

# Factors associated with accessing aged care services in Australia after approval for services: Findings from the historical cohort of the Registry of Senior Australians

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## Abstract

**Objective:** To evaluate access to approved aged care services and factors associated with accessing these services.

**Methods:** A retrospective cohort study was conducted (1/7/2003-30/6/2013). The incidence of accessing permanent residential, home and respite care services within one year, or transition care within 28 days of approval, was evaluated. The association of participants' socio-demographic characteristics, limitations, health conditions and assessment characteristics with service use was evaluated.

**Results:** In 799 750 older Australians, the incidence of accessing approved permanent residential care within one year was 70.9% (95% confidence interval [CI] 70.8%-71.0%), home care 49.5% (95% CI 49.3%-49.7%) and respite care 41.8% (95% CI 41.7%-41.9%). The incidence of accessing transition care within 28 days was 78.5% (95% CI 78.2%-78.7%). Aged care seekers', assessments' and assessors' characteristics are associated with service access.

**Conclusion:** Monitoring the use of aged care service approvals to identify service access barriers can support ongoing evidence-based policy changes.

## KEYWORDS

healthy ageing, health services for the aged, home care, registries, residential facilities, respite care, transitional care

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## 1 | INTRODUCTION

Australia has an ageing population, putting significant stress on its aged care and health-care systems.<sup>1</sup> Over 10% of Australians over 65 years old use government-subsidised aged care services every year, costing the Government \$18 billion/year.<sup>2</sup> These subsidies are granted after an aged care eligibility assessment in which the needs of older people are reviewed. In the 2017/2018 financial year, 186 128 new eligibility assessments were performed and historically most (83%) result in service approvals.<sup>2,3</sup> However, according to the most recent estimates (2009/2010) only 75% of individuals with approvals accessed these services.<sup>3</sup>

While there is significant literature on factors that lead to use of long-term care,<sup>4-9</sup> less is understood about factors that lead to use of home, respite and transition care. Even less is understood about individuals who obtained approvals for support and did not access these services. Understanding the patterns of service access and characteristics of people accessing, or not accessing, these services can be useful, to identify groups that may potentially experience barriers to entry into care, or possibly groups where access is less prioritised. Additionally, a historical understanding of the access to these services is important for appropriate resource allocation and as a base for comparison for recent changes in the aged care sector (eg, Living Longer Living Better Act).<sup>10</sup>

This study's aims were to (a) characterise individuals with a first-time aged care eligibility assessment and approvals for permanent residential, home, respite and transition care services and (b) investigate the factors associated with accessing an approved service.

## 2 | METHODS

A retrospective cohort study was conducted using data from the Historical National Cohort of the Registry of Senior Australians (ROSA).<sup>11,12</sup> This data set is comprised of linked de-identified data obtained from the Australian Institute of Health and Welfare's (AIHW) National Aged Care Data Clearinghouse.<sup>13-15</sup> In brief, these data sets contain information on aged care services eligibility assessments performed in Australia, the aged care seekers' socio-demographic characteristics, activity limitations, health problems, living conditions, carer availability, assessors, approvals for service, service utilisation and mortality.

The study cohort includes individuals  $\geq 65$  years old, not identified as being Aboriginal or Torres Strait Islander, who had a first-time aged care eligibility assessment by an Aged Care Assessment Team (ACAT), and were approved for permanent residential, home, respite or transition care between 1/7/2003 and 30/6/2013 (N = 799 750). Individuals not approved for services were not included.

### Policy Impact

This study evaluated the access of aged care services in the Australian population. Monitoring the use of aged care services approvals is necessary for the identification of service access barriers to support evidence-based policy changes.

The cumulative incidence of accessing approved permanent residential, home or respite care within one year, or receiving transition care within 28 days of approval, were the outcomes of interest. The cohort was followed until 30/6/2014 for one-year follow-up. A one-year follow-up period was chosen for permanent residential, home and respite care because i) the median time for service access ranges from 6 to 136 days, ii) prior to 2009, the approvals were valid for one year,<sup>3</sup> and iii) this is generally agreed to be a long wait for services. Twenty-eight days was used for transition care as approvals expire after this period.<sup>14</sup>

Factors associated with access to service that were evaluated included: age, sex, country of birth, Department of Veterans' Affairs (DVA) Card Status,<sup>16</sup> living arrangements, usual accommodation, carer availability, remoteness location, State, activity limitations and health conditions. Assessor/assessment variables evaluated were as follows: assessors' professional training, year, other approved services, priority category and emergency care.

Individuals were grouped by approval types for analysis, and the four types of approvals (non-exclusive) are permanent residential, home, respite and transition care. To identify factors associated with accessing an approved service within the specified time period, Fine-Gray subdistribution hazard regression models that accounted for the competing risk of death were employed. Time to accessing services was the difference between the dates of approval and entry to services. Cases were censored if they entered another service or reached the end of the study period. A stepwise variable selection approach was used, and Akaike information criterion was used for model selection. Only cases with complete information were analysed (<3.4% of cases had missing data). Survival estimates, cumulative incidence function plots, and adjusted subdistribution hazard ratios (asHR) and 95% confidence intervals (CI) are provided. All tests were two-sided and  $\alpha = 0.0125$  was considered statistically significant, which accounts for multiple hypothesis testing. R version 3.5.1 was used for analysis.

As a sensitivity analysis, for comparison to the estimates of a model treating death as a competing risk, a Cox regression model censoring individuals at the time of death was performed (Table S1).

This study received ethical approval from the University of South Australia's Human Research Ethics Committee (ID: 200489).

### 3 | RESULTS

Of the 799 750 individuals evaluated, 60.7% (N = 485 536) were female, 69.1% (N = 552 474) were born in Australia, 67.3% (N = 538 390) lived in major cities, and their median age was 83 years (IQR: 78-88). 82.1% (N = 656 263) were approved for permanent residential care, 49.7% (N = 397 419) for home care, 80.0% (N = 639 663) for respite care and 12.6% (N = 100 738) for transition care (Table 1, Table S2).

Of 781 765 individuals with approvals for permanent residential, home or respite care, 221 131 (28.3%) did not access any services within one year, including 19 222 (2.5%) who died within that period before accessing services. Out of the 100 738 individuals with approvals for transition care, 22 574 (22.4%) did not access approved care within 28 days, including 2626 (2.7%) who died within that period. The cumulative incidence of accessing permanent residential care at one year was 70.9% (95% CI 70.8%-71.0%), home care 49.5% (95% CI 49.3%-49.7%) and respite care 41.8% (95% CI 41.7%-41.9%) (Table 2, Figure 1). The cumulative incidence of accessing transition care at 28 days was 78.5% (95% CI 78.2%-78.7%) (Table 2, Figure 2).

#### 3.1 | Use of permanent residential aged care

Individuals using permanent residential care approvals were *less likely to (asHR, 95% CI)*: be born overseas (0.92, 0.91-0.92); live in temporary housing (0.95, 0.93-0.97) or another residential care place (0.86, 0.81-0.91); live outside of major cities (0.95, 0.94-0.96); have limitations with domestic assistance (0.82, 0.80-0.83), home maintenance (0.96, 0.95-0.96); and have kidney and urinary system disorders (0.92, 0.90-0.93), pain (0.93, 0.92-0.95), cancer (0.81, 0.80-0.82) and heart disease (0.96, 0.96-0.97). People with other service approvals and who were assigned a priority category for assessment greater than 48 hours were less likely to access services (Table 3).

Individuals who accessed permanent residential care were *more likely to (asHR, 95%CI)*: be older, with a 1.11 (1.10-1.11) increase in risk per 10-year increase in age; live in hotels/boarded houses/hospitals (1.09, 1.07-1.12) or retirement villages (1.20, 1.19-1.21) compared to private homes; have limitations with communication (1.03, 1.02-1.04), health-care tasks (1.11, 1.09-1.12), meals (1.25, 1.24-1.27), movement activities (1.04, 1.03-1.05), self-care (1.23, 1.22-1.25), social and community participation (1.11, 1.09-1.12), and transport (1.05, 1.03-1.06). Individuals with a history of falls (1.14, 1.13-1.15), delirium

(1.14, 1.11-1.17), dementia (1.31, 1.30-1.32) and incontinence (1.07, 1.06-1.08) were more likely to access their approved service. People with approvals prior to 2013 were more likely to access care than those in 2013, as were those whose assessment team included a medical practitioner, nursing professional and/or social welfare professional (Table 3).

#### 3.2 | Use of home care

Individuals accessing home care approvals were *less likely to (asHR, 95%CI)*: have a gold (0.72, 0.70-0.73) or white (0.90, 0.86-0.94) DVA card; live with family (0.85, 0.84-0.86), or with others (0.84, 0.81-0.87) compared to living alone; live in a hotel/boarded house/hospital (0.92, 0.87-0.96) compared to a private home; have a carer (0.88, 0.87-0.90); live outside of major cities (0.94, 0.93-0.95); have limitations with movement activities (0.87, 0.85-0.88), moving around places (0.96, 0.94-0.97); and have additional approvals for other types of care. People with cancer (0.90, 0.89-0.91), diabetes (0.97, 0.96-0.98) or heart disease (0.98, 0.97-0.99) were less likely to use their approvals, as were those assessed by a team that included a medical practitioner (0.89, 0.89-0.90) (Table 3).

Individuals using their home care approvals were *more likely to (asHR, 95%CI)*: be younger (0.97, 0.96-0.98); live in temporary housing (1.25, 1.18-1.32), residential aged care (2.32, 1.93-2.80) or an independent unit within a retirement village (1.19, 1.17-1.21) compared to living alone; have limitations with domestic tasks (1.21, 1.17-1.25), meals (1.06, 1.04-1.07), social and community participation (1.09, 1.07-1.11), and transport (1.04, 1.02-1.07); have dementia (1.09, 1.08-1.11), arthritis (1.04, 1.03-1.05), depression (1.04, 1.02-1.05), eye diseases (1.05, 1.04-1.06) or incontinence (1.04, 1.02-1.05); have been assessed by a team that included a nursing or social welfare professional; have assessments prior to 2013; and have lower priority approvals (Table 3).

#### 3.3 | Use of respite care

Most characteristics associated with permanent residential care access were similar for respite care access. The main differences (asHR, 95% CI) were that: those with gold (1.09, 1.08-1.11) DVA cards were more likely to use service approvals; people outside of major cities were more likely (1.14, 1.13-1.15); people with limitations with moving around (0.98, 0.97-0.99), hypertension (0.98, 0.97-0.999), arthritis (0.97, 0.96-0.98), diabetes (0.97, 0.96-0.98) and eye diseases (0.98, 0.97-0.99) were less likely; finally, those with approvals from a team with a social welfare professional were less likely to use respite services, while those with additional approvals for permanent residential care (1.30, 1.29-1.32) were more likely to do so (Table 3).

**TABLE 1** Characteristics of older Australians and their aged care assessments, by service approval group and status of accessing approved services within a year for permanent, home and respite care, and within 28 d for transition care, 2003–2013<sup>a</sup>

| Variables                             | Categories    | Permanent care approved<br>(N = 656 263) |                | Home care approved<br>(N = 397 419) |                | Respite care approved<br>(N = 663) |                | Transition care approved <sup>b</sup><br>(N = 100 738) |               |
|---------------------------------------|---------------|--|----------------|-------------------------------------|----------------|------------------------------------|----------------|--|---------------|
|                                       |               | Care accessed, N (%)                     |                | Care accessed, N (%)                |                | Care accessed, N (%)               |                | Care accessed, N (%)                                   |               |
|                                       |               | No                                       | Yes            | No                                  | Yes            | No                                 | Yes            | No   | Yes           |
| Total N                               |               | 257 840 (39.3)                           | 398 423 (60.7) | 232 266 (58.4)                      | 165 153 (41.6) | 425 415 (66.5)                     | 214 248 (33.5) | 22 574 (22.4)  | 78 164 (77.6) |
| Person characteristics                |               |  |                |                                     |                |                                    |                |  |               |
| Age in y,<br>median (IQR)             |               | 83 (78, 88)                              | 84 (79, 89)    | 83 (78, 87)                         | 82 (77, 87)    | 83 (78, 88)                        | 84 (79, 88)    | 84 (78, 88)  | 82 (77, 87)   |
| Sex                                   | Female        | 150 234 (58.3)                           | 246 887 (62.0) | 138 832 (59.8)                      | 107 528 (65.1) | 257 737 (60.6)                     | 132 853 (62.0) | 13 338 (59.1)  | 50 032 (64.0) |
|                                       | Male          | 107 192 (41.6)                           | 150 733 (37.8) | 93 107 (40.1)                       | 57 451 (34.8)  | 166 973 (39.2)                     | 81 057 (37.8)  | 9218 (40.8)  | 28 062 (35.9) |
|                                       | Missing       | 414 (0.2)                                | 803 (0.2)      | 327 (0.1)                           | 174 (0.1)      | 705 (0.2)                          | 338 (0.2)      | 18 (0.1)   | 70 (0.1)      |
| Country of birth                      | Australia     | 174 950 (67.9)                           | 282 958 (71.0) | 159 438 (68.6)                      | 108 995 (66.0) | 290 762 (68.3)                     | 152 211 (71.0) | 13 586 (60.2)  | 52 394 (67.0) |
|                                       | Born overseas | 81 601 (31.6)                            | 115 326 (28.9) | 72 519 (31.2)                       | 56 136 (34.0)  | 133 514 (31.4)                     | 61 980 (28.9)  | 8946 (39.6)  | 25 739 (32.9) |
|                                       | Missing       | 1289 (0.5)                               | 139 (<0.01)    | 309 (0.1)                           | 22 (<0.01)     | 1139 (0.3)                         | 57 (<0.01)     | 42 (0.2)   | 31 (<0.01)    |
| Department<br>of Veterans'<br>Affairs | No card       | 213 436 (82.8)                           | 321 523 (80.7) | 192 966 (83.1)                      | 145 002 (87.8) | 354 272 (83.3)                     | 171 783 (80.2) | 19 453 (86.2)  | 69 934 (89.5) |
|                                       | Gold card     | 35 667 (13.8)                            | 62 095 (15.6)  | 31 169 (13.4)                       | 14 635 (8.9)   | 56 461 (13.3)                      | 33 774 (15.8)  | 2574 (11.4)  | 6571 (8.4)    |
|                                       | White card    | 3805 (1.5)                               | 6005 (1.5)     | 3575 (1.5)                          | 2112 (1.3)     | 5917 (1.4)                         | 3676 (1.7)     | 262 (1.2)  | 764 (1.0)     |
|                                       | Other card    | 4932 (1.9)                               | 8800 (2.2)     | 4556 (2.0)                          | 3404 (2.1)     | 8765 (2.1)                         | 5015 (2.3)     | 285 (1.3)  | 895 (1.1)     |

Note: IQR, Interquartile range.

<sup>a</sup>For the full version of Table 1, see Table S2 in Supporting Information.

<sup>b</sup>Transition care was established 2004–2005, therefore no approvals for 2004 and 2005 are available. Transition care was evaluated within 28 d (and not one year as for other approvals).

**TABLE 2** Cumulative incidence of accessing aged care services after first aged care eligibility assessment approval<sup>a</sup>

| Time (days) | Permanent care (N = 656 263) |                      | Home care (N = 397 419) |                      | Respite care (N = 639 663) |                      | Time (d) | Transition care <sup>b</sup> (N = 100 738) |                      |
|-------------|------------------------------|----------------------|-------------------------|----------------------|----------------------------|----------------------|----------|--|----------------------|
|             | N                            | Incidence %, (95%CI) | N                       | Incidence %, (95%CI) | N                          | Incidence %, (95%CI) |          | N  | Incidence %, (95%CI) |
| 30          | 416 706                      | 29.9 (29.8, 30.0)    | 311 749                 | 16.7 (16.6, 16.8)    | 466 057                    | 16.0 (15.9, 16.1)    | 1        | 91 557                                     | 20.8 (20.6, 21.1)    |
| 90          | 267 382                      | 49.3 (49.2, 49.5)    | 224 326                 | 30.9 (30.7, 31.0)    | 365 264                    | 24.7 (24.6, 24.8)    | 7        | 47 326                                     | 57.8 (57.5, 58.1)    |
| 180         | 188 824                      | 60.3 (60.2, 60.4)    | 164 395                 | 40.2 (40.1, 40.4)    | 288 179                    | 32.5 (32.4, 32.6)    | 14       | 28 944                                     | 71.9 (71.6, 72.2)    |
| 365         | 118 863                      | 70.9 (70.8, 71.0)    | 107 687                 | 49.5 (49.3, 49.7)    | 204 395                    | 41.8 (41.7, 41.9)    | 28       | 19 860                                     | 78.5 (78.2, 78.7)    |

Note: Abbreviations: CI, Confidence intervals.

<sup>a</sup>Censoring for entry into home care was performed for permanent residential care estimate. Censoring for entry into permanent residential care was performed for home care estimate.

<sup>b</sup>Transition care access was only evaluated for 28 days as these approvals are no longer valid after this period.<sup>14</sup>

### 3.4 | Use of transition care

Individuals accessing approved transition care were *less likely* to (*asHR*, *95%CI*): be males (0.98, 0.96-0.99); be born overseas (0.98, 0.96-0.99); have a gold DVA card (0.89, 0.87-0.92); live in temporary supported housing (0.88, 0.82-0.95) or residential aged care (0.79, 0.67-0.94) compared to a private home; have limitations with communication (0.93, 0.91-0.95), home maintenance (0.95, 0.94-0.97), movement activities (0.90, 0.88-0.91) and moving around places (0.96, 0.94-0.98); have cancer (0.96, 0.94-0.97) or dementia (0.96, 0.94-0.97); have been assessed by a team with a social welfare professional (0.94, 0.92-0.95); and have permanent residential care approvals (0.58, 0.56-0.58).

Individuals accessing approved transition care were *more likely* to (*asHR*, *95%CI*): live outside major cities (1.15, 1.13-1.17); have domestic task limitations (1.09, 1.05-1.14); be living with hypertension (1.04, 1.03-1.05), pain (1.03, 1.01-1.05), falls (1.03, 1.01-1.05), arthritis (1.04, 1.03-1.06), delirium (1.06, 1.02-1.10), eye diseases (1.04, 1.02-1.06) and fractures (1.04, 1.03-1.06); and have additional home care approvals (1.11, 1.09-1.13) (see Table 3).

## 4 | DISCUSSION

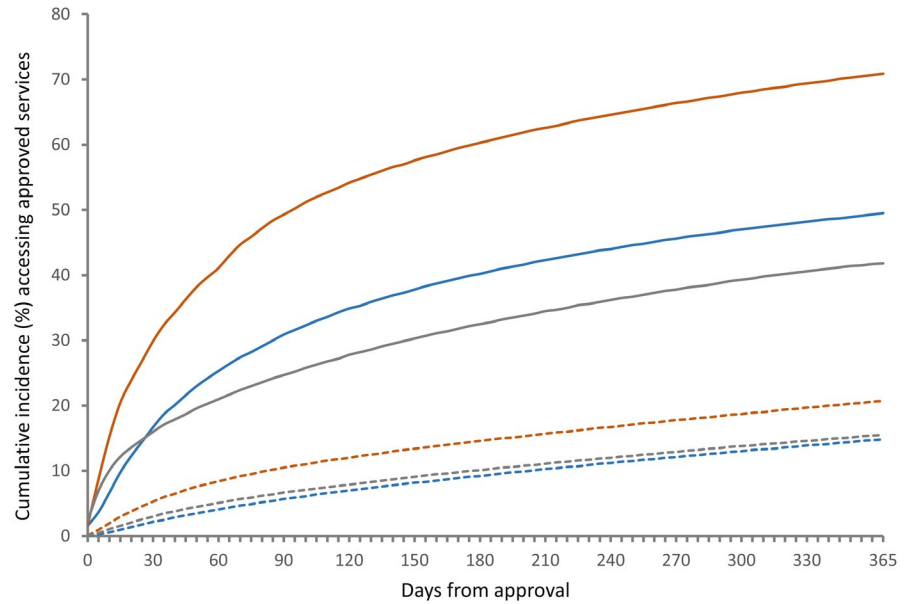
Twenty-eight per cent of individuals with approvals for permanent residential, home or respite aged care services did not access services within one year, and 22% with approvals for transition care did not access this service within 28 days. The cumulative incidence of accessing services varied between 42% and 79%. Service access depended on individuals' age, sex, living arrangements, state, remoteness and their specific limitations and health conditions (ie, pain, falls, cancer, delirium, dementia, diabetes, depression, fractures and incontinence) as well as external factors, including the eligibility assessment team involved and other service approvals.

Our study highlights common factors associated with the use of aged care services but also factors important for specific types of service access.

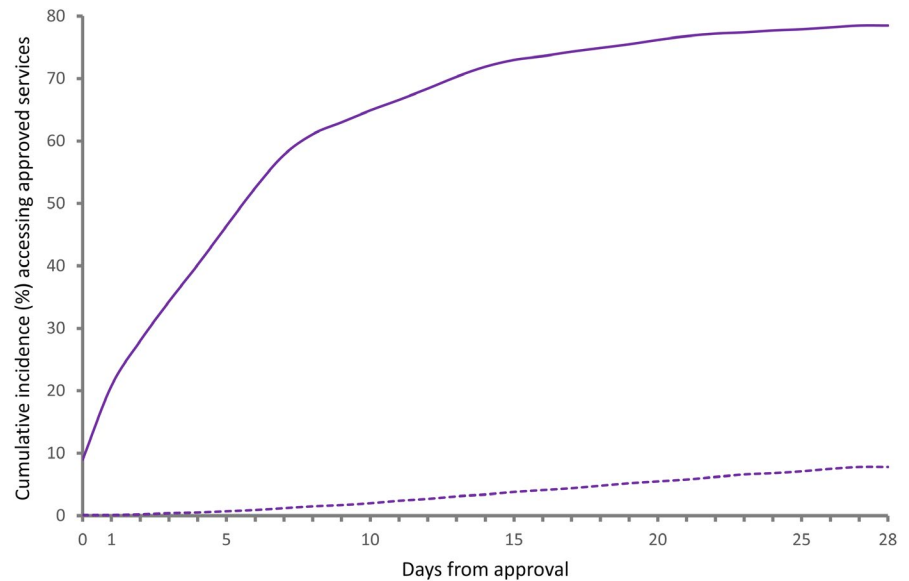
Use of respite (42%) and home (50%) care approvals was lower than for permanent (71%) and transition (79%) care. Our estimates of access are lower for transition care (89%) and higher for permanent residential (49%), respite (25%) and home care (42%), than 2009 estimates.<sup>3</sup> Our analysis included individuals from a 10-year period, censored individuals that received other services and treated mortality as a competing risk during the follow-up period, therefore reflecting the cumulative incidence of people with approvals at one year (or 28 days for transition care) who had not accessed other services or died, which is different from evaluating crude service access.<sup>3</sup> As expected, approvals for transition care were the most often used following approval, as these services are designed to assist hospitalised individuals in need of short-term care to recover. The second most used approval type was for permanent residential care, which is in line with this being the more commonly used longer term care solution in Australia (>72 000 entries in 2016).<sup>2,17</sup> The less frequent use respite approvals could reflect the reported attitudes and concerns of older people about accessing these services.<sup>18-20</sup> Finally, although not examined here, the lower use of home care services could be influenced by difficulties in accessing services (eg limited availability).<sup>21</sup>

The likelihood of using approved permanent residential care services was significantly higher for individuals born in Australia, living alone, living in houses that they did not own, living in major cities, living with activity limitations and with a history of falls, delirium, dementia and incontinence. These findings confirm prior strong evidence that age, functional limitations, home ownership status and having dementia are associated with entering residential care.<sup>8</sup> Other factors, including incontinence,<sup>7,8</sup> have also been reported in prior literature, but less consistently. Australian-specific factors

**FIGURE 1** Cumulative incidence of accessing approved permanent residential, home and respite aged care services and incidence of death within one year. — Home care; — Permanent residential aged care; — Respite care; ..... Death; ..... Death



**FIGURE 2** Cumulative incidence of accessing approved transition care and incidence of death within 28 days. — Transition care; ..... Death



were identified, including being born in Australia, living in a city and state there was variation by State. These factors are consistent with several reports<sup>22</sup> that highlight that entry into care varies by race and cultural background.<sup>5,7,8</sup>

Functional limitations, living with dementia, incontinence and a history of falls were also factors associated with an individuals' use of home care approvals. Additionally, being younger, female, living with family or others or in institutions, having a carer and living with arthritis, depression and eye diseases were specifically associated with accessing home care services. However, having a history of cancer or diabetes, having approvals for all other services and being assessed by a team with a medical practitioner made people less likely to access home care. These findings highlight that while staying at home is reportedly more desirable amongst

older Australians<sup>23</sup> and increasingly prevalent,<sup>17</sup> the individuals entering these services are different to those entering residential care. Some of these differences suggest that these are individuals with health conditions manageable at home and with more carer or family support.

Factors associated with the use of respite service approvals were similar to those for permanent residential care approvals. These similarities are due to the overlap in the population accessing these services.<sup>5,6</sup> However, we also identified factors associated with the use of respite approvals only, including having a DVA card, living outside major cities and having hypertension, arthritis, diabetes, eye diseases and fractures. The differences in the effect of certain diseases could be related to the demanding nature of certain conditions (ie, fractures). Unlike in the other approval groups, those with

**TABLE 3** Factors associated with accessing approved aged care services within one year for permanent, home, respite care, and within 28 d for transition care

| Variables   | Categories                                  | Permanent care <sup>a</sup><br>Adjusted<br>Subdistribution HR<br>(95%CI), N = 634<br>677 | Home care <sup>b</sup><br>Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 386 469 | Respite care <sup>c</sup><br>Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 620 425 | Transition care <sup>d</sup><br>Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 98 859 |
|---|---|--|---|--|--|
| <b>Person Characteristics</b>                     |   |  |   |  |  |
| Age, years  | Per 10-year increments                      | 1.11 (1.10, 1.11)  | 0.97 (0.96, 0.98)   | 1.09 (1.08, 1.09)  | 1.00 (0.99, 1.01)  |
| Sex   | Male vs Female                              | 0.96 (0.95, 0.96)  | 0.93 (0.92, 0.94)   | 0.97 (0.96, 0.98)  | 0.98 (0.96, 0.99)  |
| Country of birth                                  | Born overseas vs Australia                  | 0.92 (0.91, 0.92)  | 0.99 (0.98, 1.00)   | 0.94 (0.93, 0.95)  | 0.98 (0.96, 0.99)  |
| Department of<br>Veterans' Affairs<br>card status | Gold vs No card                             | 0.95 (0.94, 0.96)  | 0.72 (0.70, 0.73)   | 1.09 (1.08, 1.11)  | 0.89 (0.87, 0.92)  |
|   | White vs No card                            | 1.04 (1.01, 1.06)  | 0.90 (0.86, 0.94)   | 1.17 (1.13, 1.21)  | 0.93 (0.87, 1.00)  |
|   | Other vs No card                            | 1.03 (1.01, 1.06)  | 1.00 (0.97, 1.04)   | 1.04 (1.01, 1.07)  | 1.02 (0.95, 1.08)  |
| Living<br>arrangements                            | Institution care vs Lives alone             | 0.90 (0.85, 0.94)  | 0.35 (0.31, 0.39)   | 1.24 (1.14, 1.34)  | 0.97 (0.80, 1.17)  |
|   | Lives with family vs Lives alone            | 0.80 (0.79, 0.80)  | 0.85 (0.84, 0.86)   | 0.87 (0.86, 0.87)  | 1.00 (0.98, 1.01)  |
|   | Lives with others vs Lives alone            | 0.90 (0.88, 0.92)  | 0.84 (0.81, 0.87)   | 0.91 (0.89, 0.94)  | 0.99 (0.94, 1.04)  |
| Usual<br>accommodation                            | Hotel/boarding house/Hospital vs<br>Private | 1.09 (1.07, 1.12)  | 0.92 (0.87, 0.96)   | 1.02 (0.98, 1.06)  | 0.98 (0.92, 1.05)  |
|   | Temporary supported vs Private              | 0.95 (0.93, 0.97)  | 1.25 (1.18, 1.32)   | 0.68 (0.65, 0.72)  | 0.88 (0.82, 0.95)  |
|   | Residential aged care vs Private            | 0.86 (0.81, 0.91)  | 2.32 (1.93, 2.80)   | 0.12 (0.11, 0.13)  | 0.79 (0.67, 0.94)  |
|   | Retirement village vs Private               | 1.20 (1.19, 1.21)  | 1.20 (1.18, 1.22)   | 1.08 (1.07, 1.10)  | 0.98 (0.96, 1.00)  |
| Carer availability                                | Yes vs No                                   | 1.00 (1.01, 0.99)  | 0.88 (0.87, 0.90)   | 1.06 (1.09, 1.05)  | 1.00 (0.98, 1.02)  |
| Remoteness  | Other vs Major city                         | 0.95 (0.94, 0.96)  | 0.94 (0.93, 0.95)   | 1.14 (1.13, 1.15)  | 1.15 (1.13, 1.17)  |
| State   | ACT vs SA                                   | 0.97 (0.94, 1.01)  | 0.95 (0.91,<br>0.99)*   | 0.88 (0.84, 0.92)  | 1.26 (1.17, 1.34)  |
|   | NSW vs SA                                   | 1.06 (1.05, 1.08)  | 0.79 (0.78, 0.81)   | 1.13 (1.11, 1.15)  | 1.60 (1.56, 1.64)  |
|   | NT vs SA                                    | 0.62 (0.58, 0.67)  | 1.82 (1.69, 1.95)   | 0.59 (0.55, 0.65)  | 1.48 (1.01, 2.18)*   |
|   | QLD vs SA                                   | 0.94 (0.93, 0.96)  | 1.08 (1.06, 1.11)   | 0.68 (0.66, 0.69)  | 1.86 (1.81, 1.90)  |
|   | TAS vs SA                                   | 1.06 (1.03, 1.08)  | 1.12 (1.08, 1.16)   | 0.80 (0.78, 0.82)  | 2.07 (1.96, 2.19)  |
|   | VIC vs SA                                   | 0.97 (0.95, 0.98)  | 1.17 (1.14, 1.20)   | 0.90 (0.89, 0.92)  | 1.13 (1.10, 1.15)  |
|   | WA vs SA                                    | 0.97 (0.95, 0.99)  | 1.18 (1.15, 1.21)   | 0.71 (0.69, 0.72)  | 0.83 (0.81, 0.86)  |
| <b>Activity limitations</b>                       |   |  |   |  |  |
| Domestic<br>assistance                            |   | 0.82 (0.80, 0.83)  | 1.21 (1.17, 1.25)   | 0.84 (0.82, 0.86)  | 1.09 (1.05, 1.14)  |
| Transport   |   | 1.05 (1.03, 1.06)  | 1.04 (1.02, 1.07)   | 1.11 (1.09, 1.13)  | 1.01 (0.98, 1.04)  |
| Meals   |   | 1.25 (1.24, 1.27)  | 1.06 (1.04, 1.07)   | 1.28 (1.26, 1.30)  | 1.00 (0.97, 1.03)  |
| Communication                                     |   | 1.03 (1.02, 1.04)  | 0.98 (0.97,<br>1.00)*   | 1.02 (1.01, 1.03)  | 0.93 (0.91, 0.95)  |
| Social and<br>community<br>participation          |   | 1.11 (1.09, 1.12)  | 1.09 (1.07, 1.11)   | 1.09 (1.08, 1.11)  | 1.01 (0.99, 1.03)  |
| Health-care tasks                                 |   | 1.11 (1.09, 1.12)  | 1.01 (1.00, 1.02)   | 1.12 (1.11, 1.14)  | 1.00 (0.98, 1.02)  |
| Home<br>maintenance                               |   | 0.96 (0.95, 0.96)  | 0.99 (0.98, 1.00)   | 0.95 (0.94, 0.96)  | 0.95 (0.94, 0.97)  |
| Self-care   |   | 1.23 (1.22, 1.25)  | 1.01 (0.99, 1.02)   | 1.23 (1.21, 1.24)  | 0.98 (0.95, 1.00)  |
| Moving around<br>places                           |   | 1.01 (1.00, 1.02)*   | 0.96 (0.94, 0.97)   | 0.98 (0.97, 0.99)  | 0.96 (0.94, 0.97)  |
| Movement<br>activities                            |   | 1.04 (1.03, 1.05)  | 0.87 (0.85, 0.88)   | 0.98 (0.97, 1.00)  | 0.90 (0.88, 0.91)  |

(Continues)

TABLE 3 (Continued)

| Variables                           | Categories   | Permanent care <sup>a</sup><br>Adjusted<br>Subdistribution HR<br>(95%CI), N = 634<br>677 | Home care <sup>b</sup><br>Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 386 469 | Respite care <sup>c</sup><br>Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 620 425 | Transition care <sup>d</sup><br>Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 98 859 |
|-------------------------------------|--------------|--|---|--|--|
| Health conditions                   |              |  |   |  |  |
| Heart diseases                      |              | 0.96 (0.96, 0.97)  | 0.98 (0.97, 0.99)   | 0.96 (0.96, 0.97)  | 1.01 (1.00, 1.03)  |
| Hypertension                        |              | 1.03 (1.02, 1.04)  | 1.02 (1.01, 1.03)   | 0.98 (0.97, 0.99)  | 1.04 (1.03, 1.05)  |
| Arthritis                           |              | 1.01 (1.00, 1.01)*   | 1.04 (1.03, 1.05)   | 0.97 (0.96, 0.98)  | 1.04 (1.03, 1.06)  |
| Diseases of the eye                 |              | 1.00 (1.00, 1.01)  | 1.05 (1.04, 1.06)   | 0.98 (0.97, 0.99)  | 1.04 (1.02, 1.06)  |
| History of cancer                   |              | 0.81 (0.80, 0.82)  | 0.90 (0.89, 0.91)   | 0.87 (0.86, 0.89)  | 0.96 (0.94, 0.98)  |
| Dementia                            |              | 1.31 (1.30, 1.32)  | 1.09 (1.08, 1.11)   | 1.27 (1.26, 1.29)  | 0.97 (0.94, 0.99)  |
| Diabetes                            |              | 1.00 (0.99, 1.01)  | 0.97 (0.96, 0.98)   | 0.97 (0.96, 0.98)  | 0.99 (0.97, 1.01)  |
| Osteoporosis                        |              | 1.00 (0.99, 1.01)  | 1.02 (1.01, 1.04)   | 1.00 (0.99, 1.02)  | 1.01 (0.99, 1.03)  |
| History of falls                    |              | 1.14 (1.13, 1.15)  | 1.03 (1.02, 1.04)   | 1.09 (1.08, 1.11)  | 1.03 (1.01, 1.05)  |
| Depression                          |              | 1.05 (1.04, 1.06)  | 1.04 (1.02, 1.05)   | 1.14 (1.13, 1.15)  | 1.01 (0.99, 1.03)  |
| Incontinence                        |              | 1.07 (1.06, 1.08)  | 1.04 (1.02, 1.05)   | 1.05 (1.04, 1.06)  | 1.00 (0.98, 1.02)  |
| Pain                                |              | 0.93 (0.92, 0.95)  | 1.02 (1.00, 1.03)   | 0.94 (0.93, 0.95)  | 1.03 (1.01, 1.05)  |
| Kidney and urinary system disorders |              | 0.92 (0.90, 0.93)  | 0.93 (0.91, 0.95)   | 0.93 (0.91, 0.94)  | 0.98 (0.96, 1.00)  |
| Fracture                            |              | 1.01 (1.00, 1.03)  | 1.00 (0.99, 1.02)   | 1.10 (1.08, 1.11)  | 1.04 (1.03, 1.06)  |
| Bed sore                            |              | 0.99 (0.98, 1.01)  | 0.98 (0.95, 1.00)*  | 0.99 (0.97, 1.01)  | 0.97 (0.94, 0.99)*   |
| Delirium                            |              | 1.14 (1.11, 1.17)  | 1.07 (1.00, 1.14)*  | 1.21 (1.16, 1.27)  | 1.06 (1.02, 1.10)  |
| Assessment Characteristics          |              |  |   |  |  |
| Year                                | 2003 vs 2013 | 1.38 (1.34, 1.42)  | 1.52 (1.44, 1.60)   | 1.53 (1.47, 1.60)  | — <sup>e</sup>   |
|                                     | 2004 vs 2013 | 1.27 (1.24, 1.29)  | 1.28 (1.24, 1.33)   | 1.42 (1.38, 1.46)  | — <sup>e</sup>   |
|                                     | 2005 vs 2013 | 1.25 (1.23, 1.28)  | 1.41 (1.37, 1.45)   | 1.43 (1.40, 1.47)  | 0.17 (0.06, 0.44)  |
|                                     | 2006 vs 2013 | 1.30 (1.28, 1.32)  | 1.68 (1.64, 1.73)   | 1.46 (1.43, 1.50)  | 1.06 (1.00, 1.13)*   |
|                                     | 2007 vs 2013 | 1.25 (1.23, 1.28)  | 1.69 (1.65, 1.73)   | 1.43 (1.40, 1.46)  | 1.00 (0.96, 1.04)  |
|                                     | 2008 vs 2013 | 1.18 (1.16, 1.20)  | 1.59 (1.55, 1.63)   | 1.34 (1.31, 1.37)  | 1.00 (0.97, 1.03)  |
|                                     | 2009 vs 2013 | 1.15 (1.14, 1.17)  | 1.46 (1.43, 1.50)   | 1.26 (1.23, 1.29)  | 0.98 (0.95, 1.01)  |
|                                     | 2010 vs 2013 | 1.20 (1.18, 1.22)  | 1.45 (1.41, 1.48)   | 1.29 (1.26, 1.32)  | 0.96 (0.93, 0.99)  |
|                                     | 2011 vs 2013 | 1.13 (1.11, 1.15)  | 1.47 (1.44, 1.50)   | 1.16 (1.14, 1.19)  | 1.01 (0.98, 1.03)  |
|                                     | 2012 vs 2013 | 1.06 (1.04, 1.08)  | 1.20 (1.17, 1.23)   | 1.06 (1.03, 1.08)  | 0.98 (0.96, 1.01)  |
| Assessors' professional background  |              |  |   |  |  |
| Medical                             | Yes vs No    | 1.07 (1.06, 1.08)  | 0.89 (0.88, 0.90)   | 1.02 (1.01, 1.03)  | 1.00 (0.98, 1.02)  |
| Nursing                             | Yes vs No    | 1.07 (1.06, 1.08)  | 1.05 (1.03, 1.06)   | 1.05 (1.04, 1.06)  | 1.05 (1.02, 1.08)  |
| Social welfare                      | Yes vs No    | 1.05 (1.04, 1.06)  | 1.02 (1.01, 1.03)   | 0.98 (0.97, 0.99)  | 0.94 (0.92, 0.95)  |
| Service approvals                   |              |  |   |  |  |
| Home care                           | Yes vs No    | 0.50 (0.49, 0.50)  | — <sup>f</sup>  | 0.68 (0.67, 0.68)  | 1.11 (1.09, 1.13)  |
| Permanent care                      | Yes vs No    | — <sup>f</sup>   | 0.70 (0.69, 0.71)   | 1.30 (1.29, 1.32)  | 0.57 (0.56, 0.58)  |
| Respite care                        | Yes vs No    | 0.51 (0.51, 0.52)  | 0.83 (0.82, 0.84)   | — <sup>f</sup>   | 0.98 (0.96, 1.01)  |
| Transition care                     | Yes vs No    | 0.79 (0.77, 0.80)  | 0.64 (0.62, 0.66)   | 0.41 (0.39, 0.42)  | — <sup>f</sup>   |

(Continues)



TABLE 3 (Continued)

| Variables             | Categories            | Permanent care <sup>a</sup>                               | Home care <sup>b</sup>                                    | Respite care <sup>c</sup>                                 | Transition care <sup>d</sup>                             |
|-----------------------|-----------------------|---|---|---|--|
|                       |                       | Adjusted<br>Subdistribution HR<br>(95%CI), N = 634<br>677 | Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 386 469 | Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 620 425 | Adjusted<br>Subdistribution<br>HR (95%CI),<br>N = 98 859 |
| Priority <sup>e</sup> | 3–14 d vs within 48 h | 0.94 (0.93, 0.95)   | 1.14 (1.10, 1.17)   | 0.75 (0.73, 0.76)   | 0.99 (0.96, 1.01)  |
|                       | ≥14 d vs within 48 h  | 0.64 (0.63, 0.65)   | 1.06 (1.03, 1.09)   | 0.53 (0.52, 0.54)   | 0.80 (0.76, 0.84)  |

<sup>a</sup>Model N = 634 677. N = 21 586/656 263 = 3.3% cases excluded from final model due to missing data.

<sup>b</sup>Model N = 386 469. N = 10 950/397 419 = 2.8% cases excluded from final model due to missing data.

<sup>c</sup>Model N = 620 425. N = 19 238/639 663 = 3.0% cases excluded from final model due to missing data.

<sup>d</sup>Model N = 98 859. N = 1879/100 738 = 1.9% cases excluded from final model due to missing data.

<sup>e</sup>Transition care was established in 2004–2005.

<sup>f</sup>Group being examined, variable not relevant in this model.

<sup>g</sup>Aged Care Assessment Teams respond to referrals for an assessment by allocating a priority category based on the individual's needs at the time of acceptance for referral.

\*P value between .0125 and .05, not considered statistically significant after correction for multiple hypothesis testing. All other estimates where confidence intervals do not include 1 have a  $P < .0125$ .

DVA benefits were more likely to access respite services, a reflection of veterans' options regarding services for longer term and transition care. Contrary to people with approvals for home care and permanent residential care, those with respite approvals were more likely to use them if they were from outside major cities.

Individuals accessing transition care were more likely to have pain, arthritis, falls, fractures, eye diseases and delirium and have been assessed by teams that included a nursing professional and to have had additional approvals for home care. However, this is a service that men, individuals born overseas, and those who have support, are less likely to access. Individuals were also less likely to access this type of care if they had the assessment done by a team that included a welfare professional, live in South Australia or have approvals for permanent residential care. The high incidence of accessing these services and the conditions that characterise this cohort are consistent with our understanding that these individuals are in need of co-ordinated and supportive posthospital discharge care.<sup>24</sup>

This was an observational study that relied on linked existing data sources, limiting our ability to comment on factors reported to be associated with aged care services use (eg personal preferences, policy and availability) not in our data sets. For example, the national target provision rate of subsidised aged care places likely influences the use of services and clustering effects related to these geographical allocations could exist, but we were unable to account for these in this analysis.<sup>2</sup> However, a comprehensive set of characteristics of a national cohort was examined and several factors associated with entry into approved services were identified. Our study focused only on aged care services that required an aged care eligibility assessment by an ACAT and therefore does not evaluate other aged care services provided by the

government or carer/family. Additionally, we did not examine the association of hospitalisations before the use of the service approval, which is also likely associated with use of the services, particularly with transition care. However, we do not feel that the use of other minor aged care and hospital services would change the associations between the factors and services evaluated. Another limitation of our study is some weak but statistically significant associations; therefore, the strength of the associations reported should be considered. We focused on the access to services within one year of approval, which underestimates the overall accessing of some services. It is possible individuals had additional eligibility assessments before 2009 or accessed services with their longer term approvals after 2009 and these were not captured in this study.

The strengths of this study include the national capture of people who underwent an aged care eligibility assessment and the use of a systematic approach that relies on trained assessors to collect its data, therefore increasing the internal validity of the information collected. Additionally, the data collection process was implemented in 2003 and remained the same during the study period. Ours is a population-based study, and our findings are generalisable to the entire Australian population seeking and accessing aged care. Our analysis also addressed the people who died or entered a different service, to obtain accurate estimates of service use by the end of the period, which had not been previously done.

Twenty-two to twenty-eight per cent of individuals approved for aged care services did not access them, and the cumulative incidence of accessing the four services varied between 42% and 79%. Aged care seekers', assessments' and assessors' characteristics were associated with people accessing services, and some may be considered barriers to services. For example, while being female and having a

history of dementia, falls, depression and incontinence is ubiquitously associated with individuals accessing aged care services, older individuals with less support and more functional limitations and health conditions were more likely to use residential care. This suggests that while home care is increasingly desirable for older individuals it does not seem to be accessed by those with major functional limitations, highlighting potential unmet needs for individuals with higher care requirements who may wish to remain at home. This information is a first step to characterise the people still in need of care and potential barriers to aged care access.

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## CONFLICTS OF INTEREST

Renuka Visvanathan is a Board Member of Resthaven Inc, a not-for-profit aged care community service associated with the Uniting Church in Australia but separately incorporated, financially independent and a charitable Public Benevolent Institution. Craig Whitehead is a Board Member of Helping Hand Aged Care. All other authors have no conflicts of interest to declare.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.