cancer	2.6
9	Colorectal cancer	2.4	Diabetes	2.3
10	Prostate cancer	2.3	Leukaemia	1.9
11	Influenza and pneumonia	2.2	Lymphomas	1.8
12	Accidental falls	2.1	Accidental falls	1.6
13	Kidney failure	1.9	Breast cancer	1.6
14	Hypertensive diseases	1.7	Heart failure and complications	1.6
15	Cardiac arrhythmias	1.6	Aortic aneurysm and dissection	1.5
16	Parkinson disease	1.5	Liver cancer	1.5
17	Breast cancer	1.4	Melanoma	1.3
18	Pancreatic cancer	1.3	Influenza and pneumonia	1.3
19	Septicaemia	1.2	Oesophageal cancer	1.3
20	Non-rheumatic valve disorders	1.1	Pulmonary oedema and other interstitial pulmonary diseases	1.3
	All other causes	27.7	All other causes	34.2
	Total	**195,820**	**Total**	**49,034**

Source: AIHW analysis of PIAC 2014.

Table C2: Leading underlying causes of death for older people who last used PRAC, 2012–14

Rank	Cause of death	%
1	Dementia	18.2
2	Coronary heart disease	14.7
3	Cerebrovascular disease	11.1
4	COPD	4.6
5	Diabetes	3.7
6	Heart failure and complications	3.1
7	Influenza and pneumonia	2.8
8	Parkinson disease	2.2
9	Hypertensive diseases	2.1
10	Accidental falls	2.1
11	Lung cancer	1.9
12	Kidney failure	1.8
13	Prostate cancer	1.8
14	Cardiac arrhythmias	1.7
15	Cancer, unknown, ill-defined	1.6
16	Colorectal cancer	1.3
17	Septicaemia	1.2
18	Diseases of the musculoskeletal system and connective tissue	1.0
19	Lung diseases due to external agents	1.0
20	Breast cancer	1.0
	All other causes	21.2
	Total	**107,723**

Source: AIHW analysis of PIAC 2014.

Table C3: Leading underlying causes of death for older people who last used RRAC, 2012–14

Rank	Cause of death	UCOD (%)
1	Coronary heart disease	14.7
2	Cerebrovascular disease	7.5
3	COPD	6.0
4	Lung cancer	5.8
5	Dementia	5.4
6	Prostate cancer	3.5
7	Cancer, unknown, ill-defined	3.1
8	Heart failure and complications	3.0
9	Diabetes	2.9
10	Colorectal cancer	2.9
11	Accidental falls	2.2
12	Kidney failure	2.1
13	Influenza and pneumonia	1.9
14	Hypertensive diseases	1.7
15	Cardiac arrhythmias	1.7
16	Pancreatic cancer	1.6
17	Pulmonary oedema and other interstitial pulmonary diseases	1.4
18	Non-rheumatic valve disorders	1.4
19	Breast cancer	1.3
20	Benign neoplasms, in situ and uncertain behaviour	1.2
	All other causes	28.5
	Total	**5,211**

Source: AIHW analysis of PIAC 2014.

Table C4: Leading underlying causes of death for older people who last used HACC, 2012–14

Rank	Cause of death	%
1	Coronary heart disease	12.9
2	Lung cancer	8.0
3	COPD	5.6
4	Cerebrovascular disease	5.2
5	Colorectal cancer	4.2
6	Cancer, unknown, ill-defined	3.6
7	Prostate cancer	3.1
8	Diabetes	2.8
9	Pancreatic cancer	2.5
10	Heart failure and complications	2.3
11	Breast cancer	2.1
12	Accidental falls	1.9
13	Kidney failure	1.9
14	Leukaemia	1.6
15	Lymphomas	1.5
16	Non-rheumatic valve disorders	1.5
17	Cardiac arrhythmias	1.4
18	Dementia	1.4
19	Liver cancer	1.4
20	Influenza and pneumonia	1.4
	All other causes	33.9
	Total	**70,289**

Source: AIHW analysis of PIAC 2014.

Table C5: Leading underlying causes of death for older people who last used low-level aged care packages, 2012–14

Rank	Cause of death	%
1	Coronary heart disease	16.5
2	COPD	7.5
3	Cerebrovascular disease	7.1
4	Lung cancer	4.0
5	Diabetes	3.4
6	Heart failure and complications	3.3
7	Accidental falls	3.2
8	Cancer, unknown, ill-defined	2.7
9	Kidney failure	2.4
10	Dementia	2.2
11	Cardiac arrhythmias	2.2
12	Non-rheumatic valve disorders	2.2
13	Influenza and pneumonia	2.0
14	Colorectal cancer	1.8
15	Prostate cancer	1.7
16	Septicaemia	1.7
17	Pulmonary oedema and other interstitial pulmonary diseases	1.4
18	Hypertensive diseases	1.3
19	Pancreatic cancer	1.3
20	Breast cancer	1.3
	All other causes	30.7
	Total	**6,005**

Source: AIHW analysis of PIAC 2014.

Table C6: Leading underlying causes of death for older people who last used high-level aged care packages, 2012–14

Rank	Cause of death	%
1	Coronary heart disease	12.1
2	Dementia	9.9
3	Cerebrovascular disease	8.5
4	COPD	7.3
5	Diabetes	3.3
6	Parkinson disease	2.9
7	Lung cancer	2.8
8	Heart failure and complications	2.7
9	Accidental falls	2.4
10	Spinal muscular atrophy and related syndromes	2.3
11	Prostate cancer	2.1
12	Cancer, unknown, ill-defined	2.1
13	Kidney failure	2.1
14	Colorectal cancer	2.0
15	Influenza and pneumonia	1.7
16	Lung diseases due to external agents	1.4
17	Cardiac arrhythmias	1.4
18	Septicaemia	1.4
19	Hypertensive diseases	1.3
20	Non-rheumatic valve disorders	1.2
	All other causes	29.2
	Total	**4,181**

Source: AIHW analysis of PIAC 2014.

Table C7: Leading underlying causes of death for older people who last used TCP, 2012–14

Rank	Cause of death	%
1	Coronary heart disease	14.5
2	Cerebrovascular disease	7.2
3	COPD	6.1
4	Lung cancer	4.3
5	Diabetes	3.8
6	Heart failure and complications	3.4
7	Dementia	3.3
8	Kidney failure	3.1
9	Accidental falls	3.0
10	Prostate cancer	2.9
11	Colorectal cancer	2.5
12	Cancer, unknown, ill-defined	2.2
13	Cardiac arrhythmias	2.1
14	Influenza and pneumonia	1.9
15	Non-rheumatic valve disorders	1.6
16	Septicaemia	1.5
17	Pulmonary oedema and other interstitial pulmonary diseases	1.5
18	Hypertensive diseases	1.3
19	Diseases of the musculoskeletal system and connective tissue	1.2
20	Benign neoplasms, in situ and uncertain behaviour	1.2
	All other causes	31.4
	Total	**2,411**

Source: AIHW analysis of PIAC 2014.

Appendix D: Other factors affecting UCOD patterns

Table D1: Leading underlying causes of death for older people who last used PRAC, by Indigenous status, 2012–14

Rank	Cause of death	%	Cause of death	%
	Indigenous 50+		**Non-Indigenous 65+**	
1	Dementia	15.3	Dementia	18.2
2	Diabetes	11.9	Coronary heart disease	14.7
3	Coronary heart disease	9.6	Cerebrovascular disease	11.1
4	Cerebrovascular disease	9.6	COPD	4.5
5	COPD	7.5	Diabetes	3.7
6	Lung cancer	3.5	Heart failure and complications	3.1
7	Cancer, unknown, ill-defined	2.5	Influenza and pneumonia	2.8
8	Influenza and pneumonia	2.3	Parkinson disease	2.2
9	Hypertensive diseases	1.8	Accidental falls	2.1
10	Parkinson disease	1.8	Hypertensive diseases	2.1
11	Prostate cancer	1.8	Lung cancer	1.8
12	Liver disease	1.6	Kidney failure	1.8
13	Kidney failure	1.4	Prostate cancer	1.8
14	Septicaemia	1.4	Cardiac arrhythmias	1.7
15	Heart failure and complications	1.2	Cancer, unknown, ill-defined	1.6
16	Breast cancer	1.2	Colorectal cancer	1.3
17	Diseases of the musculoskeletal system and connective tissue	1.1	Septicaemia	1.2
18	Accidental falls	1.1	Diseases of the musculoskeletal system and connective tissue	1.0
19	Appendicitis, hernia and intestinal obstruction	1.1	Lung diseases due to external agents	1.0
20	Malignant neoplasms of lip, oral cavity and pharynx	1.1	Breast cancer	1.0
	All other causes	21.4	All other causes	21.4
	Total deaths	**570**	**Total deaths**	**107,151**

Source: AIHW analysis of PIAC 2014.

Table D2: Leading underlying causes of death for older people who last used HACC, by Indigenous status, 2012–14

Rank	Cause of death	%	Cause of death	%
	Indigenous 50+		**Non-Indigenous 65+**	
1	Coronary heart disease	13.7	Coronary heart disease	12.9
2	Lung cancer	9.8	Lung cancer	7.9
3	Diabetes	8.3	COPD	5.5
4	COPD	8.3	Cerebrovascular disease	5.2
5	Cerebrovascular disease	3.8	Colorectal cancer	4.2
6	Liver disease	3.0	Cancer, unknown, ill-defined	3.6
7	Colorectal cancer	2.8	Prostate cancer	3.1
8	Cancer, unknown, ill-defined	2.7	Diabetes	2.7
9	Pancreatic cancer	2.6	Pancreatic cancer	2.5
10	Kidney failure	2.6	Heart failure and complications	2.3
11	Breast cancer	2.1	Breast cancer	2.1
12	Malignant neoplasms of lip, oral cavity and pharynx	1.7	Accidental falls	1.9
13	Liver cancer	1.6	Kidney failure	1.9
14	Prostate cancer	1.5	Leukaemia	1.6
15	Heart failure and complications	1.4	Lymphomas	1.5
16	Influenza and pneumonia	1.4	Non-rheumatic valve disorders	1.5
17	Stomach cancer	1.3	Cardiac arrhythmias	1.4
18	Dementia	1.2	Dementia	1.4
19	Cardiomyopathy	1.1	Liver cancer	1.4
20	Oesophageal cancer	1.1	Influenza and pneumonia	1.4
	All other causes	27.8	All other causes	33.9
	Total deaths	**1,135**	**Total deaths**	**69,137**

Source: AIHW analysis of PIAC 2014.

Table D3: Leading causes of death for older people who did not use aged care, by Indigenous status, 2012–14

Rank	Cause of death	%	Cause of death	%
	Indigenous 50+		**Non-Indigenous 65+**	
1	Coronary heart disease	17.5	Coronary heart disease	15.7
2	Diabetes	8.0	Lung cancer	9.0
3	Lung cancer	7.8	Cerebrovascular disease	6.2
4	COPD	4.5	COPD	3.9
5	Cerebrovascular disease	4.5	Colorectal cancer	3.5
6	Liver disease	4.0	Cancer, unknown, ill-defined	3.5
7	Liver cancer	2.7	Pancreatic cancer	2.9
8	Cancer, unknown, ill-defined	2.7	Prostate cancer	2.6
9	Land transport accidents	1.9	Diabetes	2.1
10	Hypertensive diseases	1.9	Leukaemia	1.9
11	Heart failure and complications	1.8	Lymphomas	1.8
12	Influenza and pneumonia	1.7	Accidental falls	1.6
13	Accidental poisoning	1.7	Breast cancer	1.6
14	Pancreatic cancer	1.6	Aortic aneurysm and dissection	1.6
15	Suicide	1.6	Heart failure and complications	1.6
16	Malignant neoplasms of lip, oral cavity and pharynx	1.5	Liver cancer	1.5
17	Oesophageal cancer	1.4	Melanoma	1.4
18	Colorectal cancer	1.4	Pulmonary oedema and other interstitial pulmonary diseases	1.3
19	Kidney failure	1.4	Influenza and pneumonia	1.3
20	Breast cancer	1.4	Malignant neoplasms of mesothelial and soft tissue	1.3
	All other causes	29.1	All other causes	33.8
	Total deaths	**1,390**	**Total deaths**	**47,129**

Source: AIHW analysis of PIAC 2014.

Table D4: Leading underlying causes of death for older people who last used PRAC or aged care packages and took hospital leave within 30 days of their death, 2012–14

Rank	Cause of death	%	Cause of death	%
	PRAC		**Aged care packages**	
1	Dementia	12.6	Coronary heart disease	11.4
2	Coronary heart disease	12.2	COPD	7.6
3	Cerebrovascular disease	10.1	Cerebrovascular disease	7.2
4	COPD	5.4	Dementia	5.1
5	Accidental falls	5.0	Lung cancer	3.7
6	Diabetes	3.5	Heart failure and complications	3.5
7	Influenza and pneumonia	3.4	Accidental falls	3.4
8	Heart failure and complications	3.4	Kidney failure	2.9
9	Septicaemia	2.4	Cancer, unknown, ill-defined	2.8
10	Kidney failure	2.3	Diabetes	2.8
11	Lung diseases due to external agents	1.9	Prostate cancer	2.2
12	Cardiac arrhythmias	1.8	Cardiac arrhythmias	2.1
13	Parkinson disease	1.7	Colorectal cancer	2.1
14	Lung cancer	1.6	Influenza and pneumonia	2.0
15	Hypertensive diseases	1.6	Non-rheumatic valve disorders	1.8
16	Cancer, unknown, ill-defined	1.6	Septicaemia	1.8
17	Appendicitis, hernia and intestinal obstruction	1.5	Parkinson disease	1.7
18	Other urinary disorders	1.5	Lung diseases due to external agents	1.6
19	Prostate cancer	1.4	Diseases of the musculoskeletal system and connective tissue	1.3
20	Other diseases of intestines excluding paralytic ileus and intestinal obstruction without hernia	1.2	Pulmonary oedema and other interstitial pulmonary diseases	1.3
	All other causes	23.9	All other causes	31.7
	Total deaths	**30,652**	**Total deaths**	**4,794**

Note: Includes people who died while on hospital leave.

Source: AIHW analysis of PIAC 2014.

Table D5: Leading underlying causes of death for older people who last used PRAC, by palliative care status, 2012–14

Rank	Cause of death	%	Cause of death	%
	Needed palliative care		**Did not need palliative care**	
1	Dementia	14.8	Dementia	18.9
2	Coronary heart disease	10.8	Coronary heart disease	15.4
3	Cerebrovascular disease	8.6	Cerebrovascular disease	11.6
4	Lung cancer	5.4	COPD	4.7
5	Prostate cancer	4.2	Diabetes	3.9
6	COPD	4.0	Heart failure and complications	3.3
7	Cancer, unknown, ill-defined	3.6	Influenza and pneumonia	2.9
8	Colorectal cancer	3.1	Parkinson disease	2.4
9	Diabetes	2.6	Accidental falls	2.3
10	Heart failure and complications	2.4	Hypertensive diseases	2.2
11	Breast cancer	2.3	Kidney failure	1.8
12	Hypertensive diseases	1.9	Cardiac arrhythmias	1.7
13	Influenza and pneumonia	1.7	Prostate cancer	1.3
14	Kidney failure	1.6	Cancer, unknown, ill-defined	1.3
15	Parkinson disease	1.5	Septicaemia	1.3
16	Accidental falls	1.3	Lung cancer	1.2
17	Pancreatic cancer	1.3	Lung diseases due to external agents	1.1
18	Cardiac arrhythmias	1.2	Diseases of the musculoskeletal system and connective tissue	1.1
19	Benign neoplasms, in situ and uncertain behaviour	1.2	Colorectal cancer	0.9
20	Brain cancer	1.2	Other urinary disorders	0.9
	All other causes	25.4	All other causes	20.0
	Total deaths	**16,558**	**Total deaths**	**91,165**

Source: AIHW analysis of PIAC 2014.

Appendix E: Data quality statements

The following Data Quality Statements are available:

- National Aged Care Data Clearinghouse at
  <http://meteor.aihw.gov.au/content/index.phtml/itemId/586498>.

- National Death Index at <http://meteor.aihw.gov.au/content/index.phtml/itemId/480010>.

- Australian Bureau of Statistics death registrations collection at
  <http://meteor.aihw.gov.au/content/index.phtml/itemId/449208>.

- Australian Bureau of Statistics causes of death collection at
  <http://meteor.aihw.gov.au/content/index.phtml/itemId/449206>.

- Aged Care Funding Instrument at
  <http://meteor.aihw.gov.au/content/index.phtml/itemId/547478>.

Glossary

associated cause of death: Any other disease or condition listed on a death certificate that contributed to the death but was not the underlying cause.

burden of disease: A population health measure that refers to the collective years of life lost due to ill health, disability, or early death.

leading cause of death: The most commonly listed cause of death on a group of death certificates.

multiple cause of death: Any of the causes of death (underlying or associated) listed on a death certificate.

older people: In this report, all people aged 65 and over, and Aboriginal and Torres Strait Islander people aged 50–64.

PIAC 2014: The link map, 'Pathways in Aged Care', which has been updated to include all aged care service use between July 1997 and June 2014, and all deaths between July 1997 and September 2015.

underlying cause of death: The disease or condition that initiated the sequence of events resulting in death.

References

AIHW (Australian Institute of Health and Welfare) 2012a. An enhanced mortality database for estimating Indigenous life expectancy: a feasibility study. Cat. no. IHW 75. Canberra: AIHW.

AIHW 2012b. Multiple causes of death in Australia: an analysis of all natural and selected chronic disease causes of death 1997–2007. AIHW bulletin no. 105. Cat. no. AUS 159. Canberra: AIHW.

AIHW 2013. Movement between hospital and residential aged care 2008–09. Data linkage series no. 16. Cat. no. CSI 16. Canberra: AIHW.

AIHW 2014. Patterns in use of aged care: 2002–03 to 2010–11. Data linkage series no. 18. Cat. no. CSI 20. Canberra: AIHW.

AIHW 2015. Use of aged care services before death. Data linkage series no. 19. Cat. no. CSI 21. Canberra: AIHW.

AIHW 2016a. Burden of disease. Canberra: AIHW. Viewed 31 March 2017, <www.aihw.gov.au/reports-statistics/health-conditions-disability-deaths/burden-of-disease/overview>.

AIHW 2016b. Introduction to Pathways in Aged Care 2014. Cat. no. AGE 79. Canberra: AIHW.

AIHW 2017a. Cancer in Australia 2017. Cancer series no. 101. Cat. no. CAN 100. Canberra: AIHW.

AIHW 2017b. Older Australia at a glance: burden of disease. Canberra: AIHW. Viewed 8 September 2017, <www.aihw.gov.au/reports/older-people/older-australia-at-a-glance/contents/health-and-functioning/burden-of-disease>.

AIHW 2017c. Pathways to permanent residential aged care: a Pathways in Aged Care (PIAC) analysis of people's aged care program use before first entry to permanent residential aged care in 2013–14. Cat. no. AGE 81. Canberra: AIHW.

AIHW: Harrison JE & Henley G 2014. Injury deaths data, Australia: technical report on issues associated with reporting for reference years 1999–2010. Injury research and statistics series no. 94. Cat. no. INJCAT 170. Canberra: AIHW.

Becker R, Silvi J, Fat DM, L'Hours A & Laurenti R 2006. A method for deriving leading causes of death. Bulletin of the World Health Organization 84:297–304.

Calver J, Bulsara M & Boldy D 2006. In-patient hospital use in the last years of life: a Western Australian population-based study. Australian and New Zealand Journal of Public Health 30(2):143–146.

Reeve R, Srasuebkul P, Langton JM, Haas M, Viney & Pearson SA 2017. Health care use and costs at the end of life: a comparison of elderly Australian decedents with and without a cancer history. BMC Palliative Care 17(1). Viewed 14 July 2017, <https://doi.org/10.1186/s12904-017-0213-0>.

List of tables

List of figures

Related publications

The updated PIAC link map has been used to produce a companion report *Pathways to permanent residential aged care in Australia*, which describes people's patterns of use of other aged care before their first entry to permanent residential aged care in 2013–14.

Other publications relate to the PIAC link map and describe the analyses that have been based on it. These are available for free download on the AIHW website.

Almost 245,000 older people died in Australia in the 2 years to 30 June 2014. The majority of people (80%) had used an aged care program before their death, and the leading causes of death were coronary heart disease, dementia and cerebrovascular disease.