THE UNIVERSITY OF SYDNEY

Investigating Protective Factors of the DVA Community Nursing Program: Final Report

PREPARED FOR DEPARTMENT OF VETERANS' AFFAIRS

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EXECUTIVE SUMMARY

Background

The focus on community-based care and the desire for older adults to remain in the home as long as possible have long been an important policy drive for the Australian Government. Understanding how the delivery of home care services, such as the DVA Community Nursing (CN) program may help to facilitate this outcome, is important. The ultimate goal of the CN program is to help clients maintain independence and remain at home as long and as well as possible, until death or entry into residential aged care (RAC). Commissioned by DVA (Reference ID: DVA-GEN 2019-20/736), the research team from the University of Sydney has conducted this project to investigate protective factors of the CN program and other factors that contribute to a later entry into RAC or remaining at home until death.

The project examined four research questions:

- What are the protective factors of the CN program that contribute to clients entering RAC at an older age, or remaining at home until death? (RQ1)
- Are there generic protective factors that arise from receiving care in the home or that relate to the cohort of clients that receive DVA funded CN services? How are these different to/how do they interact with, any protective factors that are specific to CN services? (RQ2)
- How does the trajectory from receiving care at home to moving to RAC differ between clients who receive CN services at varying degrees, those that don't receive CN services and an age/gender matched sample of the general population? (RQ3)
- How does the CN program contribute towards clients remaining at home and maintaining their independence? (RQ4)

Approach

A mixed-methods approach was adopted: a retrospective cohort study (quantitative) using primarily pre-existing, de-identified DVA client data and a qualitative study involving CN program client interviews and CN provider consultations. A sequential mixed methods approach (quantitative followed by qualitative) was used, with the qualitative aspect of the study informed by the key findings of the quantitative study. Data for all clients who received their first CN program and/or Veterans' Home Care (VHC) services from 2010 to 2014, followed up till end-2019, were included in the study to enable a minimum of five years trajectory for each client. The project also involved the use of general population data (i.e., Home Care Package [HCP] clients), analysed independently by the Registry of Senior Australians (ROSA) team for comparison with DVA data. ROSA data were included as an age and gender-matched civilian cohort (between $\geq$65 and $\leq$100 years old accessing HCP for the first time between 1st January 2010 and 31st December 2014, with follow up period to June 30th, 2017) to compare outcomes involved in the quantitative aspect of the project. This use of a comparator group from the general population has provided context for benchmarking the effects of receiving CN services and how they relate to the primary outcomes.

Key Findings

Protective factors for community care clients (Research Question 1)

Key CN program factors associated with a reduced risk of entering permanent RAC were receiving clinical care or combined clinical and personal care (vs personal care only), having episodic service delivery and receiving the majority of care from registered nurses (RNs) (vs personal care workers, PCW).

Clients who: accessed the CN service at an earlier age; were Veteran or male (vs Partner or female); not living alone; had no dementia; or had a smaller number of medical conditions, had a reduced of risk of entering permanent RAC.

Those CN service-related and client-related protective factors, bar living alone, were consistent across two client groups (those who entered RAC within the first 18 months and after 18 months from the first CN service). Living alone did not affect the risk of permanent RAC placement in the first 18 months; however, those who lived alone throughout their entire monitoring period in the 19 months onwards after their first CN service were 22% more likely to enter permanent RAC. Extant findings by other researchers in this field support these findings concerning the client-related protective factors against permanent RAC placement.

Injury-related hospital admission, especially due to a fall-related injury, is known to be strongly associated with first entry to permanent RAC, particularly for older adults with dementia. Only a small number of CN related factors were found to be associated with a reduced risk of acute care hospitalisation: clients receiving personal care only appeared to have fewer acute care admissions per year than those receiving clinical care only, or combined care. Clients with a higher total number of clinical care visits or personal care visits had a reduced risk of hospitalisation than those who received less clinical care or personal care visits.

However, clients receiving clinical care, or combined care spent fewer days per admission in hospital. Having a higher total number of clinical care services was associated with a reduced risk of fall-related hospitalisation.

Generic protective factors for community clients and allied health utilisation (AH) (Research Question 2)
Four CN client related factors were associated with an increased use of AH services: an earlier age at first CN service; an increased medical burden; a negative indicator for dementia; and being a Partner or female.

CN service factors played the greatest role in predicting the use of AH services:

- The number of CN clinical services was most predictive of the number of AH service sessions used over time: for each extra month of CN clinical services, clients used approximately 0.71 additional AH service sessions.
- The number of personal care services used was also strongly predictive of increased AH service usage: for each additional month of personal care services, CN clients used an additional 0.45 AH service sessions.

Trajectory of Community Nursing Program Clients (Research Question 3)
The findings of RQ3 provide much needed evidence for the Australian community based aged care services. The largest differences between those who received the CN program and those who received HCP are seen in the rate of death at home prior to permanent RAC placement. Whilst HCP recipients were much more likely to enter permanent RAC, CN clients were much more likely to remain at home and die at home. Coupled with the later age of entry into permanent RAC, this suggests that CN clients are able to remain at home long enough that permanent RAC admission occurs only in the minority of clients.

Furthermore, at five years after first access to HCP, 58% of HCP clients had entered RAC and 26% had died before entering RAC. The median time to RAC entry for the HCP cohort was about 39 months. In the same period, only 27% of DVA clients had entered RAC and 41% had died at home before entering RAC. The median time to RAC entry for the CN cohort went well beyond five years (over 60 months). Importantly, having a higher incidence of death at home (as shown in the case of the CN cohort) does not suggest there is a higher mortality among CN clients. It simply suggests that as most DVA clients are able to remain at home longer than HCP clients, they are more likely to die at home than their counterparts.

Explanations for CN clients remaining at home longer and maintaining independence at home
This research demonstrates that DVA CN clients are remaining at home considerably longer than HCP clients. There are multiple (and possibly intersecting) factors contributing to this situation as shown in the findings from RQ1 (e.g., receiving the majority of care from RNs and a higher total number of clinical care). The client interview findings and consultations with CN providers (Research Question 4) further offer potential explanations as to why CN clients are able to remain at home much longer than their counterparts. Most notable CN program related factors include: timely support tailored to clients' specific needs; a timely and comprehensive assessment (offered almost immediately after a referral and ongoing care plan and reviews by a registered nurse; continuity of care; time-limited and task focused service driven by the efficiency and expertise of nurses; flexibility to offer services to those who need more intensive and frequent care; and ease of scaling services up and down. However, transferability of the interview findings to a wider context needs a careful attention due to a small sample size (n=16 clients).

Conclusion
A sound understanding of the relationship between the characteristics of CN clients and services and primary outcomes, such as time to permanent RAC admission or death at home, is crucial to further planning and enhancement of DVA client services and home-based support programs for older people. This better understanding can inform better service provision and improve policy development.

The findings provide timely insights into how the delivery of home care services may facilitate the primary outcomes, the relationship between the characteristics of DVA CN services and time to first permanent RAC

admission or death at home. The findings of RQ3 in particular provide much needed evidence, demonstrating that DVA CN clients are remaining at home considerably longer than HCP clients. The RQ3 findings are highly noteworthy, as no previous research has ever shown such clear evidence of stark differences in the outcomes between the two government funded community care models for older people in Australia.

DVA's uncapped support for CN clients is likely to be much more expensive than providing support for non-DVA clients through HCP. However, it is important to consider the longer-term cost associated with caring for people in RAC, which is substantially costlier than care in the home. The findings signal the need for further consideration of the benefits of accessing CN services as well as economic evaluation of the CN program compared to HCPs.

ABBREVIATIONS AND ACRONYMS

ACAT	Aged Care Assessment Team
AIHW	Australian Institute of Health and Welfare
ADL	Activity of Daily Living
AH	Allied Health
ASGS	Australian Statistical Geography Standard
CC	Clinical Care
CI	Confidence interval
CN	Community Nursing
CNC	Clinical Nurse Consultant
CRR	Competing Risk Regression
DVA	Department of Veterans' Affairs
EN	Enrolled nurse
GORD	Gastroesophageal reflux disease
GP	General Practitioner
HCP	Home Care Package
HR	Hazard ratio
ICD	International Classification of Diseases
IQR	Inter-quartile range
NDIS	National Disability Insurance Scheme
PC	Personal Care
PCW	Personal care workers (also known as Nursing Support Staff, NSS)
PH	Proportional Hazards
PMT	Project Management Team
PPH	Potentially Preventable Hospitalisations
RAC	Residential aged care
RAS	Regional Assessment Service
RMST	Restricted Mean Survival Time
RN	Registered nurse
ROSA	Registry of Senior Australians
RQ	Research Question
RxRisk	An index of medical comorbidity
SD	Standard Deviation
TDS	Three times daily service schedule
VHC	Veterans' Home Care

PART A: PROJECT

Project overview

Background

Population ageing is a global phenomenon. The majority of older Australians prefer to remain in their homes for as long as possible, rather than being cared for at an institutional setting such as residential aged care.[1] It is also well recognised that the longer older adults live in the community, the lower the pressure on health and aged care sectors and the higher the quality of life for those who can remain in the community.[2]

There is a multitude of factors contributing to admission to a permanent residential aged care home. One of the most common predictors of permanent residential aged care admission is individuals' loss of functional independence, which is usually measured in terms of the capability of performing activities of daily living (ADLs) such as bathing, toileting and eating, as well as the capability to perform instrumental activities of daily living (IADL's), such as managing medication usage, maintaining the household, and preparing meals of adequate nutrition.[3] Loss of functional independence in Australian older adults is most commonly a result of diseases of ageing such as dementia (the leading cause of permanent residential aged care admission);[4] however increased medical burden can also impose physical disability that restricts access to appropriate medical management and services necessary to remain functionally independent.

To remain in the community older adults typically require multiple types of assistance, such as medical support (i.e., nursing care and medication management), personal care, domestic and social support. To this end, systematic review and meta-analysis examining services that delay or avoid residential aged care admission has suggested multifactorial interventions (nursing care, home assistance, social assistance etc.) to be effective.[5] One of the Australian government responses to the desires of older adults to stay in their own homes, and to the increasing pressures of an ageing population, has been the emphasis on care and support services at home through, for example, Commonwealth Home Support Program (CHSP) and Home Care Packages (HCPs) program.

Similar to HCPs, the aim of the Department of Veterans' Affairs (DVA) Community Nursing (CN) program is to maintain and enhance the physical wellbeing and quality of life of eligible DVA Veteran cardholders through the delivery of clinical care and clinically required personal care services in their homes. The DVA CN program involves registered and enrolled nurses (RNs, ENs) and personal care workers (PCWs) from approved CN providers, delivering home nursing services to eligible DVA Veteran cardholders. The services include assessing clients' needs and developing a care plan; and providing clinical care and/or personal care to meet assessed clinical needs. The ultimate goal of the CN program is to help clients maintain independence and remain at home as long and as well as possible, until death or entry into residential aged care.

Given this focus on community-based care and the desire for older adults to remain in the home as long as possible, it is necessary to understand how the delivery of home care services may facilitate this outcome. A number of studies have shown the association between community-based home support programs and delaying or preventing permanent aged care home admissions.[5,6] However, no research has been carried out to investigate the relationship between the characteristics of DVA-provided CN services and time to first permanent residential aged care admission or to death at home. Such evidence is crucial in further planning and enhancement of DVA client services. Findings of this study will also contribute to improving understanding

[1] Australian Government Productivity Commission. (2015). Housing decisions of older Australians. Canberra
[2] The Royal Commission into Aged Care Quality and Safety. (2019). Medium and long-term pressures on the system: the changing demographics and dynamics of aged care.
[3] Mynatt, E.D., & Rogers, W.A. (2001). Developing technology to support the functional independence of older adults. Ageing International, 27(1), 24-41.
[4] McCallum, J. et al. (2005). Patterns and predictors of nursing home placement over 14 years: Dubbo study of elderly Australians. Australasian Journal on Ageing, 24(3), 169-173.
[5] Luker, J. A., et al. (2019). The evidence for services to avoid or delay residential aged care admission: a systematic review. BMC Geriatrics, 19(1), 217
[6] Mitchell, R. et al. (2017). Risk factors associated with residential aged care, respite and transitional aged care admission for older people following an injury-related hospitalisation. Archives of Gerontology & Geriatrics, 72, 59-66.

of the role of home-based support programs for older people broadly and informing improved service provision and policy development.

Commissioned by DVA (Reference ID: DVA-GEN 2019-20/736), the research (project) team from the University of Sydney has conducted a retrospective cohort (quantitative) study, with a mixed-methods sequential explanatory design, to investigate protective factors of the Community Nursing (CN) program and other factors that contribute to a later entry into residential aged care or to remaining at home until death. The mixed methods design involves the use of existing DVA and other available datasets, the collection of new data through a small number of semi-structured interviews and an associated brief survey of the interviewees.

Research questions

The project is divided into two phases: Phase 1 (Quantitative) study and Phase 2 (Qualitative) study.

Phase 1 research questions

The Phase 1 study investigates three key areas of the CN program (CN program factors, client-level factors, and service utilisation factors) to determine the relationship between enrolment in/receipt of the CN program and a later entry to permanent residential aged care placement or until death at home.

The following research questions were approved by DVA on 11/12/2020[7]:

1) What are the protective factors of the CN program that contribute to clients entering residential aged care at an older age? (RQ1)
2) Are there generic protective factors that arise from receiving care in the home or that relate to the cohort of clients that receive DVA funded CN services? How are these different to/how do they interact with, any protective factors that are specific to CN services? (RQ2)
3) How does the trajectory from receiving care at home to moving to residential aged care[8] differ between clients who receive CN services at varying degrees, those that don't receive CN services and potentially an age/gender matched sample of the general population? (RQ3)

Phase 2 research questions

The Phase 2 study addressed the research question of: How does the CN program contribute towards clients remaining at home and maintaining their independence? (RQ4).The sub questions were:

1) What is the client experience of receiving the DVA CN program? (e.g., type, duration and frequency of service(s) received and the perception about the service quality, usefulness and satisfaction)
2) What aspects of the CN program contribute to clients' wellbeing and assist them to maintain independence at home? (i.e., what is it about the CN service that helps/does not help them to remain at home?)
3) From the client's perspective, how can the CN program be further improved?

The aim of Phase 2 was to provide detailed and specific insights on how the delivery of CN services is associated with the clients remaining at home from the client's perspective.

In addition, two reference group meetings with current DVA CN program service providers (managers and clinicians) were added to the Phase 2 study. The information obtained from the meetings was used to help the research team understand the context of the CN program delivery (e.g., referral and entry to the CN program processes, assessment processes, interface with My Aged Care, GP and hospital services, communication pathways, etc.). The additional insights from the reference group meetings were used to assist the interpretation of the study findings and make recommendations from the study.

[7] The research questions originally contained an aspect of maintaining quality of life (QoL). However, a review of the available DVA data dictionaries confirmed no QoL information was available in the DVA data. Following consultation with DVA, the research team removed all references to "maintaining QoL" (11/12/2020).

[8] Initially, this research question included palliative care (as a transition out of home) to explore a different trajectory. Following a detailed examination of the DVA data provided the research team confirmed that no data about palliative care service was available. Palliative care was removed from the question after consultation with DVA (06/09/2021).

Project design

Mixed methods
The project adopted a mixed-methods approach: a retrospective cohort study (quantitative) using primarily pre-existing de-identified DVA client data and a qualitative study involving CN program client interviews. A sequential mixed methods approach (quantitative followed by qualitative) was used with the qualitative aspect of the study informed by the key findings of the quantitative study.

Data for all clients who received their first CN program and/or Veterans' Home Care (VHC) services from 2010 to 2014, followed up till end-2019, were included in the study to enable a minimum of five years trajectory for each client. The VHC population was included for comparison with the CN population. The project also involved the use of general population data (i.e., civilian cohort data), analysed independently by the Registry of Senior Australians (ROSA) team for comparison with the DVA data. ROSA data were included as an age and gender-matched civilian cohort (between $\geq$65 and $\leq$100 years old accessing HCP for the first time between 1st January 2010 and 31st December 2014, with follow up period to June 30th, 2017) to compare outcomes involved in the quantitative aspect of the project. Conducted independently by the ROSA research team, the analysis of ROSA data was restricted to analysing whether differences exist between the civilian (HCP) and DVA (CN) cohorts with regards to primary outcomes (including age at entry to permanent residential aged care and lengths of time remaining at home until death). More detailed methodological procedures are presented in Part B and Part C of this report.

Rationale for a retrospective cohort study (Phase 1)
Determinants of residential aged care placement and ability to remain in the community are multifaceted and complex, requiring insights into interplays between personal and demographic, clinical, and healthcare utilisation characteristics. Therefore, identification of protective factors that mitigate risk of residential aged care placement; identification of any generic protective factors that arise from receiving care in the home; and comparisons between populations receiving various levels of services, require application of a statistical and methodological approach that enables integration of various contributing factors, to account for the differences between individuals and clusters (such as older adults with dementia).

A retrospective cohort study was selected to answer the research questions in this project, which involved measuring multiple exposures (such as the types of CN program and home support services received, number of service hours and other factors) and outcomes (permanent entry to residential aged care, or later(?) death at home) for participants who have received DVA services. As the data was already collected by DVA, a retrospective cohort study was a time-efficient and flexible way of examining how DVA services relate to primary outcomes, as the combined effect of multiple exposures could be determined.

This flexibility was reflected in the design of the research questions; allowing statistical modelling to identify associations between many exposures and outcomes. By examining multiple exposures (i.e., various types of DVA care services), underlying hypotheses about the effects of receiving DVA services could be generated from the results of data analysis, as eligibility criteria for the study are unrestrictive and representative of participants utilising DVA services.

By analysing factors associated with the delivery of the CN program (e.g. service hours, type of service, etc.), client-level factors (e.g., age, gender, living arrangements, medical burden, etc.), and patterns of health service utilisation (e.g., the use of allied health services, number of hospitalisations, etc.), statistical modelling of the time to first permanent residential aged care admission or death at home has been conducted to facilitate identification of the protective factors of the CN program. Furthermore, a sub-study using the ROSA database to compare the time to primary outcomes with the general population (HCP recipients) was conducted, contextualising and comparing the trajectory of DVA clients with non-DVA supported older Australians.

Rationale for a qualitative study (Phase 2)
Building on the insights gained in the quantitative phase of the project, the qualitative methodology was designed to provide further understandings into what CN program clients have found to be most valuable in helping them to maintain their independence and remain in their own homes. The in-depth interview method was chosen to provide the detailed and specific insights on 'how' the delivery of CN services is associated with the clients remaining at home from the client's perspective. This would also help to investigate any discrepancies or correspondence with the protective factors found from the quantitative study and reasons for different outcomes.

The insights, including participants' perceptions of how the service can be improved, were a pathway to participants providing a perspective to the nature of protective factors, especially for specific types of clientele with unique needs (such as needs relating to dementia). Detailed information related to connection between CN services and delayed entry to permanent residential care further informs future decisions about the care of older people at home.

Project progress and milestones

Project Management Team (PMT)

The PMT was established in December 2020 under the direction of project lead, Professor Yun-Hee Jeon and in consultation with DVA. The PMT consists of relevant DVA Nursing Programs and Operations Section management and members of the research team. The PMT has worked collaboratively to achieve a successful delivery of the project. Through regular meetings and email communications the research team has provided DVA with reporting of the project's current status against the approved Project Plan and an update on the risk register. PMT members from DVA have provided ongoing advice and support to the research team, in particular during ethics submissions and modifications, data transfers, recruitment for qualitative research and preparation of a final report. The PMT met fortnightly until March 2021 and monthly thereafter. The research team has also been working collaboratively with staff and management of DVA.

The Project Risk Assessment/Risk Register was developed in December 2020 and updated since . The Data Management Agreement was established in March 2021 to ensure safe and transparent data transfer, storage and destruction processes.

Ethics approval and milestones

Ethical approval for the Phase 1 quantitative study was granted on 24th March 2021 (No. 316-21) and for the Phase 2 qualitative study on 16th August 2021 (No. 373-21). Multiple modifications for ethics approval were made and approved. Below is an overview of the progress and milestones against delivery dates.

Table 1. An overview of the progress and revised milestones

Deliverables	Delivery dates
Milestone 1. Finalised project plan	11 December 2020
Milestone 2. Obtaining the ethics approval for Phase 1	24 March 2021
DVA Data transfer to research team for Phase 1	14 May 2021
Milestone 2. Obtaining the ethics approval for Phase 2	16 August 2021
*1st Contract variation approved by DVA with extended deadlines	6 September 2021
Milestone 3. Progress Report	30 September 2021 (approved 5 October 2021)
Data preparation and analysis using the Registry of Seniors Australia (ROSA) dataset (Phase 1)	1 October -15 December 2021
DVA three mailouts to eligible participants for Phase 2 (to 150, 74 and 146 clients respectively)	7 October; 17 November 2021; 25 January 2022
Additional Milestone – A summary report of Phase 1 (Quantitative) study findings	21 January 2022 (revised and approved 18 February 2022)
**2nd Contract variation approved by DVA with additional funding	14 February 2022
Ethics Approval for Project Progress Report including an extension to the period of ethical approval	15 February 2022
***3rd Contract variation approved by DVAwith extended deadlines	10 March 2022
Ethics approval for reference group consultations	22 March 2022
Reference group meetings with DVA CN service providers	4 and 6 April 2022
Phase 2 study data collection and analysis completion	23 April 2022
Validation of Phase 1 data analysis and findings	29 March 2022
Milestone 4. Draft Final Report submitted for DVA review	30 April 2022
Milestone 5. Final Report, including executive summary, submitted	6 June 2022

*The overall progress was delayed for 4 months due to delays caused by ethics approval processes (2 months additional time taken) and data transfer, which took over 7 weeks from the time of ethics approval. In addition, the research team was unable to commence participant recruitment in time for the Phase 2 qualitative study due to the Privacy Impact Assessment requiring revised delivery dates (7 weeks delayed). **Due to further delays in the Phase 2 study recruitment, the project lead requested the University to waiver indirect costs charged to the project, which was approved on 22 November 2022 ($22,000). DVA also approved budget supplementation of a total of $21,989.67, enabling the research team to continue the project till completion. ***Continued delays in participant recruitment and additional stakeholder consultation processes for the Phase 2 study required an additional project extension.

Key findings

Phase 1 quantitative study

Overall client data characteristics
Of the 42,192 clients in the initial database provided by DVA, 19% received CN services only, 46% received both CN and VHC services and 35% received VHC services only. Approximately one in two were female (54%) and one in ten clients were identified as having dementia (11%). The median age of entry to permanent residential aged care (RAC) was 90.7 years, with the middle 50% of clients entering permanent RAC between 87.6 and 93.4 years of age. The median time from clients' first CN service to entry to permanent RAC was 30 months, however there was considerable variation, with 50% of clients remaining at home between 14 and 49 months before being admitted to permanent RAC.

Following an exploration of the data, Veterans and their Partners were identified as distinct groups as they differed substantially with respect to gender (98% of the Veterans' group being male and 99% of the Partners' group being female), and to CN and VHC service usage. Increasing age and female gender (i.e., Partners in this project) are known risk factors for permanent RAC placement, and therefore, so our modelling has accounted for differences between these groups.

Of the ten most billed CN services, six were clinical care services, three were personal care services, and one was for CN assessment. The most frequently billed VHC service was for domestic assistance, which represented over 80% of all VHC services delivered. Collectively, domestic assistance, personal care, and respite care in home accounted for 98% of all VHC services delivered. Most CN services were delivered in Major Cities of Australia (35%), regardless of whether the recipient was a Veteran or a Partner. While most CN clients reside in major cities, CN services were delivered across all remoteness categories in Australia.

Following an in-depth examination of the data, clients whose first CN program entry time was later than 2014 (n = 5,593) and clients aged under 60 years and over 100 years when they first received the CN service (n = 1,204), were filtered out of the data set. This resulted in a total of 35,395 clients included for this study. Of 35,395 clients, almost 40% received both CN and VHC services, and 22% received CN services only. Clients who received VHC services only were younger (median age of 83 years) than those who received CN services only (median age of 87 years) or combined services (median age of 87 years) when they first received the services. The median age when clients entered permanent RAC was similar across service types (ranging between 90.3 – 90.8 years); however, those who received CN and VHC service died at home at a later age (median age of 89.7 years) than those who received VHC service only (median age of 89.1 years) and received CN only service (median of 89.0 years).

The proportion of those females who received either CN services or VHC services only was close to 50%, but there were more females (57%) than males (43%) receiving both CN and VHC services. A similar pattern was shown in the relationship type, as the Partners' group was almost all female (99%). Few clients (<0.4%) were identified as Aboriginal or Torres Strait Islander, and 2-3% of clients were from remote or very remote Australia. Notably, just over 40% of all clients across the three groups had a mental health issue.

While just over16% of the sample population had dementia, there was a smaller proportion of clients with dementia in those who received VHC services only (12%) than CN (16%) or combined services (20%). Clients with CN services only were more likely to have a carer than those with combined services. The mean percentage of episodes of care for which clients had a carer was similar (approximately 32%). Half of clients receiving CN services only had clinical care only, whereas more than half of clients (54%) who received the combined services had both clinical and personal care.

Research Question 1: Protective factors for community care clients (RQ1)
RQ1: What are the protective factors of the CN program that contribute to clients entering residential aged care at an older age, or remaining at home until death?

RQ1.1. Are specific characteristics of CN service delivery associated with a later entry into permanent residential aged care, or remaining at home until death?

The CN program offers a range of services to clients with varying degrees of needs; hence examination of possible protective factors associated with receiving CN services involved characterisation of important client-

level and service utilisation factors in addition to examination of the type and frequency of CN services delivered. Therefore, a range of possible protective factors that enable a better understanding of how the CN program may be associated with a later entry into permanent RAC or remaining at home until death were explored.

1) Sampling and client characteristics for RQ1

RQ1 analysis included CN only and combined CN and VHC clients (n = 21,636), excluding those who had a CN assessment only without further care (n = 20) and those who did not receive personal or clinical care (n = 42). The median age for all CN clients when they first received CN services (either CN only or CN and VHC combined) was 87 years. While clients who entered permanent RAC had a median age of 88 years, clients who died at home had a median age of 87 years when they first received CN services.

There was a difference in receipt of VHC services between CN clients who entered RAC and those who died at home: about 70% of CN clients who entered RAC had VHC services, while 59% of CN clients who died at home had VHC services. The proportion having a service break during the study period (i.e., clients received episodic services based on needs) was higher for those who entered permanent RAC: approximately 44% for clients who entered permanent RAC and 36% for those who died at home had periods of service break (i.e., episodic services).

Carers were present for a mean of 32% of care episodes for all CN clients: 30% of episodes for those who entered RAC, and 37% of episodes for those who died at home. Approximately 42% of CN clients who entered permanent RAC lived alone, which was 11% higher than those who died at home.

Among all CN clients 55% were Partners. However, 67% of those entered RAC were Partners, while 45% of those who died at home were Partners. The distribution of medical burden was similar in those who entered RAC and those who died at home. More than half of CN clients were from major cities of Australia and only small proportion of clients were from remote or very remote Australia.

Notably, 34% of CN clients who entered RAC had dementia. Of 4,010 CN clients who had dementia, more than half entered RAC (58%). Regardless of the group, about half of the dementia clients received both clinical and personal care and approximately 12 - 14% received personal care only.

Among the CN clients who received clinical care, the majority had level 2 care (i.e., 10 - 30 visits in a one month period or $\geq$21 minutes of technical related visits). The majority of clients received the care from RNs and only 1% of clients received care from CNCs.

2) Outcome: Permanent RAC admission

Clients were divided into two groups (those who entered RAC within the first 18 months and those who entered RAC after 18 months from the first service) in order to examine risk factors of admission to permanent RAC.

In the first 18 months after their first CN service, factors associated with a reduced risk of entering permanent RAC were: being a Veteran (compared to Partner), having a lower medical burden, accessing the CN service at an earlier age, being without dementia, having episodic service delivery, receiving combined clinical and personal care and receiving the majority of care from CNCs or RNs (compared to other nursing categories or PCWs).

After the first 18 months protective factors against entering permanent RAC were: being a Veteran, accessing the CN service at an earlier age, being without dementia, not receiving VHC service, having episodic service delivery, not living alone, receiving clinical care only and receiving the majority of care from ENs or RNs compared to PCW.

3) Outcome: Death at home

Factors associated with a reduced risk of death at home were: being a Partner (compared to Veteran), having a low medical burden, living in a major city (compared to very remote Australia), entering the service at a younger age, having dementia, receiving VHC service as well as the CN service, episodic service delivery, not having a carer, living alone, receiving clinical care services only or combined services of personal and clinical care (compared to clients who received personal care services only) and receiving the CN service from PCWs (compared to the other CN staff: ENs, RNS or CNC).

RQ1.2. Are CN services associated with the frequency and length of hospitalisation, number of potentially preventable hospitalisations, and fall-related injury?[9]

1) Acute Care Admissions Characteristics

A total of19,431 CN clients had acute care admissions data with an admission date recorded in the hospital dataset, which reflected a median (IQR) monitoring period of 40 months. The five most frequent procedures for all acute care admissions were renal dialysis, chemotherapy, retinal procedures, mental health treatment, and lens procedures, most of them are same day procedures. The five most frequent 'non-routine' admissions were procedures for retina, heart failure and shock, red blood cell disorders, skin graft and debridement and kidney and urinary track infections.

2) Outcome: Acute care hospitalisation

Hospitalisation and associated factors (n = 19,296):

The average number of acute care admissions per year and the mean number of days per admission differed by the key variables such as CN care combinations, relationship type, and whether the client received VHC.

- CN clients receiving personal care only appeared to have fewer acute care admissions per year than those receiving clinical care only, or combined care. However, clients receiving clinical care, or clinical care in combination with personal care spent fewer days per admission in hospital.
- Veterans had more acute admissions per year, although the length of stay was lower than for Partners.
- Compared to CN clients who did not receive VHC services, CN clients who received VHC service had slightly more hospitalisations per year and had similar number of days per admission.

Predictors of acute care hospitalisation (n = 19,976):

- Increased age at first CN service was not predictive of an acute care hospitalisation.
- Medical burden was a predictive factor: each one unit increase in the RxRisk Index score was associated with a 14% increased risk of acute care hospitalisation. However, dementia was not predictive of the outcome.
- Being a Partner was a protective factor against acute care hospitalisation.
- Clients who received the CN program in combination with VHC services were at a higher risk of hospitalisation than clients who received CN only.
- Clients who received more clinical care visits and more personal care visits were at a lower risk of hospitalisation than clients who received less clinical care and less personal care visits, respectively.

3) Outcome: Fall-related hospitalisation

There were 2,218 CN clients identified with hospitalisations due to falls. The monitoring time was between two time points: time from the first CN service and time to the first fall-related hospitalisation). Median time to fall-related hospitalisation did not differ greatly across clients and service types.

Predictors of time to hospitalisation due to fall-related injury:

- Factors associated with an increased rate of fall-related hospitalisation were older age, greater medical burden and dementia.
- Factors associated with a reduction in the rate of fall-related hospitalisation were receiving VHC service in addition to CN, and a higher total number of clinical care visits. There was no protective effect of personal care against fall-related hospitalisation.

4) Outcome: Potentially Preventable Hospitalisations (PPH)

Overall, there were 19,431 CN clients with hospital admissions data that were available for the period between their first CN service, and last date recorded in the study. PPH rates per 100,000 were calculated and compared with national rates for adults aged 65 and older. They were found to be much lower than the national rates in all three categories: vaccine preventable, acute conditions and chronic conditions. There were a number of considerations when interpreting these figures that may explain these differences. Of the 161 conditions that were included in the calculation of PPH, only 10 were present in the data that met criteria for calculation of PPH. This was likely due to the relatively small number of client admission data available for analysis. PPH was typically calculated by including state and nation-wide populations (stratified by age), which are much larger than the sample available for CN program recipients. Therefore, the results should be interpreted with caution. Given this limitation, no further investigation between Veterans and Partners, and other CN factors was conducted.

[9] Different sampling frames were used tailored to different focus of analysis. See Part B. RQ 1.2 section for further details.

RQ1.3. Are CN services associated with prescription medication usage?

Outcome: Prescription medication usage
There were 16,445 CN clients with medication data available. The median number of medications dispensed per each CN client per year was 10.

In total, there were 7,537 CN clients taking medications listed as inappropriate (or avoid) medications using *Beers Criteria® avoid medications*. The median number of avoid medications taken by CN clients was 1. The maximum number of medications taken by CN clients that were considered as inappropriate was 5.

There were no differences in the mean number of Beers Criteria® avoid medications taken by Veterans or Partners.

Clients receiving the combined CN and VHC services had statistically significantly more Beers Criteria® avoid medications than those receiving CN service only. There was no significant difference in the number of Beers Criteria® avoid medications between CN clients with and without dementia.

Research Question 2: Generic protective factors for community clients and health care utilization (RQ2)

RQ2. Are there generic protective factors that arise from receiving care in the home or that relate to the cohort of clients that receive DVA funded CN services? How are these different to / how do they interact with any protective factors that are specific to CN services?

RQ2.1. What are the characteristics of clients accessing the CN program, and how do they differ from DVA clients not receiving the CN program?[10]

Outcome: Characteristics of CN clients (Combined CN and VHC services) vs VHC clients (VHC services only)

- A number of differences existed between clients receiving both CN and VHC services, and VHC services only. Clients who received combined CN and VHC services accessed the service later by approximately 3.5 years than those who did not receive CN services. The distribution across age groups illustrates this further. For clients who received both CN and VHC services, 81% received their first VHC services from 80 years of age and over, whilst for clients who received VHC services only, 60% received their first CN services from 80 years of age and over. Compared to Partners, Veterans were also less likely to use combined CN and VHC services. Compared to Partners, Veterans were less likely to use combined CN and VHC services (43%). Just under 50% of Veterans used VHC services.
- Medical burden within six months of first CN/VHC service was similar between CN & VHC services combined and VHC services only, with medians of 6 and 5, respectively on the RxRisk Index.
- The two groups were similarly distributed across the different geographical areas of Australia. The majority of clients in both groups (approximately 54%) resided in major cities of Australia, with decreased proportions living in inner regional, outer regional, remote, and very remote Australia (respectively).
- Clients who used both CN and VHC services had higher rates of reported dementia (20%) than those who only accessed VHC services (12%).
- The rates of mental health treatment within the past 5.5 years were very similar between groups: 42% of clients who received both CN and VHC services, and 43% of clients who received VHC services only.

RQ2.2. Are CN services associated with healthcare utilisation?

Allied Health (AH) Service Characteristics
Seventeen different services used by 15,258 CN clients were identified and included in this study. Top five most frequently used AH services were physiotherapy, podiatry, occupational therapy, dental and exercise physiologist. The median number of AH service sessions used by each client was 3.

Outcome: CN client and service factors associated with AH usage (AH service sessions)
The clients who used AH service (n = 12,460) included in the model) had a median of 24 times during their monitoring period. Nearly half of those AH service users died prior to entering permanent RAC, with lower

[10] Two groups (VHC only group and combined CN and VHC group) are examined in this question. Detailed comparisons between the three groups (CN only, combined CN and VHC and VHC only) are presented earlier in the overall client characteristics section (p.6).

portions eventually entering permanent RAC (35%) or remaining at home throughout the monitoring period (17%).

CN client factors:

- Increased age at first CN service was associated with reduced use of AH service sessions: for every ten years increase in age at first service, the average total number of AH service sessions used by clients reduced by approximately 1.7.
- Increased medical burden was associated with increased AH service usage: for every one point increase in the RxRisk index, clients used approximately 0.5 more AH service sessions.
- Clients with dementia used 1.9 fewer AH service sessions.
- Compared to Veterans, Partners used approximately 2.6 more AH service sessions over the course of their monitoring period.

CN service factors played the greatest role in predicting the use of AH service:

- Receiving both CN and VHC services during the monitoring period was associated with higher AH service use: clients receiving both services used approximately 9.2 sessions more of AH services than clients who only received CN services.
- The number of CN clinical services was most predictive of the number of AH service sessions used over time. For each extra month of CN clinical services, clients used approximately 0.7 additional AH service sessions. Clients who received CN services for 2 years continuously would have received, on average, 16 AH service sessions and those who received CN services for five years continuously would have received 40 AH service sessions.
- The number of personal care services used was also strongly predictive of increased AH service usage. For each additional month of personal care services, CN clients used an additional 0.4 AH service sessions. CN clients who received continuous personal care services for two years received 10 AH service sessions, while clients who received five years of continuous personal care services would have received 26 AH service sessions.

Research Question 3: Trajectory of Community Nursing Program Clients

RQ3: How does the trajectory from receiving care at home to moving to residential aged care differ between clients who receive CN services at varying degrees, those that don't receive CN services and an age/gender matched sample of the general population?

RQ3.1. What are the differences at entry to permanent residential care or death between clients who receive CN services, and clients who do not receive CN services?

Outcome: Differences between clients receiving CN and VHC services or VHC services only

Data on DVA clients who received either combined CN and VHC services, or VHC services only, and were admitted to permanent RAC (n = 4,723 for combined CN & VHC; n = 2,960 for VHC only) or died at home (n = 5,979 for combined CN & VHC; n = 3,756 for VHC only) were examined.

Compared to those who received combined CN and VHC services, clients who received VHC services only entered permanent RAC or died at home at an earlier age. Those clients who received VHC only prior to RAC admission had the same medical burden as their counterparts and was slightly lower in VHC only compared to CN & VHC clients for death at home.

Clients with permanent RAC entry: There were small differences found between clients who received CN and VHC services and those who received VHC services only.

- Based on the median age of entry, clients who received both CN and VHC services were six months older than clients who received VHC services only.
- In terms of medical burden, the median medical burden of both CN & VHC and VHC clients was 5.
- The rates of dementia slightly differed between groups at entry to permanent RAC (35% for the CN & VHC group and 34% for the VHC only group).
- Clients who received both CN and VHC services prior to entering permanent RAC had higher rates of mental health treatment usage in the past 5.5 years, with 43% receiving treatment, compared with 37% of clients who only received VHC services.

Clients who died at home: Some differences were found between clients who received CN and VHC services, as opposed to clients who receive VHC services only.

- Clients who received both CN and VHC services were slightly older when they died, based on the median age at death, approximately seven months older than clients who received VHC services only.
- Medical burden was slightly higher in clients who received CN and VHC combined, with median RxRisk Index of 6.
- Rates of dementia differed between the two groups, with clients who received both CN and VHC services having higher rates of dementia (14%) than clients receiving VHC only (11%).
- Clients who received both CN and VHC services also had higher rates (42%) of mental health treatment in the past 5.5 years than those who received only VHC services (38%).

RQ3.2. What are the differences in independence and age at entry to permanent residential care between the general population and DVA clients?

1) Sample comparisons

Of the matched sample of 20,980 Home Care Package (HCP) recipients (i.e., general population or non-DVA clients), 2,146 (10%) had dementia and 3,531 (17%) were receiving HCP care levels 3-4 (highly dependent). The median age at first HCP service was 88 years and 11,863 (57%) were female. The general population data for HCPs was well matched to the CN data, with age at first service, gender, and medical burden similar between groups. The crude median for age at entry to permanent RAC differed between groups (HCP and CN), with CN clients being approximately three years older when entering into permanent RAC.

2) Outcome: Time to admission to permanent RAC and death

The number of HCP and CN clients at each event (RAC entry, death at home and no/neither event) and the duration of each event were examined.

- The largest differences between groups were seen in the rate of death at home prior to permanent RAC placement. Whilst HCP recipients were much more likely to enter permanent RAC (56% of HCP clients compared to 26% of CN clients), CN clients were much more likely to die at home (41% of CN clients compared to 26% of HCP clients) when compared over the same period. Coupled with the later age of entry into permanent RAC based on the median estimates, this suggests that CN clients are able to remain at home long enough that permanent RAC admission occurs in the minority of clients.
- While HCP clients stayed at home for 14 months prior to RAC admission or death at home, CN clients remained at home for 28 months before RAC admission and an average of 16 months before death.
- Clients with dementia were much more likely to enter RAC and much sooner than those without dementia. CN clients with dementia remained at home prior to RAC admission markedly longer than HCP clients with dementia (averages of 26 months and 12 months respectively).

The cumulative incidence of entry into permanent RAC and the competing risk of death differed markedly between HCP and CN clients.

- HCP Cohort: At five years after first access to HCP, 58% of HCP clients had entered RAC and 26% had died before entering RAC. The median time to RAC entry for the HCP cohort (the point at which 50% of people accessed RAC) was about 39 months (1,185 days).
- CN Cohort: At five years after first access to a CN service, 27% of DVA clients had entered RAC and 41% had died at home before entering RAC. The same median time to RAC entry for the CN cohort could not be determined due to the fact the point at which 50% of people accessed RAC went well beyond five years (in fact, it was well beyond 60 months).
- The cumulative incidence of entry into RAC markedly differed between clients with and without dementia. At five years after first access to their respective services, 76% of HCP clients with dementia (vs 56% without dementia) and 50% of CN clients with dementia (vs 21% without dementia) had entered permanent RAC; 18% of HCP clients with dementia (vs 27% without dementia) and 28% of CN clients with dementia (vs 45% without dementia) had died before entering RAC. The median time to permanent RAC entry was about 18 months for the HCP cohort with dementia, and about 57 months for the CN cohort with dementia.

Notably, the cumulative incidence of death at home does not include those who entered permanent RAC and died subsequently at the care home. Having a higher incidence of death at home (as shown in the case of the CN cohort) does not suggest there is a higher mortality among CN clients. It simply suggests that, as most CN clients are able to remain at home longer than HCP clients, they are more likely to die at home than their counterparts.

Phase 2 qualitative study

Interview participants and their experience with the CN program
A total of 16 participants completed a brief survey and an interview. The mean age of the participants was 82 years, with most of them residing in major cities and living with their family carers or other people. Six participants reported of having mental health conditions, five having cancer and two having dementia.

Only three participants were current recipients of DVA CN services at the time of the interview and 15 participants were currently receiving other services such as VHC, travel for treatment, Healthy Heart & Healthy Mind Sessions, or Coordinated Veterans' Care, all via DVA, as well as HCP, CHSP rehabilitation and other assistance with housework.

Most participants expressed ***overall satisfaction with DVA***. They described feeling that they were very well supported as the DVA staff genuinely listened when they had issues, were compassionate, and were determined to remedy the situation. When asked specifically about the Community Nursing (CN) program, half were very positive about the service provided, the quality of the nursing care and the nurses themselves, described as competent, dedicated and knowledgeable. They understood that CN services could be time limited (depending on the clinical assessment) and were for specific purposes that enabled them to stay home. Most participants commented on the quality of the clinical care as well as the ***emotional and social support*** that the nurses were providing. This included the level of professionalism that the nurses brought to the participants which ensured that they were treated in a dignified manner that helped the participant feel more relaxed.

Reference group consultations
In addition to the interviews with CN clients, two consultations were held, one with five managers and the other with four clinicians. Five DVA CN service providers were involved representing five states (WA, VIC, WA, NSW, and SA). They included for-profit, not-for-profit and public services and provided services in rural, regional and metropolitan areas. Most of the participating providers delivered both mainstream aged care services (i.e., HCPs and CHSP) and DVA services. The aim was to explore and understand contextual issues associated with the delivery of the CN program for DVA members (e.g., referral and entry to the CN program processes, assessment processes, interface with My Aged Care, GP and hospital services, communication pathways, etc.).

Phase 2 study research question: How does the CN program contribute towards clients remaining at home and maintaining their independence?

Key themes from the interviews offer a broad understanding into the factors that contribute to CN clients' ability to remain at home and maintain their independence. Pertinent information from the consultations is summarised in boxes below, as it provided additional insights into the interpretation of the client perspectives.

Interview participants' ***determination to remain independent was a key value for many***. Several participants reported that although they knew CN services were available, they did not utilise them, which seemed to indicate a reluctance to 'waste' available services if they could manage without them. These participants preferred to live independently as much as possible without formal support, but also recognised that sometimes it is better to accept assistance in order to regain independence for the future.

Support from family members was also identified as important for some participants, and a key part of their strategy for being able to remain at home, rather than moving into a care home. These participants were very accepting of the CN service for specialised nursing care but determined to rely on family members for some aspects of personal care.

Reference Group Observations
Older DVA clients tend to be more proud and wanting to stay home as long as possible to avoid admission into residential aged care. They also tended to make full use of their gold card and maximise services in their home. ***A sense of entitlement is common with DVA clients*** who feel they have earned the right to have access to the DVA services they are receiving. They are very confident about using the services, but usually not aware of the costs involved.

Compared to non-DVA clients (e.g., HCP clients), ***DVA clients tend to remain at home longer and die at home***. Some are admitted to residential aged care later and die in the RAC home. Support at home for DVA clients for longer in their community is possible due to excellent DVA service cover and funding.

Timely support tailored to their specific needs was seen as particularly important for participants. Many were referred to the CN program on discharge from hospital (8 out of 16) or referred by a GP (3 out of 16). The timely availability of the CN service meant they could leave hospital earlier and avoid admission to an alternative care facility, or avoid a hospital admission altogether. These CN visits were typically time-limited and focused on wound care (often complex), medication management, bandaging, injections and general assessment. Participants valued the CN service, many stating they would not have been able to go home or remain at home without this service, meaning they would have either had to remain in hospital longer or potentially be placed in residential care.

Reference Group observations
Timely service response and service durations tailored to individual clients' needs: Time between assessment (or referral) to the provision of CN services is immediate or a few days depending on staff availability. Most clients need ongoing support, unless it is for a clinical need that has been resolved (e.g., wound care, eye drops, etc.) then they are "discharged" after no face-to-face visit for 28 days. Most services are personal care, medication administration, insulin and diabetes management, catheter care, wound care and wellbeing checks. Sometimes short-term care becomes long term as the nursing assessment would pick up other needs. Some CN providers have a community dementia nurse to facilitate the provision of care, support the family, provide information, utilise a multidisciplinary/holistic approach.

Compared to HCP clients, DVA clients tend to receive services in a ***more timely manner*** (and regular nursing or clinical assessment), so their health has not deteriorated as much as people waiting for HCP particularly if they have complex clinical needs. HCP requires an assessment by an independent assessment team (Regional Assessment Service or Aged Care Assessment team) before the service provider sees their client and the time lag between the assessment and the HCP service provision can be lengthy. DVA clients also do not have the limitations of funding running out compared to HCPs.

Continuity of care was highly valued by the participants, as many commented on the value of having ***the same nurse come for the period of time*** which was especially important for participants with cognitive impairments who would struggle with changing staff or with fears of exposure to the COVID-19 virus. Several participants also discussed ***the value of social and emotional support*** provided by the nurses either alongside or in addition to physical care/clinical skills.

Reference Group observations
Care plan and reviews: Once referral is received and approved, a registered nurse (RN) from the CN program conducts a ***comprehensive assessment*** during a first home visit. Notably, the first contact after referral is approved is usually done within a few days. Following the assessment, the RN develops a plan of care and required services with the client and their family (or carer) if appropriate. The RN may organise further referrals if necessary and send a letter to the GP so that the GP has information about the CN services the client is receiving. For further services that are not within the service scope, the RN refers the client back to the health professional who made the initial referral (e.g., GP) or speaks to the health professional (e.g., allied health) directly.

Once admitted, CN clients are required to be seen once every 28 days by a clinician (registered or enrolled nurse, (EN)) and every three months by an RN if they have complex clinical care needs, for example, catheter or ongoing wound care. Whilst the CN program does not include case management services, clients receive an ongoing care plan review every month, and changes to the plan may be recommended and implemented by an RN. If the need is for services outside the scope of DVA services, the client may be referred to My Aged Care.

Staffing levels and a lack of continuity were seen as major issues. Some participants reported that there were gaps in the continuity of care by the community nursing service. Despite their preference for having the same nurse, or at least the same small number of nurses visit them, casual nursing (?)staff were sent to their homes, especially during the weekends. Casual staff were seen as less well trained and less informed about the participant's needs than the regular community nurses. The participants described this as being potentially disruptive for the person requiring care as an individual may have complex needs and these are better served with consistent staff.

Reference Group observations
Workforce issues: The DVA CN program facilitates engagement of clinical and care teams, which is helpful for ensuring clients' needs are met. It is a good strategy for assessments and care plans to be done by RNs (as with the CN Program; in HCP, this is done by case managers who may not be RNs and clinical needs are sometimes overlooked. Staff shortages are common, but particularly so in community programs. The majority of community staff are casual employees.

Clear CN career paths are important, but also flexibility in work hours. DVA CNs have a minimum requirement of 3 years community experience. This is seen as a positive aspect, but also sometimes a challenge due to recruitment issues.

Participants reported that access to the CN program was limited in scope in that the visits **focused *mainly, or only, on the task identified in the original referral***, for example, wound care. Most participants were discharged from the CN service when the identified improvement was completed, but participants knew they could access the service again if in need, which gave them a level of security about the future. All participants receiving these ***time-limited services*** rated them very highly, ***appreciated the efficiency and expertise of CNs***, and stated they could not have managed at home without this support.

Despite predominately positive experiences relating to the CN service, there were some reports from participants who felt frustrated with ***a lack of flexibility*** when it came to requesting assistance that fell outside of the original referral, ordering consumables or changing visiting times.

Reference Group observations
Choice and flexibility: Clients' needs can be catered for flexibly, and services can be scaled up or down depending on the complexity of each client's needs. Clients can choose what service they want and how often; however, there are certain limitations (e.g., social support is not provided under the CN program). DVA CN clients can concurrently receive HCP if the CN program alone cannot meet the client's needs (e.g., for social aspects not funded by DVA).

Whilst DVA does not have a Consumer Directed Care (CDC) model, as in My Aged Care, clients tend to choose traditional services that DVA offers as there is no co-payment through DVA services. Gold Card holder entitlement is uncapped within the scope of the CN program unlike the My Aged Care options (CHSP and HCP).

CDC has limitations as clients do not always understand their own clinical needs. With HCP, people may spend resources on services that may not be very important in their case, but lack understanding of the importance for them, for instance, of medication prompting. The DVA CN program is perceived to be better as clients usually take clinical advice related to what is needed.

Some participants received CN services for personal care such as showering, and one was receiving CN visits three times every day. Carer participants spoke of the consuming nature of caring for a loved one at home. For those needing ***intensive, multiple visits per day/week***, it was clear that they would not be able to keep their family member at home without the CN support. The flexibility to quickly increase the number of daily visits enabled participants to remain at home with their families despite very significant and complex care needs.

Reference Group observations
Intensive DVA CN care provision: Many CN clients receive more than one visit per day, and a few with exceptional case funding for even more frequent or longer care hours. If a client's clinical needs exceed 3 visits per day they can apply for 'exceptional case funding' which could, for example, cover up to 12 hours overnight funding. Whilst there is no set policy on 24/7 care, if a client has 24/7 care needs RAC is advised. It is highly unusual to discharge clients from VHC but they could be discharged from the CN program and then re-admitted later if needed. For high needs, complex clients, case management can be arranged through other DVA program. Overall, complex care needs can be better managed and funded through the DVA CN program rather than through HCP which does not always support expensive care needs for many chronic and complex conditions.

Awareness of DVA services: Many participants reported not knowing how the DVA worked with regards to outsourcing health care and were unaware of the range of services available through DVA. As a result, several participants reported that they had been provided with services from non-DVA organisations and

were surprised to discover that the DVA was indeed funding them. Some participants were unaware of what services they could obtain from the community nurses and the DVA more broadly. As a result, they had sought additional services through other funding bodies such as the NDIS and My Aged Care. One participant recalled having CN visits after a shoulder injury several years ago, which she found very helpful and stated that she may not have been able to stay at home without these visits. However, she did not access the service following subsequent significant health issues including hip surgery, knee surgery and spinal surgery. She had three weeks in a rehabilitation facility following the spinal surgery, but no follow up CN visits were suggested, nor did she or her family request them. She was cared for by her family during the recovery period.

Reference Group observations

Most people with a DVA Gold Card inform their GP they have the card, and most GPs understand DVA Gold Card benefits for clients and DVA service providers. However, ***DVA services can be complex*** for many clients to fully understand. Nevertheless, most clients prefer DVA funded services for simplicity and familiarity. DVA clients are not required to go through Medicare and Centrelink's income tested fee, which is required for My Aged Care options (e.g., HCP). In exceptional circumstances, a client could be allowed both a high-level HCP and DVA CN services as long as the care/services are not duplicative.

Referrals for CN services come from a variety of sources and mostly come from hospitals (via the patient discharge process) and GPs. Hospital referrals are only valid for 7 days, so providers contact GPs for an ongoing referral. There are some 'informal referrals' from allied health and in these cases providers will contact the client's GP and request a D904 referral. Family members may contact DVA CN service providers/managers and request a referral and they are then advised to contact the client's GP for a 'D904' referral. However, CN service providers can provide clients with contact details for VHC services if these services are deemed necessary.

Summary of findings

Research Question 1: What are the protective factors of the CN program that contribute to clients entering residential aged care (RAC) at an older age, or remaining at home until death?

1) Permanent RAC admission (RQ1.1)
In the first 18 months after their first CN service, factors associated with a reduced risk of entering permanent RAC were: being a Veteran (compared to Partner), having a lower medical burden, accessing the CN service at an earlier age, being without dementia, having episodic service delivery, receiving combined clinical and personal care and receiving the majority of care from CNCs or RNs (compared to other nursing categories or PCWs).

Similarly, after the first 18 months protective factors against entering permanent RAC were: being a Veteran, accessing the CN service at an earlier age, being without dementia, not receiving VHC service, having episodic service delivery, not living alone, receiving clinical care only and receiving the majority of care from ENs or RNs compared to PCW.

2) Death at home (RQ1.1)
Factors associated with a reduced risk of death at home were: being a Partner (compared to Veteran), having a low medical burden, living in a major city (compared to very remote Australia), entering the service at a younger age, having dementia, receiving VHC service as well as the CN service, episodic service delivery, not having a carer, living alone, receiving clinical care services only or combined services of personal and clinical care (compared to clients who received personal care services only) and receiving the CN service from PCWs (compared to the other CN staff: ENs, RNS or CNC).

3) Predictors of acute care hospitalisation (RQ1.2)
- Increased age at first CN service was not predictive of an acute care hospitalisation.
- Medical burden was a predictive factor: each one unit increase in the RxRisk Index score was associated with a 14% increased risk of acute care hospitalisation. However, dementia was not predictive of the outcome.
- Being a Partner was a protective factor against acute care hospitalisation.
- Clients who received the CN program in combination with VHC services were at a higher risk of hospitalisation than clients who received CN only.
- Clients who received more clinical care visits and more personal care visits were at a lower risk of hospitalisation than clients who received less clinical care and less personal care visits, respectively.

4) Predictors of time to fall-related hospitalisation (RQ1.2)
- Factors associated with an increased rate of fall-related hospitalisation were older age, greater medical burden and dementia.
- Factors associated with a reduction in the rate of fall-related hospitalisation were receiving VHC service in addition to CN, and a higher total number of clinical care visits. There was no protective effect of personal care against fall-related hospitalisation.

5) CN services and association with prescription medication usage (RQ1.3)
- In total, there were 7,537 CN clients taking medications listed as inappropriate (or avoid) medications using Beers Criteria® avoid medications. The median number of avoid medications taken by CN clients was 1 and the maximum was 5.
- Clients receiving the combined CN and VHC services had statistically significantly more Beers Criteria® avoid medications than those receiving CN service only.

Research Question 2: Are there generic protective factors that arise from receiving care in the home or that relate to the cohort of clients that receive DVA funded CN services? How are these different to / how do they interact with any protective factors that are specific to CN services?

1) Difference between VHC only clients and combined CN and VHC clients (RQ2.1)
- Clients who received combined CN and VHC services accessed the service later by approximately 3.5 years than those who did not receive CN services.

- Compared to Partners, Veterans were less likely to use combined CN and VHC services (43%). Just under 50% of Veterans used VHC services.
- Medical burden within six months of first CN/VHC service was similar between CN & VHC services combined and VHC services only, with medians of 6 and 5, respectively on the RxRisk Index.
- Both groups were similarly distributed across the different geographical areas of Australia. The majority of clients in both groups (approximately 54%) resided in major cities of Australia, with decreased proportions living in inner regional, outer regional, remote, and very remote Australia (respectively).
- Clients who used both CN and VHC services had higher rates of dementia (20%) than those who only accessed VHC services (12%).
- The rates of mental health treatment within the past 5.5 years were very similar between groups: 42% of clients who received both CN and VHC services, and 43% of clients who received VHC services only.

2) CN client and service factors associated with Allied Health (AH) usage (RQ2.2)

CN client factors:

- Increased age at first CN service was associated with reduced use of AH service sessions: for every ten years increase in age at first service, the average total number of AH service sessions used by clients reduced by approximately 1.7.
- Increased medical burden was associated with increased AH service usage: for every one point increase in the RxRisk index, clients used approximately 0.5 more AH service sessions.
- Clients with dementia used 1.9 fewer AH service sessions.
- Compared to Veterans, Partners used approximately 2.6 more AH service sessions over the course of their monitoring period.

CN service factors played the greatest role in predicting the use of AH services:

- Receiving both CN and VHC services during the monitoring period was associated with higher AH service use: clients receiving both services used approximately 9.2 sessions more of AH services than clients who only received CN services.
- The number of CN clinical services was most predictive of the number of AH service sessions used over time: for each extra month of CN clinical services, clients used approximately 0.7 additional AH service sessions.
- The number of personal care services used was also strongly predictive of increased AH service usage. For each additional month of personal care services, CN clients used an additional 0.4 AH service sessions.

Research Question 3: How does the trajectory from receiving care at home to moving to residential aged care differ between clients who receive CN services at varying degrees (i.e. combined CN and VHC services), those that don't receive CN services (VHC services only) and an age/gender matched sample of the general population?

1) Differences between clients receiving combined CN and VHC services and VHC services only (RQ3.1)

Clients with permanent RAC entry:

- Based on the median age of entry, clients who received both CN and VHC services were six months older than clients who received VHC services only.
- In terms of medical burden, the median medical burden of both CN & VHC and VHC clients was 5.
- The rates of dementia slightly differed between groups at entry to permanent RAC (35% for the CN & VHC group and 34% for the VHC only group).
- Clients who received both CN and VHC services prior to entering permanent RAC had higher rates of mental health treatment usage in the past 5.5 years, with 43% receiving treatment, compared with 37% of clients who only received VHC services.

Clients who died at home:

- Clients who received both CN and VHC services were slightly older when they died, approximately seven months older than clients who received VHC services only.
- Medical burden was slightly higher in clients who received CN and VHC combined, with median RxRisk Index of 6.
- Rates of dementia differed between the two groups, with clients who received both CN and VHC services having higher rates of dementia (14%) than clients receiving VHC only (11%).

- Clients who received both CN and VHC services also had higher rates (42%) of mental health treatment in the past 5.5 years than those who received only VHC services (38%).

2) Differences between the general population and DVA clients (RQ3.2)

- Whilst HCP ('general population' recipients were much more likely to enter permanent RAC (56% of HCP clients vs 26% of CN clients), CN clients were much more likely to die at home (41% of CN clients vs 26% of HCP clients). Coupled with a later age of entry into permanent RAC, this suggests that CN clients are able to remain at home long enough that permanent RAC admission occurs in the minority of clients.
- While HCP clients stayed at home for 14 months prior to RAC admission or death at home, CN clients remained at home for 28 months before RAC admission and an average of 16 months before death.
- Clients with dementia were much more likely to enter RAC and much sooner than those without dementia. CN clients with dementia remained at home prior to RAC admission markedly longer than HCP clients with dementia (26 months and 12 months respectively).
- The cumulative incidence of entry into RAC and the competing risk of death showed marked difference between HCP and CN clients.
  - At five years after first access to HCP, 58% of HCP clients had entered RAC and 26% had died before entering RAC. The median time to RAC entry for the HCP cohort was about 39 months.
  - At five years after first access to a CN service, 27% of DVA clients had entered RAC and 41% had died at home before entering RAC. The median time to RAC entry for the CN cohort went well beyond five years (over 60 months).

Research Question 4: How does the CN program contribute towards clients remaining at home and maintaining their independence?

The interview findings suggest a number of key factors contributing to CN clients' ability to remain at home and maintain their independence. Many participants stated that without the CN service, they would have either had to remain in hospital longer or potentially be placed in residential care. The contributing factors include: clients' ***determination to remain independent*** and ***having support from family members***, ***timely support tailored to clients' specific needs*** and ***continuity of care***, especially having *the same nurse come for the period of time* which was particularly important for clients with cognitive impairments who would struggle with changing staff or with fears of exposure to the COVID-19 virus. ***Social and emotional support*** provided by the nurses either alongside or in addition to physical care/clinical skills was also a contributing factor.

Whilst access to the CN program was often limited in scope as the visits **focused *mainly, or only, on the task identified in the original referral***, which meant most were discharged from the CN service when the identified task or clinical care was completed, participants knew they could access the service again if in need, which gave them a level of security about the future. Such ***time-limited services were appreciated for the efficiency and expertise of nurses***. For those needing ***intensive, multiple visits per day/week***, it was clear that they would not be able to keep their family member at home without the CN support. The ***flexibility to quickly increase the number of daily visits enabled participants to remain at home*** despite very significant and complex care needs.

Consultations with CN service providers echoed the clients' perspectives on the contributing factors to their ability to remain at home and maintain independence. The consultations suggested that compared to non-DVA clients (e.g., HCP clients), ***DVA clients tend to remain at home longer and die at home***, largely because support at home for DVA clients for longer in their community is possible due to ***excellent service cover and funding***. Such uncapped funding through DVA gives ***clients confidence in their ability to remain at home*** as long as possible and to plan for that future accordingly. In addition, CN service providers suggest that ***a timely and comprehensive assessment (offered almost immediately after a referral) and ongoing care plan and reviews by a RN*** play a crucial role.

Conclusion

The ultimate goal of the DVA CN program is to help clients maintain independence and remain at home as long and as well as possible, preferably until death or entry into residential aged care. A sound understanding of the relationship between the characteristics of CN clients and services and primary outcomes, such as time to permanent RAC admission or death at home, is crucial to further planning and enhancement of DVA client services and home-based support programs for older people. This better understanding can inform better service provision and improve policy development. Our mixed methods research examined the relationship between the delivery of CN services and primary outcomes. The use of a

comparator group from the general population (i.e., HCP clients) has provided context for benchmarking the effects of receiving CN services and how they relate to primary outcomes.

Our findings provide timely insights into how the delivery of home care services may facilitate the primary outcomes, the relationship between the characteristics of DVA CN services and time to first permanent residential aged care admission or death at home. The findings of RQ3 in particular provide much needed evidence, demonstrating that DVA CN clients are remaining at home considerably longer than HCP clients. DVA's uncapped support for DVA clients is likely to be much more expensive than providing support for non-DVA clients through HCP. However, it is important to also consider the longer term cost associated with caring for people in RAC. The findings signal the need for further consideration of the benefits of accessing CN services as well as economic evaluation of the CN program compared to HCPs.

PART B: PHASE 1 QUANTITATIVE STUDY

Data Acquisition and Cleaning

This section provides a summary of the initial data acquisition and cleaning processes as well as key client and service characteristics that offers the context to and rationale for data analyses and interpretation of the Phase 1 study.

Data request and transfer

For the purpose of the project, the research team requested data for all clients who received their first Community Nursing (CN) program service and other DVA supported home care services in the form of Veterans' Home Care (VHC) from 2010 to 2014. Data current to end-2019 were requested to enable a minimum of five years trajectory for each client. Data were received from the Department on 14th May 2021 (referred to as the *initial dataset*), through a secure transfer process.

Table 1 below describes the number of clients included in the initial dataset: the total number of clients who received both the CN program only and CN and VHC program combined and the total number of clients who received VHC only.

Table 1. Total number of clients by DVA program included in the initial dataset

Program	Number Clients
CN/CN and VHC	81,124
VHC	35,613
Total	**116,737**

Data Cleansing

After an inspection of the initial dataset, 74,545 of 116,737 client records did not meet the project criteria; most of these clients had commenced VHC or CN services prior to 2010 (as opposed to their first VHC or CN service during 2010-2014). This was confirmed on May 25th by the Department. Subsequently, the data were re-processed by the research team.

Further filtering of cases that did not meet the study criteria was applied (of cases who were incorrectly marked as receiving CN and/or VHC services *after* permanent residential care entry), and clients with the 'Relationship Type Code' of Children (n=78 clients), '?' (n=1 client) and Parent (n=1 client). Table 2 shows the final set of cases that met the criteria for inclusion in the project, and the mean age for clients at their first CN or VHC service (respectively).

Table 2. Cases available for analysis for each program and program combination

Program	Age at First Service	Number Clients (%)
CN	83.6 (9.9)	8,078 (19.1)
CN and VHC	*85.0 (8.2)	19,236 (45.6)
VHC	78.7 (11.1)	14,878 (35.3)
Total		**42,192**

Notes: Statistics are mean (SD) and frequency (%). *Based on CN service as the project focuses on the CN program

Client Characteristics (Initial data)

Of the 42,192 clients included in the database the majority (n = 22,775, 54%) were female. Approximately one in ten clients were identified as having dementia (n = 4,812, 11.4%). The median age of entry to permanent residential aged care (RAC) was 90.7 years, with the middle 50% of clients entering permanent RAC between 87.6 and 93.4 years of age. The median time from clients' first CN service to entry to permanent RAC was 30 months, however there was considerable variation, with 50% of clients remaining at home between 14 and 49 months before being admitted to permanent RAC. For clients receiving only VHC services, the median number of months at home before admission to permanent RAC was 41 months. As with the number of months from first VHC service to permanent RAC, there was variability between clients receiving VHC services and the amount of time to permanent RAC admission. For 50% of clients receiving

VHC services, this varied between 23 and 62 months. The median age at death was 90.8 years. For 50% of clients, age at death was between 86.8 and 94.0 years of age.

Veterans and Partners sub-groups

After an exploration of the data, Veterans and Partners (i.e., a count of De facto and Spouse clients) were identified as distinct groups as they differed substantially with respect to gender, with the Veterans' group being almost entirely male (98.0%) and the Partners' group being almost entirely female (99.2%). They also differed in CN and VHC service usage (see Table 7). Increasing age and female gender (i.e., Partners in this project) are known risk factors for permanent RAC placement, and therefore descriptive results are presented for each of these client groups. In addition, the modelling has accounted for differences between these groups.

As illustrated in Tables 3 and 4, a large proportion of Veterans who accessed CN and VHC services were younger than 80 years old (31.0% of Veterans versus 12.9% of Partners who used CN services; 42.3% of Veterans versus 21.8% for Partners who used VHC services). The differences between Partners and Veterans regarding age at first service are likely to be due to differing eligibility criteria to receive CN and VHC services.[11]

Table 3. Age at first CN service for Veterans and Partners

Age Group	Veterans (n=12,094) (%)	Partners (n=15,196) (%)	Total (n=27,290) (%)
40-49	70 (0.6)	4 (<0.1)	74 (0.3)
50-59	249 (2.1)	51 (0.3)	300 (1.1)
60-69	1,750 (14.5)	360 (2.4)	2,110 (7.7)
70-79	1,668 (13.8)	1,544 (10.2)	3,212 (11.8)
80-89	4,992 (41.3)	9,395 (61.8)	14,387 (52.7)
90-99	3,335 (27.6)	3,804 (25.0)	7,139 (26.2)
100+	30 (0.1)	38 (0.2)	68 (0.2)

Note: Statistics are frequency (%)

Table 4. Age at first VHC service for Veterans and Partners

Age Group	Veterans (n=15,668) (%)	Partners (n=18,378) (%)	Total (n=34,046) (%)
40-49	228 (1.5)	17 (<0.1)	245 (0.7)
50-59	486 (3.1)	153 (0.8)	639 (1.9)
60-69	3,366 (21.5)	948 (5.2)	4,314 (12.7)
70-79	2,538 (16.2)	2,891 (15.7)	5,429 (15.9)
80-89	6,339 (40.5)	1,1681 (63.6)	18,020 (53.0)
90-99	2,697 (17.2)	2,669 (14.5)	5,366 (15.8)
100+	14 (<0.1)	19 (0.1)	33 (<0.1)

Note: Statistics are frequency (%)

Medical burden

Medical burden was assessed for Veterans and Partners in the database by calculating the RxRisk (RxRisk-V) index, which is a measure for determining an individual's health condition based on their prescription medicine dispensing. The RxRisk-V was calculated according to Pratt et al. (2018),[12] who validated its use with data from the DVA claims data. The RxRisk-V uses medication claims data to construct an index based on dispensation of medications indicated for the treatment of 46 comorbidities. A list of comorbidities identified by the RxRisk-V was generated, and the frequency of comorbidities ranked in descending order to report the ten most prevalent medical comorbidities for Veterans and Partners in the database. See Tables 5 and 6.

Table 5. Ten most prevalent medical conditions overall (n = 42,192)

Rank	Condition	Frequency (%)	Rank	Condition	Frequency (%)
1	Congestive heart failure	21,631 (51)	6	Platelet disorders	12,877 (31)
2	Hypertension	18,481 (44)	7	Pain	11,815 (28)
3	GORD	18,478 (44)	8	Depression	10,875 (26)
4	Hyperlipidemia	17,610 (42)	9	Chronic airway diseases	8,199 (19)
5	Ischaemic heart disease	15,755 (37)	10	Coagulation disorders	7,452 (18)

Note: Statistics are frequency (%). GORD: Gastroesophageal reflux disease

[11] The entitled person must be a Gold Card holder or an eligible White Card holder to receive the CN program. A person who has a Veteran Gold Card may be a veteran or a veteran's widowed partner or a dependent.

[12] Pratt NL, Kerr M, Barratt JD, et al. (2018). The validity of the Rx-Risk Comorbidity Index using medicines mapped to the Anatomical Therapeutic Chemical (ATC) Classification System. BMJ Open 8:e021122.

Table 6. Five most prevalent medical conditions in Veterans and Partners

Rank	Veterans (n=19,776)	Frequency (%)	Partners (n=22,416)	Frequency (%)
1	Congestive heart failure	9,771 (49)	Congestive heart failure	11,831 (53)
2	*GORD	8,760 (44)	Hypertension	10,695 (48)
3	Hyperlipidemia	8,675 (44)	GORD	9,687 (43)
4	Hypertension	7,763 (39)	Ischaemic heart disease	9,301 (41)
5	Ischaemic heart disease	6,437 (33)	Hyperlipidemia	8,922 (40)

Note: Statistics are frequency (%)
*Gastroesophageal reflux disease (GORD)

Service use

The majority of DVA clients in the study received both CN and VHC services (45.6%), followed by VHC services only (35.3%) and CN services only (19.1%). Some differences existed between service usage of Veterans and Partners, with Partners more likely to be receiving both CN and VHC services than Veterans. Conversely, a slightly larger proportion of Veterans used only VHC services than Partners. Table 7 depicts the frequency and percentage of clients receiving each program and program combination.

Table 7. Number and proportion of clients receiving each program and program combination

Program Usage	Veterans (n=19,776) (%)	Partners (n=22,416) (%)
CN only	4,048 (20.5)	4,030 (18.0)
CN and VHC	8,070 (40.8)	11,166 (49.8)
VHC only	7,658 (38.7)	7,220 (32.2)

Note: Statistics are frequency (%)

Service characteristics

CN Services

A total of 289 unique CN services were included in the dataset (complete list in Appendix A). Of the ten most billed services, six were clinical care services, three were personal care services, and one was for CN assessment. Table 8 displays the service name and frequency below.

Table 8. Ten Most Billed CN Services (n = 27,314 clients)

Rank	Service	Frequency (%)[a]
1	Clinical Care Add-On - 1 to 4 visits (Long: ≥21 minutes per visit)	65,503 (23.0)
2	Community Nursing Clinical Care Schedule - Technical (≥21 minutes per visit)	33,444 (11.8)
3	Community Nursing Clinical Care Schedule - Clinical Monitoring	28,606 (10.1)
4	Personal Care Core - 11 to 15 visits	27,050 (9.5)
5	Clinical Care Core - 1 to 4 visits (Long: ≥21 minutes per visit)	26,975 (9.5)
6	Personal Care Core - 25 to 30 visits	22,839 (8.1)
7	Community Nursing - Assessment	22,701 (8.0)
8	Community Nursing Personal Care Schedule (12 - 17 visits in a 28 day period)	21,733 (7.7)
9	Clinical Care Add-On - 1 to 4 visits (short: ≤20 minutes per visit)	17,561 (6.2)
10	Personal Care Core - 6 to 10 visits	17,390 (6.1)

Note: Statistics are frequency (%). [a]Percentages represent the proportion of ten most billed services, as opposed to all CN services

VHC Services

Seven unique items were included in the VHC database. The most frequently billed service was for domestic assistance, which represented over 80% of all VHC services delivered. Collectively, domestic assistance, personal care, and respite care in home accounted for 98% of all VHC services delivered. Further detail is provided in Table 9.

Table 9 VHC services, frequencies, and proportions of total VHC services used (n = 34,114 clients)

Service	Frequency (%)
Domestic Assistance	2,852,254 (81)
Personal Care	360,448 (10)
Respite Care - In Home	249,248 (7)
Home and Garden Maintenance	53,385 (1)
Unknown	767 (<1)
Respite Care - Emergency	228 (<1)
Social Assistance	86 (<1)

Note: Statistics are frequency (%).

Locations of CN Services

Geographical areas for each client with postcode data were defined using the Australian Statistical Geography Standard (ASGS) Volume 5 – Remoteness Structure (2016). Most CN services were delivered in Major Cities of Australia (35.2%), regardless of whether the recipient was a Veteran or a Partner. While most CN clients reside in major cities, Table 10 and Figure 1 show that CN services were delivered across all remoteness categories in Australia.

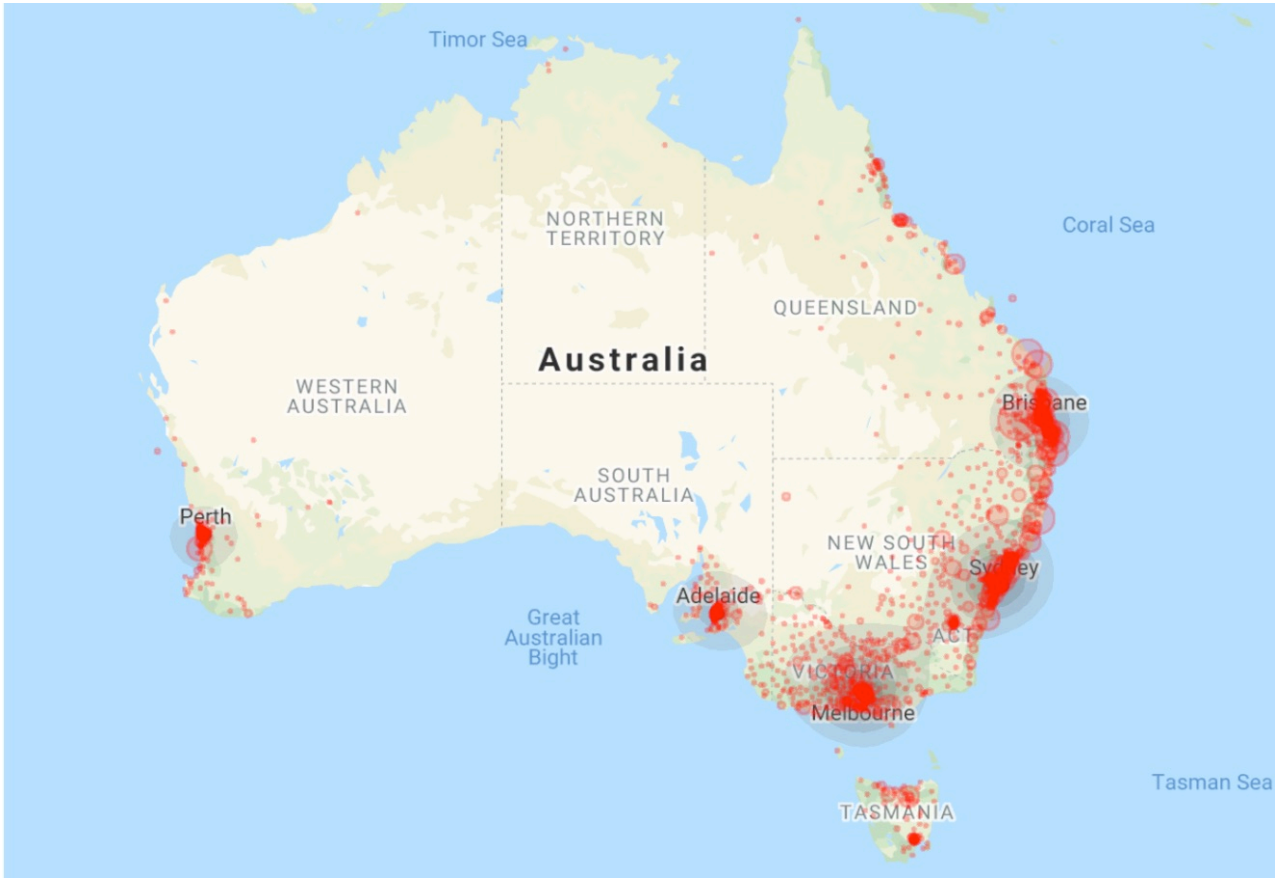
Table 10. Remoteness area classification for Veterans and Partners

Geographical Area	Veterans (n=19,776)	Partners (n=22,416)	Total (%)
Major Cities	6,490 (32.8)	8,376 (37.4)	14,866 (35.2)
Inner Regional	3,256 (16.5)	3,992 (17.8)	7,248 (17.2)
Outer Regional	2,032 (10.3)	2,458 (11.0)	4,490 (10.6)
Remote	186 (0.9)	224 (1.0)	410 (<1)
Very Remote	115 (0.6)	128 (0.6)	243 (<1)
Unknown	7,697 (38.9)	7,238 (32.3)	14,935 (35.4)

Note: Statistics are frequency (%).

Using a publicly available service, latitude and longitude coordinates were generated from postcode data and mapped across Australia. Figure 1 shows the results of this mapping, indicating the frequency of services delivered by postcode, and their locations across Australia.

Figure 1. A Heatmap of CN service locations



Data Preparation

CN Service categorisation

To investigate how different CN services, frequency of care, and service combinations influence the risk of permanent RAC admission, the 289 unique CN services were categorised into two main categories – personal care services, and clinical care services. Personal care services included 90 different CN services, while the clinical care service category included 100 different CN services. Other services categorised as Consumables, Palliative care, Support and Maintenance as well as Miscellaneous items were excluded in this study. From inspection of the services billed, it was determined that CN service items were differentiated primarily by the number of visits in a one month period, dependency level, and their inclusion under specific program divisions such as exceptional case care and three-times daily service intervals. While some services had additional information which specified the length of the visits, this information was not available for all services. Because the dependency level, number of visits per month and intensity of care were all interrelated, a new composite variable Care Level was created from these variables for clinical care services and personal care services, as shown in Table 11. Dependency level was thus incorporated into the Care Level variable that was used in modelling.

Table 11. Classification of CN care level based on service information

Care Level	Clinical Care Services	Personal Care Services
Level 1	<10 visits* Short Term Support General (low dependency) General Variation (low dependency) Technical ≤ 20 minutes	1-10 visits*
Level 2	10-30 visits* Technical ≥ 21 minutes	>10-30 visits* Daily
Level 3	>30 visits General (high dependency) Clinical Overnight Care Exceptional Case Unit – all levels All TDS** services	>30 visits Twice Daily Personal Overnight Care Exceptional Care Unit – all levels All TDS** services[a]

*Visit number categories are based on the DVA data classifications, hence the different categories: For Clinical care services visits are categorised as 1-4, 5-9, etc. visits, while for Personal care services they are categorised as 1-5, 6-10, etc. visits.
**TDS = Three times daily service schedule

Periods of discharge from CN services

CN clients may receive services periodically over a number of years, which reflects the needs-based eligibility to receive the program.[13] Given that services were not delivered continuously to a client, the frequency of discharge periods was quantified for each client to account for episodic (i.e., non-continuous) service delivery. According to the 2019 document *Notes for Community Nursing Providers*,[14] discharge *cannot* occur if the client is: "*…visited regularly, but infrequently, over a period longer than 28 days and which was considered one continuous delivery of community nursing services (e.g., 6 – 8 weekly indwelling or supra pubic catheter change).*" (P. 39).

Based on this information, a period of discharge from the CN service was defined as a period of >56 days (i.e., 8 weeks) between services. The number of these discharge periods was included in the modelling to determine if they moderated the risk of permanent RAC admission.

Determination of dementia

The presence/absence of dementia is an important factor in evaluating the risk of permanent RAC admission (Patterns and predictors of nursing home placement over 14 years: Dubbo Study of Elderly Australians)[15]. In the data provided, the presence of dementia for each client was determined based on three factors:

1. Dementia indicated in list of 'accepted disabilities';

[13] This needs-based nature of service can be episodic or on-going.
[14] Department of Veterans' Affairs (2019). Notes for community nursing providers.
[15] McCallum, J. et al. (2005). Patterns and predictors of nursing home placement over 14 years: Dubbo study of elderly Australians. Australasian Journal on Ageing, 24(3), 169-173.

2. Supply of antidementia medication indicated by the ATC code prefix 'N06D'[16];
3. Hospital admissions data that listed dementia as a code and/or text description (ICD match and/or string search); and/or
4. Clients supplied risperidone indicated for the treatment of the behavioural and psychological symptoms of dementia

The records of clients who met any of these four criteria were tagged as dementia cases throughout the study period. Rates of dementia determined using the above criteria showed a 15.8% dementia prevalence for the entire sample (n = 42,192). Rates for Veterans and Partners were similar with prevalences of 14.9% and 16.6% respectively.

Model outcomes

There were two possible events included in the time-to-event modelling which investigated how CN services affected DVA client outcomes longitudinally. These were:

1. Clients being admitted to permanent RAC
2. Clients dying at home (before entering permanent RAC).

Table 12 shows the number and proportion of DVA clients who experienced these events.

Table 12. Outcomes for Veterans and Partners

Event	Veterans (n=19,776)	Partners (n=22,416)
Permanent RAC	3914 (19.8)	7245 (32.3)
Death at home	9296 (47.0)	7802 (34.8)
Neither	6566 (33.2)	7369 (32.9)

Note: Statistics are frequency (%)

Key Risk Factor Variables

We initially established potential factors guided by previous research[17] and Andersen's health service utilization model,[18] which highlights dynamics between the Environment, Population characteristics, Health behaviour and Outcomes. Table 13 provides a list of key variables that were included in this project based on DVA data availability and explains how the variables were defined, measured and categorised.

Table 13. Key risk variables and descriptions

Variables	Description
Age at first CN service	Client's age when they first received the CN service. Calculated as number of years from the supplied date of birth to the date of client's first CN service.
Age at permanent RAC admission	Client's age when they entered permanent RAC, calculated as number of years from the supplied date of birth to date of permanent RAC entry.
Age at death	Client's age at death, calculated as number of years from the supplied date of birth to the date of death.
Geographical Area	Geographical Area (Remoteness) determined using postcode data and defined using the Australian Statistical Geography Standard (ASGS) Volume 5 – Remoteness Structure (2016) guidelines.
Clients with dementia	The presence of dementia, determined by: 1) Dementia indicated in list of 'accepted disabilities' 2) Supply of antidementia medication by search for Anatomical Therapeutic Chemical (ATC) codes starting with 'N06D'. (N06DA02 donepezil; N06DA03 rivastigmine; N06DA04 galantamine; N06DX01 memantine) 3) Hospital admissions data that list dementia as a code and/or text description (ICD match and/or string search) 4) Clients who had risperidone, which is indicated for the treatment of behavioural symptoms of dementia (N05AX08 risperidone).

[16] Anatomical Therapeutic Chemical (ATC) codes contained in DVA claims data

[17] Inacio, M. C. et al. (2020). Factors associated with accessing aged care services in Australia after approval for services: Findings from the historical cohort of the Registry of Senior Australians. *Australasian Journal on Ageing*, 39(3), e382-e392.
Jorgensen, M. et al. (2018). Modeling the Association Between Home Care Service Use and Entry into Residential Aged Care: A Cohort Study Using Routinely Collected Data. *J Am Med Dir Assoc*, 19(2), 117-121.e113.

[18] Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: does it matter? Journal of health and social behavior, 1-10

Relationship type code	A code used to denote the status of the DVA beneficiary. Veterans and Partners (combination of Spouse and De facto clients).
Medical Burden (RxRisk)	An index of medical comorbidity summarising the number of medical conditions treated using dispensed prescription medications.
CN Care Combination	A classifier which denotes the type of CN services received by the client or client group. 1. Personal care only. This denotes a client who only received CN services listed as personal care throughout their monitoring period in the study. 2. Clinical care only. This denotes a client who only received CN services listed as clinical care throughout their monitoring period in the study. 3. Personal and Clinical care. This denotes a client who received services listed as personal care, and services listed as clinical care throughout their monitoring period in the study.
Receiving VHC service	A binary indicator of whether the client has a VHC start date, which indicates receipt of VHC services.
Type of CN staff delivering care	Categorical variables which indicate types of CN staff who delivered the majority of their care. • Personal care workers (PCW) also known as Nursing Support Staff (NSS) • Enrolled nurses (ENs) • Registered nurses (RNs), and • Clinical Nurse Consultants (CNCs)
Episodic service delivery	A binary indicator variable which reflects whether clients received continuous CN service or had periods of episodic service delivery.
Presence of a carer	A percentage of the number of episodes of care that participants have a carer recorded at available data points (e.g., if a client has 10 episodes of care, and 3 of them record a value of having a carer, their score would be 30).
Living Alone	A percentage, reflecting the proportion of times a client was indicated to be living alone at available data points (e.g., if a client has 10 episodes of care, and was living alone for 7 of them, their score would be 70).
Acute care hospitalisation	Hospitalisations classified as 'Acute' under the Care Type Code hospital variable.
Fall-related hospitalisation	Hospitalisations due to fall-related injury, identified by filtering ICD diagnosis codes from both public and private admissions data. Codes included: • W00 – W01 • W03 – W11 • W13 – W14 • W16 – W19
Potentially preventable hospitalisation	The number of potentially preventable hospitalisations calculated for each of the three categories included in the 2021 Australian Institute of Health and Welfare guidelines. These categories include: • Vaccine-preventable conditions • Chronic conditions • Acute conditions The figures reported reflect rates standardised per 100,000 population.
Inappropriate medication use	Medications dispensed to clients that appear in the American Geriatrics Society (AGS) Beers Criteria® (AGS Beers Criteria®)[19]and were classified to have moderate or high-quality evidence, and a strong recommendation to avoid
Polypharmacy	A binary indicator denoting whether the client was dispensed >10 different prescription medicines in at least one year.
Mental health issue	A binary indicator for whether the client was treated for mental health disorders in the past 5.5 years.
Dependency level	The sum of services where dependency level was rated either 'High' or 'Low'. This description of the overall dependency level of High or Low is derived from the ADL Tool used by service providers and a specified combination of dependency indicator values (DVA dataset does not have detailed information about ADL scores, i.e., only High or Low is indicated per each care episode).
Healthcare utilisation	Allied health service usage quantified by filtering services with the prefix 'AH'.

Sample Characteristics

Following an in-depth examination of the data, clients whose first CN program entry time was later than 2014 (n = 5,593) and clients aged under 60 years and over 100 years when they first received the CN

[19] Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc. 2019 Apr;67(4):674-694.

service (n = 1,204) were filtered out of the data set. This resulted in a total of 35,395 clients included for this study (for all three research questions, bar RQ3.2 which used different cut-off points for the comparison with the general population). The sample demographic information is shown in Table 14.

Table 14. Demographic information for DVA clients by service types

Variables	All clients (n=35,395)	CN only (n=7,728, 21.8%)	VHC only (n=13,697, 38.7%)	CN&VHC^ (n=13,970, 39.5%)
Age at first service, Median [IQR]	86.9 [82.6, 89.8]	86.8 [81.4, 89.9]	83.0 [72.6, 87.5]	86.5 [82.0, 89.5]
Number of clients who entered permanent RAC	9,754	2,071	2,960	4,723
Age at permanent RAC admission, Median [IQR]	90.6 [87.5, 93.3]	90.7 [87.6, 93.3]	90.3 [87.2, 92.9]	90.8 [87.7, 93.5]
Number of clients who died	13,973	4,238	3,756	5,979
Age at death, Median [IQR]	89.3 [85.3, 92.3]	89.0 [84.8, 91.9]	89.1 [85.0, 92.1]	89.7 [85.8, 92.6]
Year (new entrants)				
2010	5,296 (15.0)	975 (12.6)	2,298 (16.8)	2,023 (14.5)
2011	7,841 (22.2)	1,992 (25.8)	2,866 (20.9)	2,983 (21.4)
2012	7,955 (22.5)	1,825 (23.6)	2,986 (21.8)	3,144 (22.5)
2013	7,324 (20.7)	1,548 (20.0)	2,822 (20.6)	2,954 (21.1)
2014	6,979 (19.7)	1,388 (18.0)	2,725 (19.9)	2,866 (20.5)
Female (%)	18,962 (53.6)	3,965 (51.3)	6,986 (51.0)	8,011 (57.3)
Aboriginal/Torres Strait Islander (%)	92 (0.3)	9 (0.1)	39 (0.3)	44 (0.3)
Relationship Type (%)				
Veterans	16,653 (47.0)	3,797 (49.0)	6,823 (49.8)	6,033 (43.2)
Partners	18,742 (53.0)	3,931 (51.0)	6,874 (50.2)	7,937 (56.8)
Medical burden (RxRisk) (%)				
0-4	12,295 (34.7)	2,555 (33.1)	5,332 (38.9)	4,408 (31.6)
5-7	11,945 (33.7)	2,575 (33.3)	4,327 (31.6)	5,043 (36.1)
8+	6,689 (18.9)	1,540 (19.9)	1,965 (14.3)	3,184 (22.8)
Unable to calculate#	4,466 (12.6)	1,058 (13.7)	2,073 (15.1)	1,335 (9.6)
Mental health issue (%)	14,989 (42.3)	3,198 (41.4)	5,876 (42.9)	5,915 (42.3)
Geographical Area (%)				
Major Cities of Australia	19,297 (54.5)	4,260 (55.1)	7,586 (55.4)	7,451 (53.3)
Inner Regional Australia	9,454 (26.7)	1,883 (24.4)	3,731 (27.2)	3,840 (27.5)
Outer Regional Australia	5,753 (16.3)	1,329 (17.2)	2,077 (15.2)	2,347 (16.8)
Remote Australia	549 (1.6)	145 (1.9)	204 (1.5)	200 (1.4)
Very Remote Australia	294 (0.8)	86 (1.1)	92 (0.7)	116 (0.8)
NA	48 (0.1)	25 (0.3)	7 (0.1)	16 (0.1)
Dementia (%)	5,696 (16.1)	1,238 (16.0)	1,681 (12.3)	2,777 (19.9)
Presence of a carer+ (SD)	32.3 (42.9)	33.3 (44.0)	N/A	31.8 (42.2)
Dependency level* (SD)				
High	3.8 (13.9)	2.4 (10.8)	N/A	4.6 (15.3)
Low	19.1(30.2)	12.6 (21.8)	N/A	22.7 (33.4)
Missing	1.7 (6.9)	1.2 (5.4)	N/A	1.9 (7.6)
CN Care Combination (%)				
Personal Care Only	2,664 (12.3)	979 (12.7)	N/A	1685 (12.1)
Clinical Care Only	8,664 (39.9)	3896 (50.4)	N/A	4768 (34.1)
Clinical and Personal Care	10,308 (47.5)	2827 (36.6)	N/A	7481 (53.6)
Other types of care	62 (0.3)	26 (0.3)	N/A	36 (0.3)

Notes: Data represents as median [IQR], mean (SD) and frequency (%). ^Includes clients who received both CN and VHC services. Age at first service and new entrants by year are based on CN service entry time; #No medication data recorded in the first 18 months from first service date; +Mean percentage (SD) of the time client has a carer; *Average months of dependency level rated as high or low, or missing.

As shown in Table 14, of 35,395 clients, almost 40% of clients received both CN and VHC service, and about 22% received CN service only. Clients who received VHC service only were younger (median age of 83.0 years) than those who received CN service only (median age of 86.8 years) or combined CN and VHC service (median age of 86.5 years) when they first received the service. While the median age when clients entered permanent RAC was similar across service types (ranging between 90.3 – 90.8 years), those who received CN and VHC service died at home at a later age (median age of 89.7 years) than those who received VHC service only (median age of 89.1 years) and received CN only service (median of 89.0 years).

The number of new clients (i.e., first users) was lowest in 2010 for all service combinations. After an increase in 2011 client numbers showed a general downward trend annually, in particular in the CN only group. The proportion of females who received either CN or VHC only was closer to 50%, but there were more females (57.3%) than males receiving both services. A similar pattern was shown in the relationship type, as the Partner's group was almost all female (99.2%). Few clients (<0.4%) were identified as Aboriginal or Torres Strait Islander, and 2-3% of clients were from remote or very remote Australia. Notably, just over 40% of clients across the three groups had a mental health issue.

While just over 16% of the sample population had dementia, there was a smaller proportion of clients with dementia in those who received VHC service only (12.3%) than CN (16.0%) or combined service (19.9%). The mean percentage of episodes of care for which clients had a carer, was similar (approximately 32%).

Half of clients receiving CN services only had clinical care only (50.4%), whereas more than half of clients who received CN and VHC services had both clinical and personal care (53.6%).

Research Question 1: Protective factors for community care clients

RQ1: What are the protective factors of the CN program that contribute to clients entering residential aged care at an older age, or remaining at home until death?

This section provides detailed methodological approaches and results that specifically answer the first research question concerning protective factors for community care clients against an entry to residential aged care and remaining at home until death. This main question is addressed by answering three sub-questions in RQ1.1, RQ1.2 and RQ1.3.

RQ1.1. Are specific characteristics of CN service delivery associated with a later entry into permanent residential aged care, or remaining at home until death?

The CN program offers a range of services to client groups with varying degrees of need; hence examination of possible protective factors associated with receiving CN services involved characterisation of important client-level and service utilisation factors in addition to examination of the type and frequency of CN services delivered. Therefore, in reference to RQ1 we explored a range of possible protective factors that enable a better understanding of how the CN program may be associated with a later entry into permanent residential care, or remaining at home until death.

Data and analysis

Firstly, descriptive statistics (such as mean, median, etc.) were generated for each of the variables included. Any necessary transformations, recoding of text (i.e., string) or categorical data were also conducted. All statistical programming and transformation of the data were conducted using the R language for statistical computing (Version 4.1.3).[20] Survival analysis methods were used to assess the relationship between CN program services and the primary outcomes of time to permanent RAC entry, or death at home. Survival analysis methods are statistical models that model the time to an event, which in this project involves modelling the time to permanent RAC entry or death at home. Part of building survival models is selecting appropriate 'predictors', that are potentially associated with the likelihood of an event over time and are informed by the scientific literature; and by building models that test if the predictors are related to the event (i.e., permanent entry to RAC). We established potential predictors guided by previous research[21] and Andersen's health

[20] R Core Team. (2020). R: A language and environment for statistical computing: R Foundation for Statistical Computing.
[21] Inacio, M. C. et al. (2020). Factors associated with accessing aged care services in Australia after approval for services: Findings from the historical cohort of the Registry of Senior Australians. *Australasian Journal on Ageing*, 39(3), e382-e392.

service utilization model,[22] which highlights relationships between the environment, population characteristics, health behaviour and outcomes.

Cox's Proportional Hazards model was used as a preliminary analysis in order to assess whether there was evidence of violation of its main assumption, namely, that the hazard ratio remained constant over the period of observation.

The hazard ratio (HR) generated by Cox's Proportional Hazards (PH) model (and its competing risks regression, CRR, version) is often used to estimate a treatment effect (e.g., effect of CN service) on time to an event (e.g., admission to permanent RAC).

The Fine-Gray version of Cox's PH model was used to address RQ1 to examine risk factors and potential CN-specific interventions that influence the amount of time a client remains at home, as opposed to admission to permanent RAC. The Fine-Gray model adapts the Cox model for competing risks,[23] referred to here as CRR. It is a multivariate technique which allows adjustment for covariates. In this analysis the implementation used was the R function crr.

For the event admission to permanent RAC, the event death at home is a competing risk. Similarly, in the analysis of time to death in the community, the event admission to permanent RAC is a competing risk.

Clients included in the following analyses were monitored for a median of 36 months (IQR 14, 68) (mean 42.6 months). The risk of permanent RAC placement varied over time. After construction of the Cox PH models, examination of model residuals showed violation of the PH assumption, which demonstrated deviation at approximately 18 months of survival time. Based on this evidence, two models were constructed to accommodate the violation of the assumption of proportional hazards and examine risks of permanent RAC entry. These models were CRR models since it was necessary to take into account the competing risks. The first CRR model examined clients with 1-18 months survival time. To accommodate change in risk of permanent RAC placement, a second CRR model examined clients with greater than 18 months survival time. For each variable the hazard was reported from both of these models.

Hazard ratios from both CRR models with death as a competing risk are reported for the majority of variables that were identified as protective or risk factors for permanent RAC placement. These were found to be:

1. Age at first CN service
2. Whether the client received VHC services
3. Medical burden (RxRisk index score)
4. Whether the client has dementia
5. Whether the client was a Veteran or a Partner

Sampling

For RQ1, only CN and CN & VHC clients are included (n = 21,698, see Table 14). Those who received a CN assessment without further care (n = 20) and those who did not receive personal care, clinical care or combined care were also removed (n = 42). The final number available for analysis in RQ1 is 21,636.

Client characteristics

Tables 15 and 16 show the client characteristics for all CN clients as well as subgroups of those who entered RAC and those who died at home. The median age for all CN clients when they first received CN service (either CN only or CN and VHC combined) was 86.6 years, (mean 84.5 years). While clients who entered permanent RAC had a median age of 87.8 years (mean 87.0 years), clients who died at home had a median age of 87.2 years (mean 85.3 years) when they first received CN service.

[21] Jorgensen, M. et al. (2018). Modeling the Association Between Home Care Service Use and Entry into Residential Aged Care: A Cohort Study Using Routinely Collected Data. *J Am Med Dir Assoc*, 19(2), 117-121.e113.

[22] Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: does it matter? Journal of health and social behavior, 1-10

[23] Jason P. Fine & Robert J. Gray (1999) A Proportional Hazards Model for the Subdistribution of a Competing Risk, *Journal of the American Statistical Association*, 94:446, 496-509, DOI: 10.1080/01621459.1999.10474144

Table 15. Comparison between all CN clients, clients who entered permanent RAC, and clients who died at home

Variable	All CN clients (n=21,636)		CN clients who entered RAC (n=6,787)		CN clients who died at home (n=10,170)	
	Median (IQR)	mean	Median (IQR)	mean	Median (IQR)	mean
Age at first CN Service (years)	86.6 (81.8-89.7)	84.5	87.8 (84.7-90.3)	87.0	87.2 (83.2-90.1)	85.4
Receiving VHC service (%)	100.0 (0-100.0)	64.4	100.0 (0-100.0)	69.5	100.0 (0-100.0)	58.5
Episodic service delivery (%)	0 (0-100.0)	41.4	0 (0-100.0)	43.7	0 (0-100.0)	35.7
Presence of a carer (%)	0 (0-85.0)	32.3	0 (0-75.0)	30.2	0 (0-100.0)	37.0
Lives Alone (%)	0 (0-94.8)	35.6	0 (0-100.0)	41.8	0 (0-83.3)	30.9

There was a difference in receiving VHC service between CN clients who entered RAC and who died at home. A mean of 69.5% of CN clients who entered RAC had VHC services, while 58.5% of CN clients who died at home had VHC services. The mean proportion having a service break during the study period (i.e., clients received episodic services based on needs) was higher for those who entered RAC: approximately 44% for clients who entered RAC and 36% for those who died at home.

Carers were present for a mean of 32% of care episodes for all CN clients, 30% of episodes for those who entered RAC, and 37% of episodes for those who died at home. Approximately 42% of CN clients who entered permanent RAC lived alone, which was 11% higher than those who died at home.

Table 16. Frequencies for demographic and CN factors for all clients, clients who entered permanent RAC, and clients who died at home

Variables	All CN clients (n=21,636)	CN Clients who entered RAC (n=6,787)	CN Clients who died at home (n=10,170)
Relationship Type			
Veterans	9,792 (45.3)	2,261 (33.3)	5,638 (55.4)
Partners	11,844 (54.7)	4,526 (66.7)	4,532 (44.6)
Medical Burden (RxRisk)			
0-4	9,317 (43.1)	2,856 (42.1)	4,341 (42.7)
5-7	7,604 (35.1)	2,510 (37.0)	3,403 (33.5)
8+	4,715 (21.8)	1,421 (20.9)	2,426 (23.9)
Geographical Area			
Major Cities of Australia	11,717 (54.2)	3,833 (56.5)	5,551 (54.6)
Inner Regional Australia	5,703 (26.4)	1,738 (25.6)	2,571 (25.3)
Outer Regional Australia	3,672 (17.0)	1,072 (15.8)	1,765 (17.4)
Remote Australia	342 (1.6)	94 (1.4)	174 (1.7)
Very Remote Australia	202 (0.9)	50 (0.7)	109 (1.1)
Dementia			
Without	17,626 (81.5)	4,450 (65.6)	8,880 (87.3)
With	4,010 (18.5)	2,337 (34.4)	1,290 (12.7)
CN Care Combination			
Personal Care Only	2,664 (12.3)	884 (13.0)	1,466 (14.4)
Clinical Care Only	8,664 (40.0)	2,442 (36.0)	3,915 (38.5)
Clinical and Personal Care	10,308 (47.6)	3,461 (51.0)	4,789 (47.1)
***Majority Care level – Clinical Care (n=18,972 excluding Personal Care Only)**			
Level 1	6,675 (30.9)	2,213 (32.6)	2,663 (30.6)
Level 2	10,972 (50.7)	3,279 (48.3)	5,268 (60.5)
Level 3	1,325 (6.1)	411 (6.1)	773 (8.9)
***Majority Care level – Personal Care (n=12,972 excluding Clinical Care Only)**			
Level 1	4,562 (21.1)	1,513 (22.3)	2,077 (33.2)
Level 2	5,051 (23.3)	1,862 (27.4)	2,160 (34.5)
Level 3	3,359 (15.5)	970 (14.3)	2,018 (32.3)
***Majority CN Staff**			
PCW Majority	6,161 (28.5)	2,365 (34.8)	2,703 (26.6)
EN Majority	1,647 (7.6)	497 (7.3)	802 (7.9)
RN Majority	13,577 (62.8)	3,863 (56.9)	6,523 (64.1)
CNC Majority	251 (1.2)	62 (0.9)	142 (1.4)

*The grouping was based on a majority rule as clients may receive any combination of clinical care levels and personal care levels over time. Similarly, CN staffing grouping was also based on a majority rule as clients are likely to receive any combination of staffing. The majority rule means a category that has the largest number is assigned to a client.

Among all CN clients 55% were Partners. However, 67% of those who entered RAC were Partners, while 45% of those who died at home were Partners. The distribution of medical burden was similar in those who entered RAC and those who died at home. More than half of CN clients were from major cities of Australia and only small proportion of clients were from remote or very remote Australia.

Notably, 34% of CN clients who entered RAC had dementia. Of the 4,010 CN clients who had dementia, more than half (2,337) entered RAC (58%). Regardless of the group, about half of the clients received both clinical and personal care and approximately 12 - 14% received personal care only.

Among the clients who received clinical care, the majority had level 2 care (i.e., 10-30 visits in a one month period or ≥21 minutes of technical related visits). This was also the case for personal care. The majority of clients received the care from RNs and only 1% of clients received care from CNC.

Outcome: Permanent RAC admission

Table 17 represents the results of CRR models that examined risk factors of admission to permanent RAC in two different time periods (first 18 months and after 18 months from the first CN service). In the first 18 months, factors associated with a reduced risk of entering permanent RAC were: being a Veteran (compared to Partner), having a lower medical burden, accessing the CN service at an earlier age, being without dementia, having episodic service delivery, receiving combined clinical and person care (compared to personal care only) and receiving the majority of care from RNs or CNC (compared to PWC).

Similarly, after 18 months the protective factors against entering permanent RAC were: being a Veteran, accessing the CN service at an earlier age, being without dementia, not receiving VHC services, having episodic service delivery, not living alone, receiving clinical care only compared to personal care only and receiving majority care from ENs or RNs compared to PCW.

Table 17. Hazard ratios for permanent RAC admission for the first 18 months and after 18 months

Key variables		Hazard Ratio First 18 months (n=21,636)	Hazard Ratio 19 months onwards (n=15,034)
Relationship Type			
	Partners	1.47 (1.33, 1.63)	1.32 (1.24, 1.41)
	Veterans	Ref	Ref
Medical burden (RxRisk)			
	5-7	1.51 (1.35, 1.68)	1.00 (0.94, 1.06)
	8+	1.79 (1.58, 2.03)	1.02 (0.94, 1.10)
	0-4	Ref	Ref
Geographical Area			
	Inner Regional Australia	0.99 (0.88, 1.11)	0.97 (0.91, 1.04)
	Outer Regional Australia	0.93 (0.81, 1.06)	0.95 (0.88, 1.03)
	Remote Australia	0.81 (0.53, 1.24)	0.93 (0.73, 1.18)
	Very Remote Australia	0.85 (0.50, 1.46)	0.85 (0.62, 1.18)
	Major Cities of Australia	Ref	Ref
Age (per 10 years)		2.29 (2.08, 2.51)	1.92 (1.83, 2.01)
Dementia		2.51 (2.28, 2.77)	2.48 (2.33, 2.64)
Receiving VHC		0.92 (0.84, 1.02)	1.09 (1.02, 1.16)
Episodic service delivery		0.27 (0.24, 0.31)	0.89 (0.84, 0.95)
Presence of a carer (per episode)		See [1] below	See [2] below
Living Alone (per episode)		See [3] below	See [4] below
CN Care Combinations			
	Clinical Care Only	0.86 (0.74, 1.00)	0.86 (0.76, 0.97)
	Combined clinical and personal Care	0.78 (0.68, 0.88)	0.89 (0.80, 1.00)
	Personal Care Only	Ref	Ref
Type of CN staff			
	EN Majority	0.92 (0.75, 1.12)	0.88 (0.78, 0.99)
	RN Majority	0.86 (0.75, 0.99)	0.91 (0.85, 0.98)
	CNC Majority	0.57 (0.34, 0.95)	0.99 (0.74, 1.32)
	PCW Majority	Ref	Ref

All statistics represent estimate (95% CI); Ref represents the reference group[24]; [1]HR 0.999 (0.997, 1.000); [2]HR 1.000 (0.999, 1.001); [3]HR 1.000 (0.999, 1.001); [4]1.002 (1.001, 1.002); [1 – 4]Differences were evident only at third decimal place and reported here.

[24] Reference group means a group to which an individual group is compared (e.g., Veterans are a reference group to which Partners as a group are compared)

Relationship Type: Compared to Veterans, Partners were 1.47 (95% CI: 1.33, 1.63) times more likely to enter permanent RAC within the first 18 months of CN services. After 18 months of CN services, the risk of permanent RAC for Partners decreased slightly but remained higher than Veterans, at 1.32 (95% CI: 1.24 1.41.

Medical burden: CN clients who had increased medical burden were at higher risk of permanent RAC admission in the first 18 months of CN service. Those with medical burden score of 5 - 7 were 1.51 (95% CI: 1.35, 1.68) times more at risk and those in the highest category (score 8 or greater) were 1.79 (95% CI: 1.58, 2.03) times more at risk than those in the lowest category (score 0 - 4). However, beyond 18 months, the risks of permanent RAC did not differ by medical burden.

Geographical Area: Compared to clients living in major cities of Australia, clients living in regional or remote areas were not at increased risk of entering permanent RAC in either time period.

Age at first CN service: Clients entering the program at a later age were at increased risk of entering permanent RAC in the first 18 months after their first CN service. Every 10 year delay in entering the program increased the risk of permanent RAC placement by 2.29 (95% CI: 2.08, 2.51), such that a client entering the program at age 80 would be 2.08 – 2.51 times the risk of permanent RAC placement than a client entering the program at age 70. A client entering the program at age 90 would be 4.33 – 6.30 times more likely of permanent RAC placement than a client aged 70.

A similar finding was shown in 19 months onwards after the first CN service (HR 1.92, 95% CI 1.83, 2.01). A client entering the program at age 80 would be 1.83 – 2.01 times the risk of entering permanent RAC placement than a client entering the program at age 70. A client aged 90 would be 3.35 – 4.04 times more likely to enter permanent RAC than a client aged 70.

Dementia status: CN clients who were indicated as having dementia were at the greatest risk of admission to permanent RAC. Clients with dementia were 2.51 (95% CI: 2.28, 2.77) times more likely to enter permanent RAC than people without dementia for the first 18 months and 2.48 (95% CI: 2.33, 2.64) times more likely thereafter.

Receiving VHC services: Receiving VHC as well as CN services was not an indicator of increased risk of permanent RAC placement in the first 18 months after clients received their first CN service (HR 0.92, 95% CI 0.84, 1.02). However, from 19 months onwards, clients who received VHC services as well as CN services were at an increased risk of permanent RAC placement (HR 1.09, 95% CI: 1.02, 1.16).

Episodic service delivery: The delivery of CN services was based on clinical need, therefore CN clients would have periods where service was not required. Whether or not some clients experienced periods where care was not required (i.e., periods of no-service greater than 56 days) may therefore be an indication of care needs, such as recovery from a surgical procedure (i.e., episodic service), and/or maintenance of independence. This was reflected in the results of the modelling at both time intervals analysed.

Receiving episodic service delivery reduced the risk of permanent RAC placement. When compared to CN clients who had continuous CN service, clients who had periods of episodic service in the 18 months after their first CN service were 0.27 (95% CI: 0.24, 0.31) times as likely to enter permanent RAC. While this protective effect continued, it was markedly reduced from 19 months onward after CN clients received their first service. Clients with episodic service 19 months onward after their first CN service were 0.89 (95% CI: 0.84, 0.95) times as likely to enter permanent RAC.

Presence of a carer: In the first 18 months after their first CN service the presence of a carer was not associated with the risk of permanent RAC placement (HR 0.999, 95% CI 0. 997, 1.000), with a similar result obtained for 19 months onwards (HR 1.000, 95% CI 0.999, 1.001

Living alone: In the first 18 months of CN service, living alone did not affect the risk of permanent RAC placement (HR 1.000, 95% CI 0.999, 1.001). However, from 19 months onwards, every 1% increase in clients reporting they lived alone increased the risk of permanent RAC placement by 1.001 to 1.002. Clients who lived alone 50% of the time were 1.11 (95% CI: 1.05, 1.11) times more likely to be admitted to permanent RAC than those who never lived alone. Clients who lived alone throughout their entire monitoring period in the 19 months onwards after their first CN service were 1.22 (95% CI: 1.11, 1.22) times more likely to enter

permanent RAC.

Type of CN staff: During the first 18 months of CN service, there was a reduced risk of permanent RAC placement for clients who received majority care from RNs (HR 0.86, 95% CI 0.75, 0.99) and CNCs (HR 0.57, 95% CI 0.34, 0.95) (compared to PCW). From 19 months onwards, clients who received majority care from ENs (HR 0.88, 95% CI 0.78, 0.99) and RNs (HR 091, 95% CI 0.85, 0.98) were at a reduced risk compared to majority care from PCW (Table 17).

Table 18. Hazard ratio comparison between clients receiving different types of CN care for the first 18 months and after 18 months

Types of CN Care	Hazard Ratio (95% CI) First 18 months (n=21,636)	Hazard Ratio (95% CI) After 18 months (n=15,034)
Clinical Care vs Personal Care*	0.86 (0.74, 1.00)	0.86 (0.76, 0.97)
Combined Care vs Personal Care*	0.78 (0.68, 0.88)	0.89 (0.80, 1.00)
Combined Care vs Clinical Care*	0.90 (0.79, 1.02)	1.04 (0.97, 1.12)

Note: *Represents the reference group. The hazard ratios were derived within the same model as Table 17.

CN Care Combinations: All possible pairwise comparisons for CN care combinations are reported in Table 18. In the first 18 months, clients who received Combined Clinical and Personal Care, compared to Personal Care only, were at a reduced risk (HR 0.78, 95% CI 0.68, 0.88) of RAC placement. Clinical Care vs Personal Care and Combined Care vs Personal Care are as reported in Table 17, while Combined Care vs Clinical Care was not associated with increased risk of RAC placement in the first 18 months (HR 0.90, 95% CI 0.79, 1.02) (Table 18).

However, for the longer period of CN services (19 months onwards), Clinical Care appeared to play a role in reducing the risk of permanent RAC admission. When compared to CN clients who received only Personal Care CN services, clients who received CN Clinical Care only services 19 months onward after their first CN service were at lower risk (HR 0.86; 95% CI: 0.76, 0.97) for permanent RAC admission. Again, comparing Clinical Care with Combined Care, there was no association with risk of RAC placement (HR 1.04, 95% CI 0.97, 1.12). (Table 18).

Frequency of visits and intensity of care: CN services for clinical and personal care were further categorised into different levels according to the frequency and intensity of care.

As shown in Table 19 below, in the first 18 months there was no association with any level of clinical care and permanent RAC placement. From 19 months onwards, receiving a higher level of care, CC2 (10 – 30 visits per month) vs CC1 (<10 visits per month) was associated with an increased risk (HR 1.11, 95% CI 1.04, 1.18). The lack of statistical differentiation involving CC3 comparisons may be due to the relatively small sample size for CC3 clients (n=1,325, 6.1%) compared to CC1 (n=6,675, 30.9%) and CC2 (n=10,972, 50.7%), as shown in Table 16.

Table 19. Hazard ratio comparison between clients who received the majority of their clinical care (n=17,961) at each CC for admission to permanent RAC for the first 18 months and after 18 months.

Clinical Care (CC) Levels	Hazard Ratio (95% CI) First 18 months (n=17,961)	Hazard Ratio (95% CI) After 18 months (n=13,861)
CC2 vs CC1*	1.05 (0.92, 1.19)	1.11 (1.04, 1.18)
CC3 vs CC1*	1.12 (0.92, 1.36)	1.11 (0.97, 1.28)
CC3 vs CC2*	1.06 (0.88, 1.28)	1.01 (0.88, 1.15)

Note: *Represents the reference group. Refer to Table 11 for definitions of CC1, CC2 and CC3. The grouping was based on majority rules as clients may receive any combination of CC1, CC2 and CC3 over time. Sample size differs due to care categorisation.

Notably, for risk of admission to permanent RAC, Table 20 shows that the effect of frequency and intensity of personal care was the opposite to that of clinical care levels. In the first 18 months, there was no association between PC2 (>10 to 30 visits or daily personal care per month) and PC1 (HR 0.96, 95% CI 0.89, 1.03). However, clients who received PC3 vs PCI (HR 0.81, 95% CI 0.75, 0.88) or PC3 vs PC2 (HR 0.85, 95% CI 0.78, 0.92) were associated with lower risk. PC3 care is associated with more than 30 visits, twice daily visits, exceptional care units, overnight or TDS personal care per month. Provision of the highest level of personal care was therefore associated with a reduced risk of RAC placement in this time period.

After 18 months from date of first service, there was no association of any level of care with the risk of permanent RAC placement.

Table 20. Hazard ratio comparison between groups who received the majority of their personal care (n=12,972) at each PC level for admission to permanent RAC for the first 18 months and after 18 months.

Personal Care (PC) Levels	Hazard Ratio (95% CI) First 18 months (n=12,972)	Hazard Ratio (95% CI) After 18 months (n=9,091)
PC2 vs PC1*	0.96 (0.89, 1.03)	0.98 (0.90, 1.06)
PC3 vs PC1*	0.81 (0.75, 0.88)	1.01 (0.91, 1.12)
PC3 vs PC2*	0.85 (0.78, 0.92)	1.04 (0.95, 1.13)

Note: *Represents the reference group; Refer to Table 11 for definitions of PC1, PC2 and PC3. The grouping was based on a majority rule as clients may receive any combination of PC 1, PC2 and PC3 over time. Sample size differs due to care categorisation.

Outcome: Death at home

The protective factors for death at home was examined by CCR models (Table 21). Factors associated with a reduced risk of death at home were: being a Partner (compared to Veteran), lower medical burden, living in a major city (compared to very remote Australia)younger age at first service, having dementia, receiving VHC services as well as the CN services, episodic service delivery, not having a carer, living alone, receiving clinical care services only or combined services of personal and clinical care (compared to clients who received personal care services only) and receiving PCW services compared to the other CN staff.

Relationship Type: Compared to Veterans, Partners were less likely to die at home (HR 0.57; 95% CI: 0.55, 0.59).

Medical Burden: Compared to CN clients with the least medical burden, clients in the highest category (8 or greater) were 1.16 (HR 1.10, 1.22) times more likely to die at home compared to clients with the least medical burden (0 – 4). Clients with a moderate medical burden compared to the lowest did not differ in their risk of dying at home.

Geographical area: Compared to clients living in major cities of Australia, clients living in very remote areas were at increased risk of dying at home (HR 1.28, 95% CI 1.05, 1.54).

Age at first CN service: Clients entering the service at a later age were at an increased risk of dying at home. A client who entered the service at age 80 was 1.32 (95% CI 1.28, 1.35) times more likely to die at home than a client who entered the service at age 70.

Dementia status: A positive indicator for dementia was associated with the greatest reduction in risk of dying at home. CN clients with a positive indicator for dementia were 0.51 (95% CI: 0.48, 0.54) times as likely to die at home as those without a positive indicator.

Receiving VHC services: A positive indicator for receiving VHC services was also associated with a reduction in risk of dying at home. Compared to CN clients who did not receive VHC services, CN clients who received VHC services were 0.71 (95% CI: 0.68, 0.74) times as likely to die at home.

Episodic service delivery: Clients who experienced at least one break in CN services were also at reduced risk of dying at home. Specifically, CN clients who experienced at least one service break were 0.63 (95% CI: 0.60, 0.65) times as likely to die at home.

Presence of a carer: Having a carer increased the risk of dying at home (HR 1.003; 95% CI: 1.003, 1.004). Clients who had a carer 50% of the time were 1.16 (95% CI: 1.16, 1.22) times more likely to die at home compared to those with a carer none of the time. Those who had a carer throughout their entire monitoring period were approximately 1.35 (95% CI: 1.35, 1.49) times more likely to die at home.

Living Alone: Living alone was a protective factor against dying at home (HR 0.998; 95% CI: 0.997, 0.998). Clients who lived alone 50% of the time were 0.90 (95% CI: 0.86 – 0.90) times as likely to die at home compared to clients who never lived alone. Clients who lived alone 100% of the monitoring time they received CN services were 0.82 (95% CI: 0.74 – 0.82) as likely to die at home.

CN Care Combinations: Compared to clients who received only personal care services, clients who received clinical care services only were 0.60 (95% CI: 0.55, 0.64) times as likely to die at home. Compared to clients who only received personal care, clients who received clinical and personal care were also at lower risk of dying at home (HR 0.83; 95% CI: 0.77, 0.88).

Type of staff delivering CN care: Clients who received the majority of their care from ENs, RNs or CNCs (as opposed to PCW) were at an increased risk of dying at home. Clients who received the majority of their care from ENs were 1.29 (95% CI: 1.19, 1.41) times more likely to die at home. Those receiving the majority of their care from RNs were 1.33 (95% CI: 1.26, 1.41) times more likely to die at home and clients receiving the majority of their care from CNCs were 1.78 (95% CI: 1.49, 2.12) times more likely to die at home. However, due to the small number of clients receiving the majority of their care from the small number of CNCs (n=149), this result must be interpreted with caution.

Table 21. Hazard ratios for model factors of risk of death at home

Variables		Hazard Ratio (95% CI) (n=21,636)
Relationship Type		
Partners		0.57 (0.55, 0.59)
Veterans		Ref
Medical burden (RxRisk)		
	5-7	0.95 (0.91, 1.00)
	8+	1.16 (1.10, 1.22)
	0-4	Ref
Geographical Area		
	Inner Regional Australia	0.98 (0.93, 1.03)
	Outer Regional Australia	1.05 (1.00, 1.11)
	Remote Australia	1.17 (1.00, 1.37)
	Very Remote Australia	1.28 (1.05, 1.54)
	Major Cities of Australia	Ref
Age (per 10 years)		1.32 (1.28, 1.35)
Dementia		0.51 (0.48, 0.54)
Receiving VHC		0.71 (0.68, 0.74)
Episodic service delivery		0.63 (0.60, 0.65)
Presence of a carer^		See [1] below
Living Alone^		See [2] below
CN Care Combinations		
	Clinical Care Only	0.60 (0.55, 0.64)
	Clinical and Personal Care	0.83 (0.77, 0.88)
	Personal Care Only	Ref
Type of CN staff delivering care		
	EN Majority	1.29 (1.19, 1.41)
	RN Majority	1.33 (1.26, 1.41)
	CNC Majority	1.78 (1.49, 2.12)
	PCW Majority	Ref

All statistics represent estimate (95% CI); Ref represents the reference group; ^Differences were evident only at third decimal place and therefore reported here instead; [1]HR 1.003 (1.003, 1.004); [2]HR 0.998 (0.997, 0.998)

RQ1.2. Are CN services associated with the frequency and length of hospitalisation, number of potentially preventable hospitalisations, and fall-related injury?

Data and Analysis

Injury-related hospital admission is strongly associated with first entry to permanent RAC, particularly for older adults with dementia who are four times more likely to enter permanent care than those without dementia after hospitalisation.[25] This risk is particularly high after hospitalisation due to a fall-related injury. To identify whether the CN program was protective against hospitalisation and fall-related injury we examined the following factors:

Factors of interest included (but were not limited to):

- Number of hospitalisations (yearly)

[25] Mitchell, et al. (2017). Risk factors associated with residential aged care, respite and transitional aged care admission for older people following an injury-related hospitalisation. Archives of Gerontology and Geriatrics 72:59-66.

- Length of stay (days)
- Hospital episode information (admission code to categorise hospitalisation due to fall)
- The number of potentially preventable hospitalisations (PPH) for a given age group and health condition reflects the accessibility and effectiveness of primary and community-based care services.[26] The number of PPH per 100,000 people was calculated for DVA clients aged 65 years and over. This enabled comparison with national averages. Based on hospital admission records, PPH rates were calculated for selected acute and chronic medical conditions – contingent on the amount of available data for each condition. These conditions included: Cellulitis, Gangrene, Urinary tract infections, including pyelonephritis, Asthma and Diabetes complications.

Acute Care Admissions Characteristics

Of 21,636 CN clients, 19,431 CN clients had acute care admissions data with an admission date recorded in in the hospital data, which reflected a median (IQR) monitoring period of 40 months (IQR 17, 71). There were 8,670 Veterans and 10,761 Partners included in the analysis. The ten most frequent procedures for all hospital admissions are listed in Table 22.

Table 22. Top ten most frequent reasons for acute care admissions for CN clients (n = 19,431)*

Rank	Admission Reason	Frequency
1	Renal dialysis	24,005
2	Chemotherapy	8,666
3	Retinal procedures	5,511
4	Mental health treatment, same day, without electroconvulsive therapy	4,122
5	Lens Procedures same day	3,227
6	Heart failure and shock without catastrophic chronic condition	2,968
7	Red blood cell disorders without catastrophic or severe chronic condition	2,858
8	Other skin graft and/or debridement procedures without catastrophic/severe chronic condition	2,566
9	Kidney and urinary tract infections age>69 without catastrophic chronic condition	2,465
10	Oesophagitis, gastroenteric & miscellaneous digestive system disorder age>69 without catastrophic/severe chronic condition	2,022

*This number includes people whose admission date comes after their recorded death date (n = 771). They are included here because the reason for this discrepancy was unknown.

As shown in Table 23, the most frequent admissions were for same day procedures, and this was further examined by searching the procedure descriptions containing the word 'same day', as well as 'renal' and 'chemotherapy' from the database. There were 14 procedures in total that contained these descriptors. Ranked from most to least frequent, the following table lists the procedure names and their frequencies.

Table 23. Prevalent same day procedure for CN clients (n = 4,461)

Rank	Same day procedure	Frequency
1	Renal dialysis	24,005
2	Chemotherapy	8,666
3	Mental health treatment, same day, without electroconvulsive therapy (ECT)	4,122
4	Lens Procedures same day	3,227
5	Lymphoma and non-acute leukaemia, same day	1,742
6	Other colonoscopy, same day	1,092
7	Other gastroscopy for non-major digestive disease, same day	1,039
8	Complex Gastroscopy same day	797
9	Mental health treatment, same day, with ECT	363
10	Other gastroscopy for major digestive disease, same day	204
11	Glaucoma and Complex Cataract Procedures same day	202
12	Oral and Dental Disorders Except Extractions and Restorations same day	152
13	Alcohol use disorder and dependance, same day	124
14	Major Skin Disorders same day	48

Table 24 shows the 'non-routine' admissions which did not require same day procedures for CN clients. Procedure descriptions, and the number of admissions for each procedure for the ten most frequent are listed below, ranked from most to least frequent. The mean number of days per acute care admission (excluding same day procedures) was 7 days (SD = 5.97).

[26] Australian Commission on Safety and Quality in Health Care (2017) A Guide to the Potentially Preventable Hospitalisations Indicator in Australia Sydney: Australian Commission on Safety and Quality in Health Care. https://www.safetyandquality.gov.au/sites/default/files/migrated/A-guide-to-the-potentially-preventable-hospitalisations-indicator-in-Australia.pdf

Table 24. Prevalent non-routine procedures for CN clients (n = 19,296)*

Rank	Procedure	Frequency
1	Retinal procedures	5,511
2	Heart failure and shock without catastrophic chronic condition	2,968
3	Red blood cell disorders without catastrophic/severe chronic condition	2,858
4	Other skin graft and/or debridement procedures without catastrophic/severe chronic condition	2,566
5	Kidney and urinary tract infections age>69 without catastrophic chronic condition	2,465
6	Oesophagitis, gastroenteric & miscellaneous digestive system disorder age>69 without catastrophic/severe chronic condition	2,022
7	Respiratory infections/inflammations with catastrophic chronic condition	1,999
8	Other skin, subcutaneous tissue and breast procedures	1,963
9	Chronic obstructive airways disease with catastrophic/severe chronic condition	1,923
10	Respiratory infections/inflammations with severe or moderate chronic condition	1,890

*This number excludes those who had same day procedure only

Outcome: Acute care hospitalisation

Hospitalisation and associated factors: As shown in Table 25, the average number of acute care admissions per year and the mean number of days per admission differed by the key variables.

Clients receiving ***personal care only*** appeared to have fewer acute care admissions per year than those receiving ***clinical care only***, or ***combined care***. However, clients receiving clinical care, or clinical care in combination with personal care spent fewer days per admission in hospital.

Veterans had more admissions per year, although the length of stay was lower than ***Partners***. This may be attributable to the difference in medical burden and age between the groups. As mean medical burden (RxRisk) was higher in Veterans compared with Partners (5.9 and 5.6, respectively), this could contribute to the increased frequency of hospitalisations per year. However, the younger age at first service for Veterans compared with Partners (84.5 and 86.3 years, respectively) may account for the shorter stay during admission.

Compared to CN clients who did not receive ***VHC services***, CN clients who received VHC service had slightly more hospitalisations per year, and had similar number of days per admission.

Table 25. The number of hospitalisations per client and lengths of stay by variables (n = 19,296)

Variables	Admissions per client per year		Days per admissions	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
CN Care Combinations				
Personal Care (n=2,182)	1.9 (1.2)	1.5 (1.0-2.3)	7.7 (7.2)	5.8 (3.0-10.0)
Clinical Care (n=7,701)	2.1 (1.5)	1.8 (1.0-2.5)	6.3 (6.0)	4.7 (2.5-8.0)
Combined Care(n=9,413)	2.3 (1.6)	2.0 (1.3-2.8)	6.7 (5.6)	5.5 (3.4-8.4)
Relationship Type				
Veterans (n=8,611)	2.3 (1.7)	2.0 (1.3-3.0)	6.6 (6.2)	5.0 (2.8-8.3)
Partners (n=10,685)	2.0 (1.3)	1.8 (1.0-2.4)	6.8 (5.8)	5.4 (3.1-8.5)
Received VHC				
Yes (n=12,845)	2.2 (1.5)	2.0 (1.3-2.7)	6.6 (5.7)	5.2 (3.0-8.3)
No (n=6,451)	2.1 (1.6)	1.8 (1.0-2.5)	6.9 (6.4)	5.2 (2.8-8.8)

***Predictors of acute care hospitalisation*:** Table 26 represents the results of CRR models that examined risk factors of acute care hospitalisation, focusing on client factors and CN services they received from their first CN service to the date of hospitalisation. For those 18,660 with a hospital admission date, the median time to hospitalisation was 7.9 [IQR 2.1, 18.4] months (mean 13.2, SD 15.3) after the first CN service.

Client factors of age at first CN service, the sum of the RxRisk Index score for the first six months after CN service, whether the client has dementia, and whether the client was a Veteran or a Partner was included. In addition, CN service factors of whether they received CN only or CN and VHC services, and the total number of clinical care and personal care visits from their first CN service to the date of hospitalisation were included.

Table 26. Hazard ratios for model factors of acute care hospitalisation

Factors	Hazard Ratio (95% CI) (n=19,976)*
Client Factors	
Age at first service	See[1] below
Medical burden (RxRisk)^	1.14 (1.13, 1.14)
Dementia	1.03 (0.99, 1.07)
Partners	0.87 (0.85 0.90)
Veterans	Ref
CN Factors	
Receiving VHC	1.10 (1.06, 1.14)
Total number of clinical care visits	0.98 (0.97, 0.98)
Total number of personal care visits	0.98 (0.98, 0.98)

*The number of CN clients here includes those with and without an admission date in the hospital data as well as those who are recorded as not having an admission over the monitoring period (i.e., treated as 'event free'). The reason for this missing admission date (n = 545) cannot be explained. Nevertheless, this number is unlikely to change the outcome of the analysis. 19,976 includes 18,660 with an admission date, 1,105 who died without an admission (competing risk) and 211 who had no hospital admission during the study period. (Additional notes for the final sample size for this model: i) n=21,636 (total sample) minus 827 clients who never appear in the hospital data n=20,809; ii) 20,809 minus those 771 who had conflicting admission and death date n = 20,038; iii) 20,038 minus 62 who had a record of the death occurring in the same month as the CN first service (the actual date of the death was not available, and we used 1st of each month for the date of death); iv) final n = 19,976).

^Medical burden has been entered in this model as the actual RxRisk score, e.g., 1, 2, 3...6…8.., rather than as the categorised 0 – 4, 5- 7, 8+ levels

1HR 1.001 (0.999, 1.003)

Client Factors: Increased age at first CN service was not predictive of an acute care hospitalisation (HR 1.001; 95% CI 0.999, 1.003). Each one unit increase in the medical burden score was associated with a 1.14 (95% CI: 1.13, 1.14) increased risk of acute care hospitalisation. A positive indicator for dementia was not predictive of the outcome (HR 1.03; 95% CI 0.99, 1.07), and Partners were less likely to be hospitalised than Veterans (HR 0.87; 95% CI 0.85, 0.90).

CN Factors: For CN factors, clients who received the CN program in combination with VHC services were at a higher risk of hospitalisation than clients who received CN only (HR 1.10; 95% CI 1.06, 1.14). Each one unit increase in the number of clinical or personal care visits reduced the risk of hospitalisation ((HR 0.98; 95% CI 0.97, 0.98) and (HR 0.98; 95% CI 0.98, 0.98), respectively). A client who received 30 clinical care visits would have 0.74 - 0.82 times the risk of hospitalisation than a client who received 20 clinical care visits, and a client who received 30 personal care visits would be 0.82 times the risk of hospitalisation as a client who received 20 personal care visits.

Outcome: Fall-related hospitalisation

Hospitalisation due to falls was investigated using hospital admissions data. Falls as an external cause of external injury were identified by examination of ICD-10-AM codes, including codes W00, W01, W03 – W11, W13, W14, W16 –W19.

***Fall-related hospitalisation during entire monitoring period (time from the first CN service and time to the first fall-related hospitalisation)*:** There were 2,218 CN clients identified with hospitalisations due to falls. Table 27 shows the number of total admissions per client due to fall-related injury, and the length of stay for these CN clients.

Table 27. Hospitalisation due to falls for all CN clients (n = 2,218)

Variable	Median [IQR]
Length of stay (days)	9.0 [4.0, 18.0]
Total admissions per client due to falls	1.0 [1.0, 2.0]

Time to fall-related hospitalisation and CN client and service factors: The number of months from clients' first CN service to their first hospitalisation due to fall-related injury was calculated. The median time to hospitalisation did not differ greatly across clients and service types (Table 28). The clients included in the analysis (n = 2,218) were hospitalised for fall-related injury a median of 23.0 [IQR 9, 44] months (mean 29.1 (SD = 23.9) months) after their first CN service. It was found that all clients included in this model eventually entered permanent RAC.

Table 28. Time to first hospitalisation due to falls for all CN clients (n = 2,218) by factors

Variable	Median [IQR] months
All CN clients	23.0 [9.0, 44.0]
Veterans	21.0 [8.0, 41.0]
Partners	25.0 [10.0, 46.0]
Clients with dementia	23.0 [9.0, 41.0]
Clients without dementia	23.5 [9.8, 45.0]
Received CN service only	17.0 [6.0, 33.0]
Received CN and VHC service	25.0 [11.0, 46.0]

***Predictors of time to hospitalisation due to fall-related injury*:** A Cox proportional hazards model examining predictors of the time to the first hospitalisation due to fall-related injury was created, examining client factors and CN services they received from their first CN service to the date of hospitalisation for fall-related injury.

The client factors of age at first CN service, medical burden for the first six months after CN service, whether the client had dementia, and whether the client was a Veteran or a Partner were included in the modelling. In addition, CN service factors of whether they received CN only or CN and VHC services, and the total number of clinical care and personal care visits from their first CN service up to the date of the first hospitalisation were included.

Table 29. Hazard ratios for risk of hospitalisation due to fall-related injury (n = 2,218)

Factors	Hazard Ratio (95% CI) (n=2,218)
Client Factors	
Age at first service	1.03 (1.03, 1.04)
Medical burden (RxRisk)	1.07 (1.05, 1.08)
Dementia	1.11 (1.01, 1.23)
Partners	0.92 (0.85, 1.01)
Veterans	Ref
CN Factors	
Receiving VHC	0.77 (0.69, 0.85)
Total number of clinical care	0.98 (0.97, 0.98)
Total number of personal care	0.99 (0.99, 1.00)

Amongst clients hospitalised for a fall-related injury, factors associated with an increased rate of hospitalisation were older age, greater medical burden and a positive indicator for dementia. Factors associated with a reduction in the rate of hospitalisation for a fall were receiving VHC service in addition to CN, and a higher total number of clinical care visits.

***Client Factors*:** Older clients had an increased rate of hospitalisation (HR 1.03; 95% CI 1.03, 1.04) compared to younger clients, as did clients with higher medical burden (HR 1.07; 95% CI 1.05, 1.08) compared to lower burden and with a positive indicator for dementia (HR 1.11; 95% CI 1.01, 1.23). Partners and Veterans did not differ in risk (HR 0.92; 95%CI 0.85, 1.01).

***CN Factors*:** Compared to clients who received CN only, clients who received VHC services in combination with CN services had a reduced rate of fall-related hospitalisation (HR 0.77; 95% CI 0.69, 0.85), and clients who received more clinical care visits also had a reduced rate (HR 0.98; 95% CI 0.97, 0.98). The number of personal care visits was not associated with fall-related hospitalisation.

Outcome: Potentially Preventable Hospitalisations (PPH)

The number of potentially preventable hospitalisations was calculated according to selected conditions for ICD-10-AM codes, 2020.[27] Conditions that were required to be the principal diagnosis for admission were determined by having the ICD diagnosis sequence number one. All ICD-10-AM codes included in the determination of the PPH index that had additional exclusion criteria (such as the presence of other procedures during admission) were examined to verify no other procedures had taken place. Both private health care practice and public hospitalisation records were included in the calculation of the index.

[27] National Healthcare Agreement: PI 18–Selected potentially preventable hospitalisations, 2021. https://meteor.aihw.gov.au/content/index.phtml/itemId/725793

Overall, there were 19,431 CN clients with hospital admissions data that were available between their first CN service, and last date recorded in the study. Standardised rates for each category of PPH were calculated firstly by averaging the number of admissions per client, per year, as some clients had instances of PPH's over multiple years while monitored. The total number of admissions for each category were then calculated, divided by the total number of CN clients in the database (n = 21,636), then multiplied by 100,000, as shown below. This enabled comparison between PPH rates in the CN population per category with national rates for adults aged 65 years and older, as shown in Table 30.

The formulae used to calculate standardised PPH per category for CN program clients:

$$PPH_{standardised} = \frac{\sum(PPH_{category})}{21{,}636} \times 100{,}000$$

Table 30. National and CN client PPH rates per 100,000

PPH Category	National rates	CN rates
Vaccine Preventable conditions	1,072	462
Acute conditions	2,680	776
Chronic conditions	5,531	700

The CN rates were found to be much lower than the national rates in all three categories: vaccine preventable, acute and chronic conditions (Table 30). There were a number of considerations when interpreting these figures that may explain these differences. Of the 161 conditions that were included in the calculation of PPH, only 10 were present in the data that met criteria for calculation of PPH. This was likely due to the small number of clients available for analysis. PPH was typically calculated by including state and nation-wide populations (stratified by age), which are much larger than the sample available for CN program recipients (n = 21,636). Therefore, the results should be interpreted with caution. Given this limitation, no further investigation between Veterans and Partners and other CN factors was conducted.

RQ1.3. Are CN services associated with prescription medication usage?

Data and Analysis
Prescription medication usage in older adults was associated with the number of adverse drug events, disability, hospitalisation and mortality.[28] Polypharmacy (>5 regular prescribed drugs) as well as the use of potentially inappropriate medications, as defined by the Beers Criteria®,[29] are factors shown to be related to poor health outcomes and were investigated using ATC codes contained in DVA claims data.

The following were calculated to investigate the association between CN services and medication usage:

- Types of medications
- Number of medications per client
- Potentially inappropriate medications for use in older adults (defined by Beers Criteria®).

Outcome: Prescription medication usage
Top 10 medications supplied: Table 31 represents the top 10 medications supplied. There were 16,445 CN clients with medication data available.

Number of different medications per client supplied per year: The number of unique ATC codes per year for each client were calculated to determine the number of different medications supplied per year. The median number of medications dispensed per year for CN clients was 10 [IQR 7, 15].

Number of Beers Criteria® avoid medications per CN client: Medications from the 2019 Beers Criteria® that had moderate or high quality of evidence and a strong recommendation to avoid were included in the list of medications to examine for CN program clients. In total, there were 7,537 CN clients taking medications listed as avoid according to these criteria. The median number of avoid medications taken by CN clients was 1 [IQR 1, 2]. The maximum number of medications taken by CN clients and listed as avoid was 5. Table 32 shows the number of clients (n = 7,537, 46.0% of all CN clients with medication data) taking the minimum and maximum number of medications listed as avoid. The most frequently used type of medication were

[28] Scott, I.A. et al. (2015). Reducing inappropriate polypharmacy: the process of deprescribing. *JAMA Intern Med*, 175(5), 827-834.
[29] Jano, E., & Aparasu, R. R. (2007). Healthcare outcomes associated with Beers' criteria: a systematic review. *Ann Pharmacother*, 41(3), 438-447.

Benzodiazepines (49%) followed by anti-depressants (37%).

Table 31. Top 10 medications supplied (n=16,445)

Medication	Frequency
Paracetamol	114,450
Atorvastatin	90,541
Esomeprazole	84,878
Pantoprazole	78,053
Furosemide (Frusemide)	59,816
Warfarin	54,507
Cefalexin	54,442
Perindopril	49,703
Clopidogrel	48,426
Simvastatin	48,081

Table 32. Number of clients with medication taking 1-5 Beers Criteria® avoid medication

Number of medications	Number of Clients (%)
1	5,330 (71)
2	1,832 (24)
3	348 (5)
4	25 (<1)
5	2 (<1)

Table 33. Number of medications taken per each category of Beers Criteria® avoid medication, from most frequent to least frequent (n=7,537)

Beers Criteria® **avoid medications**	Frequency
Benzodiazepines (short and long acting)	68,055
Antidepressants	51,633
Nifedipine (immediate release)	7,693
Anticholinergic antispasmodics	5,789
Hypnotics (z-drugs)	2,660
Sulfonylureas (long acting)	2,212
Indomethacin & Ketorolac (includes parenteral)	502
Antithrombotics	419
Antiparkinsonian agents	170
First generation antihistamines	159

Differences in number of Beers Criteria® avoid medications between CN characteristics

There were no differences in the mean number of Beers Criteria® avoid medications taken by Veterans or Partners (P=0.59), as shown in Table 34.

Table 34. Difference in number of Beers Criteria® avoid medications by the relationship type

Relationship Type Code	Median [IQR]	Mean (SD)	P value*
Veterans (n=3,154)	1 [1,2]	1.35 (0.59)	0.59
Partners (n=4,383)	1 [1,2]	1.34 (0.58)	

* Independent t test

The number of Beers Criteria® avoid medications taken by clients who received the CN program alone, or in combination with VHC services was calculated. Clients receiving the combined CN and VHC services had statistically significantly more Beers Criteria® avoid medications than those receiving CN service only (P<0.001). There was no significant difference in the number of Beers Criteria® avoid medications between CN clients with and without dementia (P=0.94). See Table 35.

Table 35. Difference in number of Beers Criteria® avoid medications by the types of program and by dementia status

Programs Received	Median [IQR]	Mean (SD)	P value*
CN (n=2,087)	1 [1,1]	1.29 (0.54)	<0.001
CN and VHC (n=5,450)	1 [1,2]	1.37 (0.60)	
With Dementia (n=1,439)	1 [1,2]	1.35 (0.58)	0.94
Without Dementia (n=6,098)	1 [1,2]	1.35 (0.59)	

* Independent t test

Research Question 2: Generic protective factors for community clients and health care utilisation

RQ2. Are there generic protective factors that arise from receiving care in the home or that relate to the cohort of clients that receive DVA funded CN services? How are these different to / how do they interact with any protective factors that are specific to CN services?

This section provides detailed methodological approaches and results that specifically answer the second research question concerning generic protective factors for community care clients compared between the CN service cohort and the non-CN service cohort (i.e., VHC clients).

Comprehensive geriatric assessment and service delivery in the home may delay the development of disability,[30] by reducing barriers for those with complex needs to present for treatment - particularly in the case of complex medical morbidity. An Australian study examining home care service use by a large non-profit in Australia has also found that each hour of service provided per week was associated with a lower risk of entry into residential care.[31] By characterising the differing needs of clients who receive CN services (versus those who do not) and service utilisation patterns (i.e., allied health service use data) between these groups, identification of generic protective factors were explored. The main question is therefore addressed by answering the two sub-questionsRQ2.1 and RQ2.2.

RQ2.1. What are the characteristics of clients accessing the CN program, and how do they differ from DVA clients not receiving the CN program?

Data and Analysis

A longitudinal study of Australians has identified a number of factors that are protective against permanent residential care placement.[32] In particular; age, gender, marital status, medical comorbidity and dependency level have been shown to be important baseline characteristics with strong predictive value. Based on these data and other available demographics included in the database, statistical summaries characterising DVA clients receiving and not receiving the CN nursing program (i.e., CN service clients vs. VHC service clients) were generated and compared. Characteristics that were analysed in this project included following variables:

- Age at their first VHC service
- Relationship type (Veteran versus Partner)
- Medical burden (RxRisk)
- Mental health issue as well as the indicator of having dementia
- Geographical area

Outcome

As shown in Table 36 (and Table 14), a number of differences existed between clients receiving both CN and VHC services, and VHC services only. Clients who received combined CN and VHC services accessed their services (based on the first CN service date) later by approximately 3.5 years than those who did not receive CN services. The distribution across age groups illustrates this further. For clients who received both CN and VHC services, 80.5% received their first CN services from 80 years of age and over, whilst for clients who received VHC services only, 60.0% received their first VHC services from 80 years of age and over. Compared to Partners, Veterans were less likely to use combined CN and VHC services (43.2%). Just under 50% of Veterans used VHC services.

[30] Visvanathan, R. et al. (2019). Prolonged Wait Time Prior to Entry to Home Care Packages Increases the Risk of Mortality and Transition to Permanent Residential Aged Care Services: Findings from the Registry of Older South Australians (ROSA). The journal of nutrition, health & aging, 23(3), 271-280.
[31] Jorgensen, M. et al. (2018). Modeling the Association Between Home Care Service Use and Entry Into Residential Aged Care: A Cohort Study Using Routinely Collected Data. J Am Med Dir Assoc, 19(2), 117-121.e113.
[32] McCallum, J. et al. (2005). Patterns and predictors of nursing home placement over 14 years: Dubbo study of elderly Australians. Australasian Journal on Ageing, 24(3), 169-173.

Table 36. Differences between clients receiving VHC or CN and VHC services

Characteristics	CN and VHC (n=13,970)	VHC (n=13,697)
Age at first service, Median [IQR]	86.5 [82.0, 89.5]	83.0 [72.6, 87.5]
Age at first service (%)		
60-69	1,043 (7.5)	2,803 (20.5)
70-79	1,672 (12.0)	2,681(19.6)
80-89	8,263 (59.1)	6,709 (49.0)
90-99	2,992 (21.4)	1,504 (11.0)
Veterans (%)	6,033 (43.2)	6,823 (49.8)
Medical burden, Median [IQR]	6.0 [4.0, 7.0]	5.0 [3.0, 7.0]
Geographical area (%)		
Major Cities of Australia	7,451 (53.3)	7,586 (55.4)
Inner Regional Australia	3,840 (27.5)	3,731 (27.2)
Outer Regional Australia	2,347 (16.8)	2,077 (15.2)
Remote Australia	200 (1.4)	204 (1.5)
Very Remote Australia	116 (0.8)	92 (0.7)
Missing	16 (0.1)	7 (0.1)
Dementia (%)	2,777 (19.9)	1,681 (12.3)
Mental health issue (%)	5,915 (42.3)	5,876 (42.9)

Medical burden within six months of the first service was similar between CN & VHC services combined and VHC services only, with medians of 6 and 5, respectively on the RxRisk Index. The groups were similarly distributed across the different geographical areas of Australia. The majority of clients in both groups (approximately 54%) resided in major cities of Australia, with decreased proportions living in inner regional, outer regional, remote, and very remote Australia (respectively). Clients who used both CN and VHC services had higher rates of dementia, when compared with clients who only accessed VHC services. Rates of dementia among CN and VHC users were 19.9%, whilst only 12.3% of VHC only clients met the study criteria for dementia. Rates of mental health treatment within the past 5.5 years were similar between groups. For clients who received both CN and VHC services, 42.3% had received treatment in the past 5.5 years, with clients who only received VHC services showing very similar rates (42.9%).

RQ2.2. Are CN services associated with healthcare utilisation?

Data and Analysis

Multiple chronic conditions (multimorbidity) are linked to poor outcomes that increase the risk of entry to permanent residential care, such as a decline in independence, increased risk of hospitalisation and cognitive decline in community-dwelling older adults.[33] Utilisation of healthcare services such as allied health is associated with a decreased likelihood of hospital admission particularly among older adults with dementia, where multi-morbidity is common. As the CN program assesses the clients' needs in the home, and therefore avoids the need for the client to present for primary health care services, the potential for more adequate healthcare utilisation to address multi-morbidity may be protective.

Factors and interactions for the project included:

- Number of claims (e.g., allied health claims; yearly)
- Service item category
- Interaction between CN service hours and claims

Allied Health (AH) Service Characteristics

Allied health services were identified by selecting items with the prefix 'AH' in the database. Dates of service were filtered to include only those that were billed during the study monitoring period, after the first date of CN service, and before the last date of CN service. Seventeen different services used by 15,258 CN clients were identified by this search, shown below ranked by frequency. See Table 37.

[33] Mondor, L. et al. (2017). Multimorbidity and healthcare utilization among home care clients with dementia in Ontario, Canada: A retrospective analysis of a population-based cohort. PLoS Med, 14(3), e1002249.

Table 37. Frequency of services billed for CN clients, ranked from highest to lowest number of services billed.

Rank	Service Type	Number billed	Rank	Service Type	Number billed
1	Physiotherapy	569,014	10	Social Work	6,838
2	Podiatry	284,414	11	Osteopathic	4,992
3	Occupational Therapy	187,172	12	Psychology	3,969
4	Dental	164,439	13	Diabetes Educators	562
5	Exercise Physiologists	105,082	14	Unknown	106
6	Optical	61,283	15	Orthoptists	49
7	Dietetics	47,245	16	Orthotists	17
8	Chiropractic	16,463	17	Miscellaneous Services	7
9	Speech Pathology	7,347			

Of the listed AH service types above, the median number of AH services used by each client was 3 [2, 5]. Table 38 lists the median number of times clients used each of the services, excluding services with a frequency of less than 600 (rank 14-22).

Table 38. Median number of sessions used by CN clients for each category of allied health service ranked from most to least used services

Rank	Service Type	Median number of sessions used per client
1	Exercise Physiologists	28
2	Physiotherapy	21
3	Podiatry	14
4	Chiropractic	12
5	Dental	12
6	Osteopathic	9
7	Occupational Therapy	8
8	Dietetics	6
9	Optical	6
10	Social Work	6
11	Psychology	4
12	Speech Pathology	4
13	Diabetes Educators	2

Outcome: CN client and service factors associated with AH usage

A linear regression model examining CN client and service factors associated with AH usage was created. Data for clients who received less than 150 AH service sessions (visits), and clients who had less than 150 CN clinical and personal service items were included. The distribution of values for clinical care services, personal care services and total number of AH services identified outliers (those with extreme values) above values of 150 and therefore these variables were capped at a maximum of 149 for this model. The clients included in the model (n = 12,460) used AH service a median of 24 times [IQR 8, 60] during their monitoring period. Nearly half of those AH clients in the dataset died prior to entering permanent RAC (n = 5,933; 47.6%), with lower portions eventually entering permanent RAC (n = 4,372; 35.1%) or remaining at home throughout the study monitoring period (n = 2,155; 17.3%).

Client factors of age at first CN service, medical burden score for the first six months after CN service, whether the client had dementia, and whether the client was a Veteran or a Partner were included. In addition, CN service factors of whether they received CN services only or CN and VHC services, and the total number of clinical care and personal care visits during their monitoring period were included.

Table 39. Linear model examining predictors of total number of AH service sessions for CN clients used during the study monitoring period.

Variables	Estimate (B)	Standard Error	t-value
Age at first service (per 10 years)	-1.71	0.43	-3.98
Medical burden (RxRisk)	0.45	0.10	4.48
Dementia	-1.88	0.76	-2.47
Partners	2.56	0.63	4.07
Received VHC	9.19	0.66	13.90
No. of Clinical care services	0.67	0.02	33.09
No. of Personal care services	0.43	0.02	19.86
Adjusted R^2 = 0.196			

As shown in Table 39, the model accounted for approximately 20% of variance (adjusted $R^2 = 0.196$) associated with the total number of AH service sessions used by CN clients. The B coefficient represents the change in mean number of AH service sessions used for each one unit change in the predictor. Increased age at first CN service was associated with reduced use of AH service sessions. For every ten years increase in age at first service, the average total number of AH service sessions used by clients reduced by approximately 1.7 (B = -1.71, t = -3.98, P = <0.001). For clients entering the service at 91 years of age compared to the mean age of 86 years, this would mean a decrease of one AH service session over the total monitoring period. Increased medical burden was associated with increased AH service usage. For every one point increase in the RxRisk index, clients used approximately 0.5 more AH service sessions (B = 0.45, t = 4.48, P = <0.001). A client with medical burden of 7 would therefore receive, on average, 1 more AH service session than a client with medical burden of 5. Clients with dementia used 1.9 fewer AH service sessions (B = -1.88, t = -2.47, P = 0.014). Compared to Veterans, Partners used approximately 2.6 more AH service sessions over the course of their monitoring period (B = 2.56, t = 4.07, P = <0.001). Client factors of older age and dementia reduced the number of AH sessions, while medical burden and being a partner increased the number of AH service sessions.

CN service factors played the greatest role in predicting the use of AH services. Receiving both CN and VHC services during the monitoring period was associated with higher AH service use, with clients receiving both services using approximately 9.2 sessions more AH services than clients who only received CN services (B = 9.19, t = 13.90, P = <0.001). The number of CN clinical services was most predictive of the number of AH service sessions used over time. For each extra month of CN clinical services, clients used approximately 0.7 additional AH service sessions (B = 0.67, t = 33.09, P = <0.001). Clients who received CN services for 2 years continuously would have received, on average, 16 AH service sessions and those who received CN services for five years continuously would have received 40.2 AH service sessions. The number of personal care services used was also strongly predictive of increased AH service usage. For each additional month of personal care services, CN clients used an additional 0.4 AH service sessions (B = 0.43, t = 19.86, P = <0.001). CN clients who received continuous personal care services for 2 years received 10 AH service sessions, while clients who received five years of continuous personal care services would have received 26 AH service sessions.

Research Question 3: Trajectory of Community Nursing Program Clients

RQ3: How does the trajectory from receiving care at home to moving to residential aged care differ between clients who receive CN services at varying degrees, those that don't receive CN services and an age/gender matched sample of the general population?

This section provides detailed methodological approaches and results that specifically answer the third research question concerning the trajectory of CN clients from receiving care at home to moving to residential aged care. Comparisons are made between the CN clients and the VHC clients, and between the DVA cohorts (CN clients) and the general population (home care package clients) in RQ3.1 and RQ3.2 respectively.

RQ3.1. What are the differences at entry to permanent residential care or death between clients who receive CN services, and clients who do not receive CN services?

Data and Analysis

Reduced independence is one of the most important predictors of entry to residential care for older Australians. The goal of community home programs is to help clients maintain independence and stay home as long and well as possible. Data analysis for this question focused on whether there were any differences between CN program clients and those who did not receive CN services (VHC clients) in terms of permanent RAC admission and death as primary outcomes. Factors of interest included:

- Age at first VHC service, RAC admission and death
- Relationship type
- Medical burden (RxRisk) in the first six months after their service
- Indicator of having dementia
- Mental health issue

Outcome: Differences between clients receiving CN and VHC services or VHC services only
DVA clients who received either combined CN and VHC services, or VHC services only, and were admitted to permanent RAC or died at home were selected from the dataset. Table 40 summarises differences between groups at their age at the event (permanent RAC or death at home), and their medical burden six months after their first service.

Compared to those who received combined CN and VHC service, clients who received VHC services only were 0.5 years (6 months) younger when they entered RAC, and were 0.6 years (7 months) younger when they died. Those clients who received VHC only prior to RAC admission had the same medical burden as their counterparts and was slightly lower in VHC only compared to CN & VHC clients for death at home.

Table 40. Differences between clients in age at permanent RAC admission or death and medical burden for clients receiving CN and VHC or VHC only.

Variable	Permanent RAC		Death at home	
	CN&VHC (n=4,723)	VHC (n=2,960)	CN&VHC (n=5,979)	VHC (n=3,756)
	Median [IQR]	Median [IQR]	Median [IQR]	Median [IQR]
Age at RAC entry/Death at home	90.8 [87.7, 93.5]	90.3 [87.2, 92.9]	89.7 [85.8, 92.6]	89.1 [85.0, 92.1]
Medical burden (RxRisk)	5.0 [4.0, 7.0]	5.0 [3.0, 7.0]	6.0 [4.0, 8.0]	5.0 [3.0, 7.0]

Clients with permanent RAC entry: There were small differences at age of entry to permanent RAC between clients who received CN and VHC services, and those who received VHC services only (see Table 41)

Table 41. Differences between clients receiving CN and VHC or VHC only: ***Permanent RAC entry***

Variables	CN&VHC N (%) (n=4,723)	VHC N (%) (n=2,960)
Age at first service: Median [IQR]	87.6 [84.5, 90.1]	86.8 [83.7, 89.4]
Relationship type (Veterans)	1612 (34.1)	1181 (39.9)
Medical burden (RxRisk) for first 6 months, Median [IQR]	5.0 [4.0, 7.0]	5.0 [3.0, 7.0]
Geographical Area		
Major Cities of Australia	2,621 (55.5)	1,747 (59.0)
Inner Regional Australia	1,248 (26.4)	720 (24.3)
Outer Regional Australia	754 (16.0)	441 (14.9)
Remote Australia	63 (1.3)	38 (1.3)
Very Remote Australia	34 (0.7)	13 (0.4)
Missing	3 (0.1)	1 (<0.1)
Age at entering permanent RAC, Median [IQR]	90.8 [87.7, 93.5]	90.3 [87.2, 92.9]
Dementia	1652 (35.0)	991 (33.5)
Mental health issue	2,022 (42.8)	1,097 (37.1)

Note: Statistics are frequency (%)

As shown in Table 41, based on the median age of entry, clients who received both CN and VHC services were 0.5 years (6 months) older when they entered permanent RAC. In terms of medical burden, the median medical burden of both CN & VHC and VHC clients was 5. The rates of dementia similar between groups at entry to permanent RAC (35% for the CN & VHC group and 34% for the VHC only group). There were differences between groups in mental health. Clients who received both CN and VHC services prior to entering permanent RAC had higher rates of mental health treatment usage in the past 5.5 years (42.8%) compared to VHC clients (37.1%) prior to entering permanent RAC.

Clients who died at home: Some differences were found between clients who received CN and VHC services, as opposed to clients who received VHC services only (see Table 42).

Clients who received both CN and VHC services were slightly older when they died, based on the median age at death, approximately 0.6 years (7 months) older than clients who received VHC services only. Medical burden was slightly higher in CN & VHC clients. Rates of dementia differed between the two groups, with clients who received both CN and VHC services having higher rates of dementia than clients receiving VHC only (13.7% and 11.0%, respectively). Clients who received both CN and VHC services also had higher rates of mental health treatment in the past 5.5 years than clients who received only VHC services (41.6% and 37.7%, respectively).

Table 42. Differences between clients receiving CN and VHC or VHC only: ***clients who died at home***

Variables	CN&VHC (n=5,979) N (%)	VHC (n=3,756) N (%)
Age at first service, Median [IQR]	87.2 [83.4, 90.0]	86.2 [81.5, 89.1]
Relationship type (Veterans)	3266 (54.6)	2122 (56.5)
Medical burden (RxRisk) for first 6 months, Median [IQR]	6 [4, 8]	5 [3, 7]
Geographical Area		
Major Cities of Australia	3,226 (54.0)	2,072 (55.2)
Inner Regional Australia	1,566 (26.2)	940 (25.0)
Outer Regional Australia	1,030 (17.3)	627 (16.7)
Remote Australia	93 (1.6)	80 (2.1)
Very Remote Australia	56 (0.9)	34 (0.9)
Missing	8 (0.1)	3 (0.1)
Age at death, Median [IQR]	89.7 [85.8, 92.6]	89.1 [85.0, 92.1]
Dementia	822 (13.7)	413 (11.0)
Mental health issue	2,487 (41.6)	1,417 (37.7)

RQ3.2. What are the differences in independence and age at entry to permanent residential care between the general population and DVA clients?

Data and Analysis

A National Historical cohort of the Registry of Senior Australians (ROSA) dataset was used as a representative sample of the general population. This database contains nationwide data from 1997-2017. The ROSA is a South Australia based Clinical Quality Registry developed to support the monitoring and evaluation of the quality of ageing and aged care services provided to older Australians. The Historical National Cohort of the ROSA dataset is comprised of linked de-identified data obtained from the Australian Institute of Health and Welfare's (AIHW) National Aged Care Data Clearinghouse, which 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.[34] Previous research examining residential respite care use and admission to residential care suggests this database contains outcomes and covariates similar to this proposal for analysis of the CN client.[35] They included (but were not limited to):

- Entry to residential care (yes/no)
- Duration from aged care assessment to entry to residential care in months
- Date of death
- Demographic and family status information
- Functional status (activity limitations)
- Health conditions (including dementia status and chronic disease)

The sampling frame for the general population drawn from the ROSA dataset was all recipients of the Home Care Package (HCP) program nationally during the study period. The Home Care Package (HCP) program is an Australian Commonwealth government subsidised program, which aims to provide support to assist older people to live independently in their own homes. The study cohort included all individuals aged ≥65 years old (and ≤100 years) accessing HCP for the first time between 1st January 2010 and 31st December 2014 and who do not have a DVA card, with a follow up period to June 30th, 2017. DVA card status was used to exclude individuals and was ascertained using the concession card status information collected in the PBS dispending records prior to the access to HCP. HCP level presented was the level of care first received; it was possible individuals changed care level during the study period (generally to a higher level of care).

In addition to the total recipients of HCP nationally, a sample cohort that was of similar age and gender distribution as the DVA cohort being studied was identified. This selected sample was created via random selection of 1:1 individuals according to the age*gender distribution of the group in the DVA population being analysed by the Project team. No other variables were used to select the sample cohort (e.g., year of care entry). No identifiers or individual level information was used for 'matching' and no data was linked for this purpose. The age group 60-64 years, which was included within the DVA dataset, was not matched to the

[34] Inacio, M.C. et al (2020). Factors associated with accessing aged care services in Australia after approval for services: Findings from the historical cohort of the Registry of Senior Australians. Australasian Journal on Ageing, 39(3), e382-e392.
[35] Harrison, S.L. et al. (2020). Residential Respite Care Use Is Associated with Fewer Overall Days in Residential Aged Care. J Am Med Dir Assoc, 21(5), 653-659.e652.

ROSA as HCP eligibility is limited to those aged 65 years or older (or 50 years or older for Aboriginal or Torres Strait Islander people). More details are provided in Appendix B ROSA DVA Home Care Comparison Report.

CN client data was also censored at June 30th, 2017 for both CN and CN and VHC recipients. Additionally, DVA clients using both CN and VHC services and who received their first CN service after 2014 (i.e., received VHC services first; n = 2,280) were excluded to match the general population sample.

All analyses are descriptive. The sample and outcomes are described using frequencies, proportions, medians and interquartile ranges (IQR). The cumulative incidence of mortality and entry into RAC are described using a cumulative incidence plot for the whole cohort up to June 30th, 2017, regardless of any gaps in HCP or CN program use in that time. Figures were created using SAS 9.4 and RStudio (package networkD3).

Sample comparisons

Of the matched sample of 20,980 HCP recipients, 2,146 (10.2%) had dementia and 3,531 (16.8%) were receiving HCP care levels 3-4 (highly dependent[36]). The median age at first service was 86 (IQR 82-89) and 11,863 (56.5%) were female. As shown in Table 43, the general population data for HCPs was well matched to the CN data, with age at first service, gender, and medical burden similar between groups.

The crude median for age at entry to permanent RAC differed between groups (HCP and CN), with CN clients being approximately three years older when entering into RAC (Table 43). On further examination, this was particularly evident in the first quartile of the estimates (bottom 25% of clients), with a difference of four years in this lower range. The main differences in age of entry to RAC between these groups were between 84-88 years of age, with a larger proportion of CN clients entering permanent RAC in their late 80's as opposed to mid-80's. The 3rd quartile (top 25% of clients) was similar to HCP recipients, with CN clients entering approximately two years later. This suggests that by age 91 years, or 93 years, a similar proportion of clients from each group was likely to have been admitted to permanent RAC.

Table 43. Comparison between matched HCP sample and CN client sample

Characteristics	**HCP clients (n=20,980)**	**CN clients (n=20,980)**
Year (new entrants)^		
2010	3,577 (17.0)	2,897 (13.8)
2011	4,232 (20.2)	4,766 (22.7)
2012	4,292 (20.5)	4,800 (22.9)
2013	4,358 (20.8)	4,359 (20.8)
2014	4,521 (21.5)	4,158 (19.8)
Age at first service, Median [IQR]	86 [82,89]	87 [83, 90]
Female (%)	11,863 (56.5)	11,863 (56.5)
Aboriginal/Torres Strait Islander (%)	550 (2.6)	50 (0.2)
Remoteness (%)		
Major Cities	13,218 (63.0)	11,443 (54.5)
Inner Regional	4,651 (22.2)	5,491 (26.2)
Outer Regional	2,398 (11.4)	3,531 (16.8)
Remote/ Very Remote	339 (1.6)	515 (2.5)
Missing	374 (1.8)	0 (0.0)
Number of RxRisk comorbidities, Median [IQR]	5 [3,7]	5 [3,7]
Number of RxRisk comorbidities (%)		
0-4	9,088 (43.3)	9,017 (43.0)
5-7	8,172 (39.0)	7,379 (35.2)
8+	3,720 (17.7)	4,584 (21.8)
Dementia (%)	2,146(10.2)	2,001 (9.5)
Age at first RAC service*, Median [IQR]*	88 [84,91]	91 [88, 93]
Age at death*, Median [IQR]*	89 [86,92]	91 [87, 94]

^Those who access the service for the first time (HCP or CN); *Those with RAC entry; **Those who died (with or without RAC)

Outcome: Time to admission to permanent RAC and death

Table 44 shows the number of HCP and CN clients at each event (RAC entry, death at home and no event) and the duration of each event. The largest differences between groups were seen in the rate of death at home prior to permanent RAC placement. Whilst HCP recipients were much more likely to enter permanent

[36] See Appendix B. ROSA report. This care level cannot be compared between HCP and CN services as CN services do not have care level distinctions in their service provision.

RAC (56.0% of HCP clients compared to 25.9% of CN clients), CN clients were much more likely to die at home (40.7% of CN clients compared to 25.5% of HCP clients) when compared over the same period.

Coupled with the later age of entry into permanent RAC based on the median estimates from Table 43, this suggests that CN clients are able to remain at home long enough that permanent RAC admission occurs in the minority of clients. While HCP clients stayed at home for 14 months prior to RAC admission or death at home, CN clients remained at home for 28 months before RAC admission and 16 months before death. CN and HCP clients with dementia were much more likely to enter RAC than clients without dementia, with entry occurring two months earlier for CN clients and three months earlier for HCP clients than those without dementia. CN clients with dementia remained at home prior to RAC admission markedly longer than HCP clients with dementia (26 months and 12 months respectively).

Table 44. Crude outcomes –Matched Sample of Home Care Package Recipients by Dementia Status

Outcome	HCP All (n=20,980)	HCP Dementia (n=2,146)	HCP No dementia (n=18,834)	CN All (n=20,980)	CN Dementia (n=2,001)	CN No dementia (n=18,979)
RAC Entry (%)	11,750 (56.0)	1,595 (74.3)	10,155 (53.9)	5,430 (25.9)	1,122 (56.1)	4,308 (22.7)
***Months to RAC entry**, Median [IQR]*	14 [6, 27]	12 [5, 22]	15 [7, 28]	28 [14, 42]	26 [13, 40]	28 [14, 43]
Death at home (%)	5,349 (25.5)	363 (16.9)	4,986 (26.5)	8,544 (40.7)	511 (25.5)	8,033 (42.3)
***Months to death,** Median [IQR]*	14 [5, 29]	15 [5, 28]	14 [5, 29]	16 [5, 31]	22 [13, 33.5]	15 [5, 31]
No event (%)	3,881 (18.5)	188 (8.8)	3,693 (19.6)	7,006 (33.4)	368 (18.4)	6,638 (35.0)
***Months to follow-up,** Median [IQR]*	48 [39, 63]	47 [39, 61]	48 [39, 63]	53 [41, 67]	50 [38, 65]	53 [41, 67]
Overall death (%) (follow-up until 30th Jun 2017)	13,147 (62.7)	1,418 (66.1)	11,729 (62.3)	11,647 (55.5)	1,156 (57.8)	10,491 (55.3)
***Months to death,** Median [IQR]*	25 [11, 40]	27 [14, 42]	24 [11, 40]	23 [8, 40]	35 [20, 49]	21 [7, 39]

As shown in Table 45 below, the cumulative incidence of entry into RAC and the competing risk of death differed markedly between HCP and CN clients. At five years after first access to HCP, 57.6% of HCP clients had entered RAC and 26.3% had died before entering RAC. As shown in Figure 2, the median time to RAC entry for the HCP cohort (point at which 50% of people accessed RAC) was about 39 months (1,185 days). On the other hand, at five years after first access to a CN service, 26.6% of DVA clients had entered RAC and 41.3% had died at home before entering RAC. The same median time to RAC entry for the CN cohort could not be determined due to the fact the point at which 50% of people accessed RAC went well beyond five years (in fact, it was well beyond 60 months in further examination of the CN data).

Table 45. Cumulative incidence (%) for permanent RAC admission with death as a competing risk and for Death at home with RAC admission as a competing risk for all CN and HCP clients from first service to 5 year follow-up

	Clients	Event	1 year	2 years	3 years	4 years	5 years
All	**CN Clients**	RAC admission (%)	5.2	10.9	16.8	22.2	26.6
		Death at home (%)	16.8	26.0	33.1	38.0	41.3
	HCP Clients	RAC admission (%)	24.6	39.7	48.4	53.9	57.6
		Death at home (%)	11.5	17.2	21.4	24.2	26.3
Clients with Dementia	**CN Clients**	RAC admission (%)	10.2	21.0	32.4	42.5	50.3
		Death at home (%)	6.8	14.7	20.9	25.0	27.6
	HCP Clients	RAC admission (%)	38.0	58.3	67.7	72.8	76.0
		Death at home (%)	7.2	11.5	14.4	16.2	17.7
Clients without Dementia	**CN Clients**	RAC admission (%)	4.1	8.5	13.1	17.4	21.0
		Death at home (%)	19.1	28.7	35.9	41.0	44.6
	HCP Clients	RAC admission (%)	23.1	37.6	46.2	51.7	55.5
		Death at home (%)	12.0	17.9	22.2	25.1	27.3

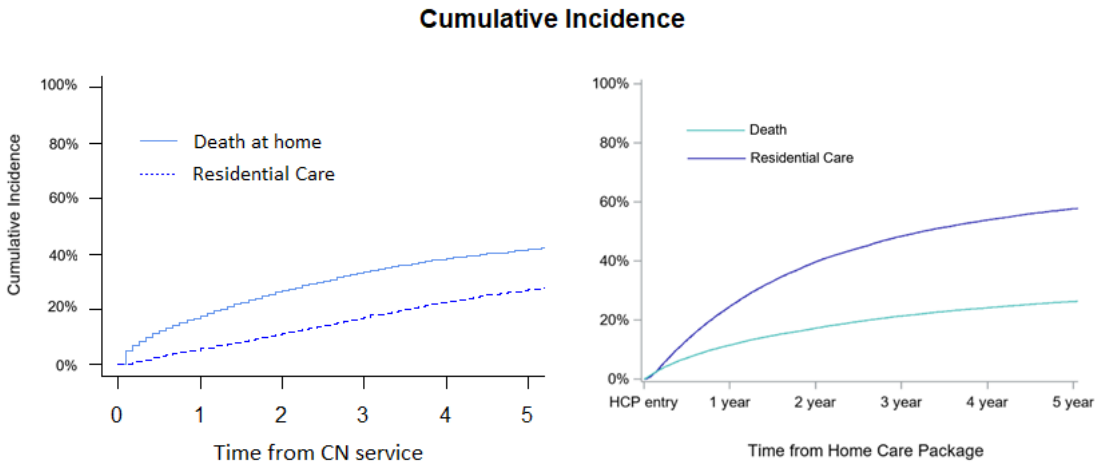
Table 45 also highlights the significance of dementia in the incidence for permanent RAC admission. Cumulative incidence of entry into permanent RAC markedly differed between clients with and without dementia. At five years after first access to their respective service, 76.0% of HCP clients with dementia (vs 55.5% without dementia) and 50.3% of CN clients with dementia (vs 21.0% without dementia) had entered

permanent RAC; 17.7% of HCP clients with dementia (vs 27.3% without dementia) and 27.6% of CN clients with dementia (vs 44.6% without dementia) had died before entering RAC. As shown in Figure 2, the median time to RAC entry was about 18 months for the HCP cohort with dementia, and about 57 months for the CN cohort with dementia.

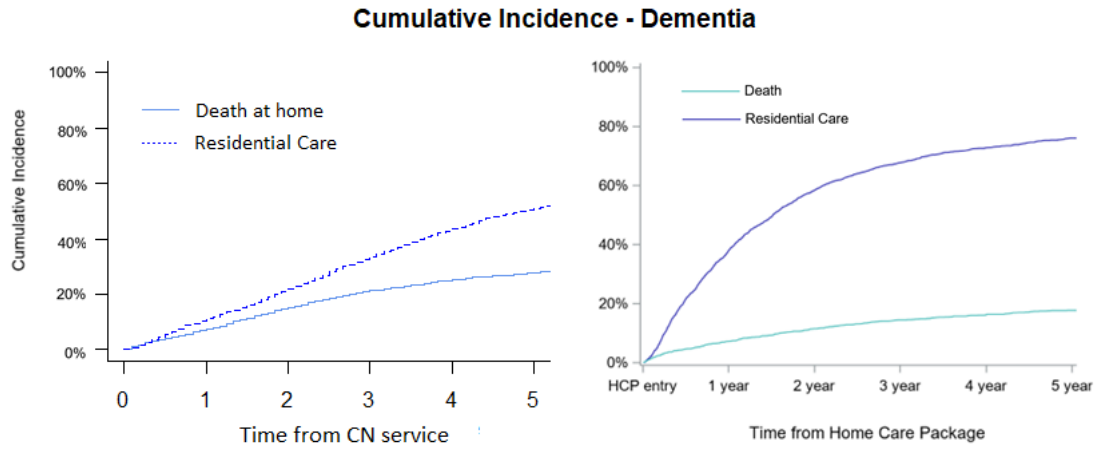
Notably, the cumulative incidence of death at home in Table 45 does not include those who entered permanent RAC and died subsequently in an RAC. Having a higher incidence of death at home (as shown in the case of the CN cohort) does not suggest there is a higher mortality among CN clients. It simply suggests that as most DVA clients are able to remain at home longer than HCP clients, they are more likely to die at home than their counterparts.

Figure 2. Representation of the comparisons for each cohort: Total cohorts, cohort with dementia and cohort without dementia receiving either CN services or HCP.

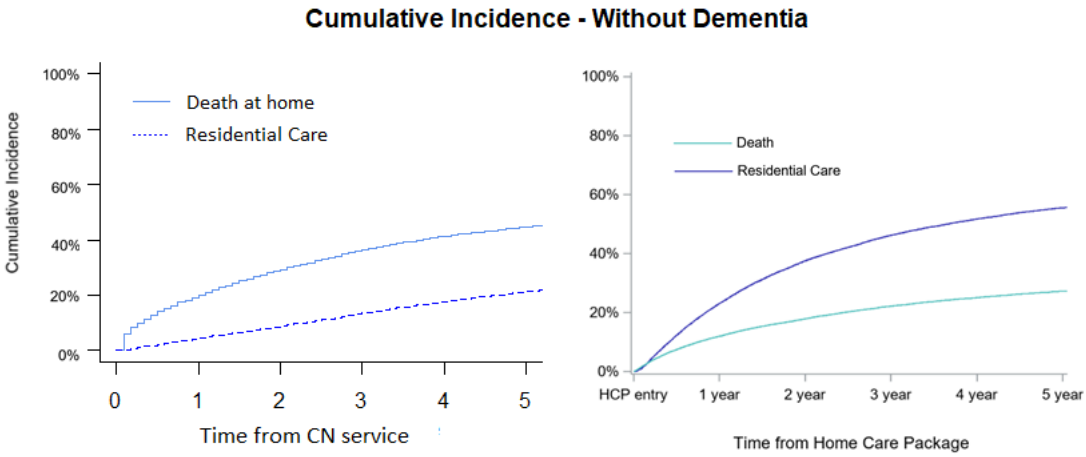
All Clients:



Clients with Dementia:



Clients without dementia:



Summary of findings

Protective factors for community care clients (Research Question 1)
Key CN program factors associated with a reduced risk of entering permanent RAC were receiving clinical care or combined clinical and personal care (vs personal care only), having episodic service delivery and receiving the majority of care from registered nurses (RNs) (vs personal care workers, PCW).

Clients who: accessed the CN service at an earlier age; were Veteran or male (vs Partner or female); not living alone; had no dementia; or had a smaller number of medical conditions, had a reduced of risk of entering permanent RAC.

Those CN service-related and client-related protective factors, bar living alone, were consistent across two client groups (those who entered RAC within the first 18 months and after 18 months from the first CN service). Living alone did not affect the risk of permanent RAC placement in the first 18 months; however, those who lived alone throughout their entire monitoring period in the 19 months onwards after their first CN service were 22% more likely to enter permanent RAC. Extant findings by other researchers in this field support these findings concerning the client-related protective factors against permanent RAC placement.

Injury-related hospital admission, especially due to a fall-related injury, is known to be strongly associated with first entry to permanent RAC, particularly for older adults with dementia. Only a small number of CN related factors were found to be associated with a reduced risk of acute care hospitalisation: clients receiving personal care only appeared to have fewer acute care admissions per year than those receiving clinical care only, or combined care. Clients with a higher total number of clinical care visits or personal care visits had a reduced risk of hospitalisation than those who received less clinical care or personal care visits.

However, clients receiving clinical care, or combined care spent fewer days per admission in hospital. Having a higher total number of clinical care services was associated with a reduced risk of fall-related hospitalisation.

Generic protective factors for community clients and allied health utilisation (AH) (Research Question 2)
Four CN client related factors were associated with an increased use of AH services: an earlier age at first CN service; an increased medical burden; a negative indicator for dementia; and being a Partner or female.

CN service factors played the greatest role in predicting the use of AH services:

- The number of CN clinical services was most predictive of the number of AH service sessions used over time: for each extra month of CN clinical services, clients used approximately 0.71 additional AH service sessions.
- The number of personal care services used was also strongly predictive of increased AH service usage: for each additional month of personal care services, CN clients used an additional 0.45 AH service sessions.

Trajectory of Community Nursing Program Clients (Research Question 3)
The findings of RQ3 provide much needed evidence for the Australian community based aged care services. The largest differences between those who received the CN program and those who received HCP are seen in the rate of death at home prior to permanent RAC placement. Whilst HCP recipients were much more likely to enter permanent RAC, CN clients were much more likely to remain at home and die at home. Coupled with the later age of entry into permanent RAC, this suggests that CN clients are able to remain at home long enough that permanent RAC admission occurs only in the minority of clients.

Furthermore, at five years after first access to HCP, 58% of HCP clients had entered RAC and 26% had died before entering RAC. The median time to RAC entry for the HCP cohort was about 39 months. In the same period, only 27% of DVA clients had entered RAC and 41% had died at home before entering RAC. The median time to RAC entry for the CN cohort went well beyond five years (over 60 months). Importantly, having a higher incidence of death at home (as shown in the case of the CN cohort) does not suggest there is a higher mortality among CN clients. It simply suggests that as most DVA clients are able to remain at home longer than HCP clients, they are more likely to die at home than their counterparts.

PART C: PHASE 2 QUALITATIVE STUDY

Aim and research question

The aim of this phase 2 qualitative study was to explore and evaluate the DVA's Community Nursing (CN) program by examining clients' experiences of the program, their perceptions of whether, how the CN program has assisted them in maintaining their independence, as well as how the CN services can be improved. Phase 2 also aimed to support interpretation of the Phase One findings.

RQ4: Main Research Question: How does the CN program contribute towards clients remaining at home and maintaining their independence?

Sub-question 1. What is the client experience of receiving the DVA CN program? (e.g., type, duration and frequency of service(s) received and the perception about the service quality, usefulness and satisfaction)
Sub-question 2. What aspects of the CN program contribute to clients' wellbeing and assist them to maintain independence at home? (i.e., what is it about the CN service that helps/does not help them to remain at home?)
Sub-question 3. From the client's perspective, how can the CN program be further improved?

Recruitment of research participants

Eligibility criteria

These were: DVA clients who first enrolled in the CN program from 2010-2014; having received a minimum of one month of CN services; who were still at home; who could communicate in English (conversational English capability); and who have provided consent to participate in the study.

People who required assistance during the interview due to communication difficulties such as hearing and verbal communication issues, or any other health or non-health related difficulties, could nominate their family carer to assist their interview. The term family carer in this project was defined as a member of the family, a relative or a friend who takes a primary responsibility for the care of the DVA client and who had a minimum of 7 hours a week contact with the client.

The entitled person had to be a Gold Card holder or an eligible White Card holder to receive the DVA CN program. A person who has a Gold Veteran Gold Card may be a veteran or a veteran's widowed partner or dependent. The Gold Card is gold in colour and includes the words "DVA Heath Card – All Conditions within Australia" or "DVA Health Card – Totally & Permanently Incapacitated". A person who has a Veteran White Card may be a veteran or current or former member of the Australian Defence Force. The White Card is white in colour and includes the words "DVA Health Card – Specific Conditions".

Sampling

Stratified purposeful sampling was undertaken using maximum variation sampling, taking into account of following factors:

- ***Personal factors:*** age (60s, 70s, 80s, and 90s and over), gender of the clients, Aboriginal and Torres Strait Islander status, remoteness area (metropolitan, inner regional, and outer regional areas), dependency level (high/low), family carer status (yes/no), veteran vs. spouse member status, dementia vs non-dementia.
- ***Program factors:*** CN services only vs. CN and Veterans Home Care (VHC) services and duration of enrolment in CN program

A list of potential participants that satisfied the stratification methodology was generated. Using the stratified list, a random subset of unique identifiers was selected (i.e., sampling without replacement). The proportion of clients with dementia and their age group, dependency level and other key strata to be included in the list of potential participants were predefined to ensure adequate capture of characteristics of interest (such as clients with dementia, differing care needs, Indigenous status, etc.). The stratification focused on diversity, and this does not require equal numbers of all factors.

Recruitment

The research team initially sent the DVA team a list of 150 potential participants' unique IDs . The DVA team then matched the 150 unique IDs with their client details and sent a letter of invitation (see details below).

As there was an insufficient level of interest from those initial 150 clients, the research team generated two additional sets of potential participants' IDs taking into account the stratification schedule. The invitation process was repeated three times. Approximately 30-40 participants had been planned for the qualitative study to reach data saturation. However, the response rate was very poor (less than 5%) the project team decided to stop recruitment after five months. Sixteen participants were recruited to the study.

On behalf of the research team, the DVA team sent potential participants a letter of invitation introducing the study, the Participant Information Sheet and a Consent Form, inviting them to take part in an interview. Potential participants were asked to contact researchers directly if they had any questions or concerns regarding the Participant Information Sheet or the Consent Form. Upon the return of the signed consent, sent directly to the research team, the researchers scheduled the interview. The researchers also sent out a brief survey prior to the interview, either via mail or email (participants' choice).

Data collection and analysis

This study involved one-on-one interviews with CN program clients who were living at home. A brief survey of the participants (demographics, clinical and service information) was also conducted upfront. The brief survey questionnaire was sent to participants prior to the interview, either via mail or email upon the receipt of consent form. One-on-one interviews were carried out either via telephone or videoconference (depending on the participant's preference) each taking between 20 and 60 minutes. Participants were asked about their experience and satisfaction with the CN services they have received, as well as their perception about the value of the CN services in improving their independence and wellbeing.

Participants were advised during the consent process that some of the questions asked during the interview may cause emotional distress, and that they could cease participating in the interview at any time. Interviewers were registered nurse researchers who were highly experienced and competent to provide support should any participant concerns arise. Participants were also linked to the appropriate support services, if required (Participant Information Sheet and Consent Form contain contact details for Lifeline, Carer Gateway and Open Arms). In addition, participants were ensured of anonymity and confidentiality of their participation and data.

A brief survey

The survey questionnaire collected demographic information including gender, age, location of residence, DVA card status, whether they have a family carer, qualifying service details and duration of service (for veterans), support received (e.g., HCP, VHC, etc.), and chronic conditions including dementia.

Participants received the questionnaire prior to their interview. They could return the questionnaire to the research team or they could provide the answer during the interview session. The questionnaire was sent once the participants consented to the interview.

Interview

Participants were questioned on the following topics during the interview:

- ***Experience of CN program*** including types of CN program received (e.g. duration of enrolment in the program, personal, care, clinical care, functional and social support), number of visits per week, duration of each visit, service provider information (multiple or single).
- ***Satisfaction of CN program*** including their perception concerning ease of access to the program, satisfaction with the program delivery in meeting their needs, and reasons for their (non)satisfaction.
- ***Perceived impacts of the CN program on client's capacity to remain at home and maintain level of independence*** (e.g., What is it about the CN program that helps or doesn't help them to remain at home? Has the CN program enhanced their independence and sense of wellbeing? Do they think the CN program plays a vital role in keeping them out of hospital and permanent residential aged care? Why do they perceive the way they do about the CN program, with detailed processes/stories?)

- ***Suggestions to improve CN program and any issues or concerns***

The interviews were audio-recorded and fully transcribed by a professional transcriber. NVivo (qualitative research data management and analysis software) was used to assist data analysis and content analysis was used to elicit key issues and patterns of the participants' experiences and perceptions.[37] Findings are presented answering each of the three sub-questions stated above.

Findings

Participant characteristics

Initially, 18 people consented to participate in the study, but one person could not be contacted further, and another person declined the interview due to a sudden health issue. A total of 16 participants completed the brief survey and interview. Three of those participants were assisted by their relatives (2 by their daughter and 1 by their partner) for the survey and interview.

As shown in Table 46, the mean age of the participants was 82 years, with the youngest being in their 60s and the oldest in their 100s. Most of them resided in major cities and lived with their family carers or other people. Six participants reported of having mental health conditions, four having anxiety disorder and/or depression, one having bipolar disorder and one having post-traumatic stress disorder, five having cancer (bowel, prostate or breast cancer) and two having dementia.

Only three participants were current recipients of DVA CN services at the time of the interview (two for Personal Care and for a monthly general health visit). In the past, nine participants received post-surgery care: three received wound care for injuries or other health conditions, and two received personal care. Most participants were referred to CN services, either by hospitals (n=8) or GPs (n=3) while the remaining five could not recall.

Of the15 participants currently receiving other services, seven people were also receiving VHC service via DVA, three were receiving a HCP (Level 1/2) and one was receiving CHSP services. Other current services included travel for a client's treatment via DVA, DVA funded Healthy Heart & Healthy Mind Sessions, Coordinated Veteran's Care, rehabilitation and other assistance with housework. (See Table 46)

Table 46. Participant demographics and service use (n=16)

Characteristics	Number	Characteristics	Number
Age, years, Mean (SD)	82.3 (±10.5)	**CN service received in the past**	
Female	7	Post-surgery care	9
Relationship type		Wound care for other conditions	3
Veteran	9	Personal Care	2
Partner	7	**Other services received in the past**	
Geographical Region		Acute Hospital Care	14
Major Cities of Australia	10	Rehabilitation Service	4
Inner Regional Australia	5	Commonwealth Home Support Programme	3
Outer Regional Australia	1	Veterans' Home Care	2
Living arrangements		Transition care and other intensive supports	3
Live alone	6	Mental health GP package	1
Live with a family carer	8	Physiotherapy	1
Live with other people (family/friend/other)	2	**Current DVA CN recipients**	3
Have a family carer	10	**Other service currently receiving**	
Medical Conditions		Veterans' Home Care	7
Mental Health Conditions	6	Home Care Package (Level 1 or 2)	3
Cancer	5	Commonwealth Home Support Programme	1
Stroke	4	Allied health services	3
Dementia	2	National Disability Insurance Scheme	1
Brain and nerves (e.g., MS or brain trauma)	2	Others	8
Heart disease	2		
Parkinson's disease	2		
Epilepsy, seizures or convulsions	2		

[37] Morse J, Field P (1995) 'Qualitative research methods for health professionals.' 2nd edn. Sage Publications: Beverly Hills, CA.

What is the client experience of receiving the DVA CN program?

Overall satisfaction with DVA

The participants interviewed spoke of their experiences of dealing with both the community nurses and DVA more broadly. While some participants had little distinction between the two, the majority of the participants (12 out of 16) expressed overall satisfaction with DVA. Most spoke of the quality of the nursing staff but several also reported that DVA generally had been of great assistance to them and they were very appreciative of the services provided.

> *I consider myself extremely lucky that I get the services, because I don't know that I'd be in a situation I'm in now if I wasn't getting them. I mean, I don't know what's available outside of DVA. I'm not familiar, but I get the feeling it's not as good. So if that's the case, if I'm right there, then I'm pleased, very pleased with what I get through DVA.* (CN012)

Clients described feeling that they were very well supported as the DVA staff genuinely listened when they had issues, were compassionate, and were determined to remedy the situation.

> *They are very understanding sometimes when you've got a bit of an issue and they seem to grasp it and say, "Hang on, we'll fix that," and, before you know it, it's resolved and then you're happy, you don't have to pay and that's it* (CN013)

> *…it's just an absolute Godsend to have that service available through DVA…If you're wanting a percentage rating, we'd probably be on 99.9"* (CN010)

Overall satisfaction with the CN service

When asked specifically about the Community Nursing program, over half of the participants (8 out of 16) were very positive about the service provided, the quality of the nursing care and the nurses themselves. These CN services that were time limited and for a specific purpose enabled the participants to be discharged earlier from hospital for those who had hospital admissions. Some reported that the nurses were very courteous and punctual, ensuring that they confirmed that the time they would arrive would be suitable for the participant and this was greatly appreciated.

> *The nursing program is for a limited time until of course you get a bit better. They were just good; they were efficient, they were helpful, there's not much more you can say.* (CN007)

Most of the participants commented on the quality of the clinical care that the nurses were providing. This included the level of professionalism that the nurses brought to the participants which ensured that they were treated in a dignified manner that helped the participant feel more relaxed.

> *I couldn't see any ways you could improve on their service; she was just brilliant. And bear in mind that this was a rear end operation, and quite the - what would you call it, an embarrassing situation, but I didn't feel embarrassed at all at any stage, even though it was in the Nether regions.* (CN008)

Additionally, the nurses were seen by many of the participants as being very competent, dedicated and knowledgeable which helped to ensure the participants were well monitored and any change was appropriately dealt with, for example identifying when further medical intervention was required.

Emotional and Social Support

Several participants spoke of the fact that the nurses provided emotional and social support as they would often feel isolated and quite lonely. The nurses were seen as being cheerful, friendly and proactive in asking about their concerns and mental health which was reported as being invaluable in supporting participant wellbeing.

> *And it was really because she'd come, and she'd check my blood pressure. And she's – how've you been? And anything worrying you? And we'd sit down, and she'd have a cup of coffee – bring her coffee in with her and she'd come. And, uh, we'd have a chat for an hour, and I'd feel real good. And she'd say, oh – well, I better get back to work…Like, they will – they'll – they'll do anything they can for you. And they're just lovely. And I actually find it's company.* (CN009)

> *But it is providing social to COVID. I think we both probably would have gone up the wall if we hadn't have had nurses coming two or three times a day. So it actually provided that sort of social contact and that's why I like to have generally the same people so that she knows who they are that are coming. And she responds to them. I mean, she sings songs, she can't talk, but she'll still sing songs, so...* (CN010)

Timely and Tailored Care

Most participants (12 out of 16) spoke of the services provided by the community nurses as being both timely and tailored to their specific needs. Many reported that when they were discharged from hospital having the community nurses service was vital for them to be sent home in the first place. This was especially the case for participants living alone who required assistance with activities of daily living such as showering and dressing in addition to clinical care. For some participants, without the community nurses they would have either had to remain in hospital longer or potentially be placed in residential care.

> *When I came home, I think it was on a Monday and then they had arranged for the nurse to come and shower me and check on me. I think it was three times a week or four times a week, and yeah, that was really good because you don't realise how awkward it is doing without one arm… They were very good and very nice and they would ring and check and tell me what time they were coming. It was very well done.* (CN006)

> *Everybody I know is now very much against going into a regulated retirement nursing home environment, and they would prefer that; to stay in our own homes with community nursing like we're talking about, with that sort of support when you need it.* (CN001)

Flexibility and Specific/task focused care

Despite predominately positive experiences relating to the CN service, there were some reports from participants who felt frustrated with a lack of flexibility when it came to requesting assistance that fell outside of the original referral, ordering consumables or changing visiting times. Several of the participants (5 out of 16) spoke of the task-focused nature of the community nurses' referrals and the lack of flexibility when it came to requests. Participants reported that when asked, the nurses either stated that they were unable to do it or were unsure about their ability to assist in different ways.

> *There was one thing I had brought up with one of the community nurses, and that was about giving an injection, and they said no, that wasn't within their scope or role, and that was acceptable. Then I thought, well, they are nurses what - things like say a Prolia injection or a flu shot, which I would have thought would have been straightforward… Would they be eligible to say wash my ears out or do anything like that?... they don't seem inclined to do it, they seem to limit their problems to taking the blood pressure and doing what's on the list.* (CN017)

Ordering products in sufficient quantities was another issue raised by some participants. One participant spoke of her frustration with obtaining wound care materials through DVA for her parent and reported that the process was time consuming and cumbersome.

> *And I don't know whether that's a restriction of DVA, or whether it's the company or what. I'm just constantly having to say, could you order some more Mepilex, or could you order me some more medications because it only lasts two months and you've got to throw it out.* (CN010)

One participant recalled that when organizing the visits by the nurses the staff had tried to change the times of the visit to suit the nursing staff which was disruptive for the participant.

> *…the people seem to think that we – because we're needing help, we sit down and wait all day for you to ring us up and say – we're finally coming. And what day they're coming and things like that. I said, we do have a life of our own to live… But I said, you have been told what days I don't want anyone coming. And what time suits me best. And lately – oh – so and so's coming 'cause your usual girl's not working this day. But, um, so and so won't be coming till midday.* (CN009)

What aspects of the CN program contribute to clients' wellbeing and assist them to maintain independence at home?

What helps: Timely, tailored and consistent care

Timely support was seen as particularly important for participants. Many were referred to the CN program on discharge from hospital (8 out of 16) or referred by a GP (3 out of 16). The timely availability of the CN service meant they could leave hospital earlier and avoid admission to an alternative care facility, or avoid a hospital admission altogether. These CN visits were typically time-limited and focused on wound care (often complex), medication management, bandaging, injections and general assessment. Participants valued the CN service, many stating they would not have been able to go home or remain at home without this service.

> *They were very good actually, because the wound actually - I had a problem with it, and I wouldn't have identified it. One of the nurses identified it, and I ended up having to go back to the specialist and he had to put me on*

antibiotics and if it hadn't been - if it hadn't been identified, I could've very well … ended up back in a hospital again (CN012).

Many commented on the value of having ***the same nurse come for the period of time*** which was especially important for participants with cognitive impairments who would struggle with changing staff or with fears of exposure to the COVID-19 virus. Several participants also discussed the value of social and emotional support provided by the nurses either alongside or in addition to physical care/clinical skills.

For these participants, access to the CN program was limited in scope in that the visits focused mainly, or only, on the task identified in the original referral, for example, wound care. Most were discharged from the CN service when the identified task was completed, but participants knew they could access the service again if in need, which gave them a level of security about the future:

> "*… if he needed help physically, he could get a nurse in through DVA, so that option is always there, if we get to that stage*" (CN014).

All participants receiving these time-limited services rated them very highly, appreciated the efficiency and expertise of CNs, and stated they could not have managed at home without this support.

> *They changed it every day. They come and they used this special sanitising stuff and picked off the bits of skin as they come up particular type of cream or water or antiseptic. They used to just waltz across my foot with a cotton bud and bit by bit, the skin just lifted off. Bit by bit they picked it off with a pair of tweezers and then more antiseptic, come back the next day and do it all over again* (CN013).

Some participants were receiving CN services for personal care such as showering, and one was receiving CN visits three times every day. Carer participants spoke of the consuming nature of caring for a loved one at home. For those needing ***intensive, multiple visits per day/week***, it was clear that they would not be able to keep their family member at home without the CN support: "*… it's very intense and if you don't want them in the care, which I don't, then it's just an absolute Godsend to have that service available through DVA*" (CN010). The flexibility to quickly increase the number of daily visits enabled participants to remain at home with their families despite very significant and complex care needs.

Client values and attitudes

Participant interviews identified determination to ***remain independent as a key value for many***. Several participants reported that although they knew the service was available, they did not utilise it, which seemed to indicate a reluctance to 'waste' available services if they could manage without them.

> *The nurses said, oh we'll come, and we'll shower you and things like that. And I said, I have to do for myself. I said, I was in the hospital, and they didn't shower me. I said, I had to do it all myself. So I said, if I can do it there, I can do it at home*" (CN009).

Several participants exhibited a stoic approach to management of their care at home: "*I think in my generation, we tend to be stoic, we tend to be put up with things. To be honest with you, it's to our detriment, because we don't like to ask for help*" [CN012]. These participants preferred to live independently as much as possible without formal support, but also recognised that sometimes it is better to accept assistance in order to regain independence for the future:

> *I mean, I certainly if I've learned nothing, I'm still looking after myself because I asked for help. That's the way I look at it, but if I hadn't asked for help and ended up back in hospital and had another operation on my hip, I don't know where I would have been now* (CN012).

> *I like to think I'm pretty independent. But because I had a bath and not a shower in the unit I was living in at the time, there's always the element of thinking, well you might fall trying to get in because you've only got one arm, you wouldn't be able to do it. So yes, so that's why, yes, it continued and then by the end of the time that the nurses had been coming to shower me, and dress me, I was pretty much able to do it myself* (CN006).

Maintaining traditional family and gender roles was also identified as important for some participants, and a key part of their strategy for being able to remain at home, rather than moving into a care home. These participants were very accepting of the CN service for clinical nursing care but were determined to rely on family members for some aspects of personal care. In other words, the strategy involved a collaboration between DVA provided services and family support:

> *And they* [the nurses] *said, oh yeah – we'll … he'll need help. He'll need help to shower. And – and all this. And he looked and he said, I will not have somebody else in my home whilst my wife is capable of looking after me* (CN009).

One very common participant attitude was the determination to remain at home for as long as possible, preferably to die at home: "*… I don't feel like going into a nursing home. I'll avoid that at all costs*" (CN005).

Client lack of knowledge

One participant seemed unaware of the services they could access or thought that, if they utilised the DVA community nurses, they could lose services that they received through other funding. This participant could access DVA services after her husband died, but initially was not aware of this.

> *No, I know I had, I don't think I was aware at that stage because it was only a couple of years after my husband passed away suddenly and I moved back here to be close to the family, and I don't think I was aware that DVA provided such care, because I remember contacting the local council to see if I could have got some help there. They had a list a mile long and they couldn't help at all* (CN006).

Although this participant did recall having CN visits after a shoulder injury several years ago which she found very helpful and stated that she may not have been able to stay at home without these visits, she did not access the service following subsequent significant health issues including hip surgery, knee surgery and spinal surgery. She had three weeks in a rehabilitation facility following the spinal surgery, but no follow up CN visits were suggested, nor did she or her family request them. She was cared for by her son and granddaughter during the recovery period which has supported her to remain at home at this stage.

What does not help: a lack of continuity and casual staffing

Some participants (3 out of 16) reported that there were gaps in the continuity of care by the community nursing service. The participants commented on their preference for having the same nurse, or at least the same small number of nurses visit them. They reported being unhappy about constant changes. This was most noticeable on weekends when it seemed that casual staff were sent to their homes. The participants described this as being potentially disruptive for the person requiring care as an individual may have complex needs and these are better served with consistent staff. They also noted that these staff appeared to be less well trained and less informed about the participant's needs than the regular community nurses.

> *But if they've got casual staff, you get different people all the time. They don't really, they don't seem to have as good training, they don't seem to know what your needs are. There's no information being passed to them by their temporary employees if you like, and that is definitely a problem.* (CN012)

> *I don't think it would work if I had different people. As it is, when I first started with them, I would get a variety of different carers and when we went to twice a day, which is 14 services in a week, that was just before COVID here I was sometimes getting 11 different people and that was dreadful… There's a couple of them that are permanent, but I just don't think it works for either for me or for my mother.* (CN010)

They also objected when the CN visits were scheduled at a time that didn't suit them, and there were some comments about the inefficient ordering of necessary supplies. For example, one participant found that when she ordered supplies herself through DVA she was only sent very small quantities:

> *And you're constantly having to ring or get, get the nurse to report to get the office to place the order. And I think it's because there are certain things that only the nurses or your doctor can order, things like continence pads and those sorts of things. I know a lot of people get those via the nurses as well* (CN010).

How can the DVA CN program be further improved?

A number of suggestions were made by the interview participants. Whilst the question focused on the CN program, many participants did not see the distinction between the DVA's role and the provider's role.

Improvement in communication processes

Several participants reported that they sometimes found the communication and approval processes difficult. Several spoke of DVA making changes to services without consultation which was disconcerting and upsetting for participants and left them in difficult situations without the necessary supports. One participant spoke about the difficulty obtaining approvals for services, commenting that he found getting past the "gatekeepers" extremely challenging and noting that they seem ill prepared to adequately assist participants. As a consequence, he relied on his referring clinicians to liaise with DVA for the services required.

Another participant felt abandoned by DVA when she was unable to reconnect with the service after being away for the Christmas period.

> *I said, it's coming up to Christmas. I'm going away for Christmas and I'm going away the end of January. So I won't want anyone then. I said, you may as well finish it. And she said she'd try to get me back onto the CVC program. But I think she forgot because my doctor retired, and he didn't know anything about it. Um. So I said to them, I feel as if DVA have just dropped me in the gutter* (CN009).

> *I think people need to be aware of what's available. When I was told that I had to give myself my own needles by a specialist, I actually asked my doctor if I could get the community nurses to do it. If I didn't know that, I didn't know about the service, then I possibly wouldn't have. I mean, they would have come they probably well, no, they would have come and dressed the wound and everything, but my point is, people just don't know* (CN012)

Many participants described not knowing who to turn to when the services were not working, or if they needed to report issues or amend their needs. Clients spoke about the need for a dedicated "case worker" or one contact person who was familiar with their circumstances and history. Participants felt that this would greatly improve their overall experience of DVA services across the board, not only the CN program.

One participant in their mid-90s stated that she felt she needed more support, perhaps from multiple DVA services, but she didn't know how to access this assistance, stating that a single, well informed point of contact would be very helpful:

> *I'll ring them and suggest but I will also ring the NDS and make an appointment to talk about some of the - to liaise with my appointments, and I'm supposed to have according to the social department, so if I had that care or a caseworker (CN011)*

Marketing of services

Many participants reported not knowing how the DVA worked with regard to outsourcing health care, and many were unaware of the range of services available through DVA. As a result, several participants reported that they had been provided with services from non-DVA organisations and were surprised to discover that the DVA was indeed funding them. Some participants were unaware of what services they could obtain from the community nurses and the DVA more broadly. As a result, many had sought additional services through other funding bodies such as the NDIS and My Aged Care.

> "*I don't think I was aware that DVA provided such care, because I remember contacting the local council to see if I could have got some help there. They had a list a mile long and they couldn't help at all.*" (CN006)

> "*Well, I was not aware of that, you see. So that's made me something aware of that I wasn't aware of before, and I was guided by the fact that the burns unit said, "Oh, no, we will get [Aged Care Provider Name] around to you." But it was an option, so I could have DVA home care, they provide the same thing. And do they?*" (CN013)

> "*If I didn't know about the service, then I possibly wouldn't have. I mean, they would have come they probably well, no, they would have come and dressed the wound and everything, but my point is, people just don't know.*" (CN012)

Better staff training

Several participants spoke of the staff being inadequately trained. This was mostly in the context of the weekend staff that appeared to be casuals, but this created difficulties for participants with complex needs. However, one carer participant explained that a lack of staff training was putting her mother at risk:

> *I mean, what they need to do is train the person because my mother is too difficult. She's likely to go down on the ground, unless the person who is dealing with her knows how to deal with her. It's no good having a tiny little nurse to support her because she's not tiny herself. She's quite, she's 65 kilos or something and the nurses need to know how to handle some of those patients, I would think certainly my mother. And so that sort of training I mean, COVID hasn't helped with any of that either. They couldn't have all their training programs that they probably should have had. But I certainly think that they need to go back to training programs, manual handling and all of those sorts of things because it's just been too difficult (CN010).*

Reference group consultations

As part of the project, the research team proposed to conduct informal meetings with a selected number of current DVA Community Nursing (CN) program service providers: two reference groups, one with managers and the other with nurses. This additional work was deemed necessary as the interviews with the CN clients prompted further questions requiring contextual details for the interpretation of the findings. Such insights

were considered important in understanding the overall findings and in making recommendations from the study. This additional engagement with DVA CN program stakeholders was treated as external consultations, not as part of data collection, and approved by the DVA program area.

Aim

The aim of the reference group consultations was to explore and understand contextual issues associated with the delivery of the CN program for DVA members (e.g., referral and entry to the CN program processes, assessment processes, interface with My Aged Care, GP and hospital services, communication pathways, etc.).

Membership

1) service providers/managers (approximately 5-8); and 2) clinicians (RNs, ENs delivering the CN program) (approximately 5-8) were to be invited.

Recruiting members

DVA project team facilitated the process by a direct invitation to randomly selected CN service providers from diverse contexts (geographical and for-profit/not-for-profit). Contact providers were assured that their participation was entirely voluntary. Participating providers then nominated two people (one manager and one nurse) and sent their names and contact details to the research team directly to ensure anonymity of their staff participation.

Meetings

The wo meetings took place chaired by the research team. A total of nine managers and clinicians from five DVA CN service providers from five states (WA, VIC, WA, NSW, and SA) participated in the consultations. They represented for-profit, not-for-profit and public services and provided services in rural, regional and metropolitan areas. Most of the participating providers delivered both mainstream aged care services (i.e., HCPs and CHSP) and DVA services. A meeting with managers took place first, followed by a meeting with clinicians. Each meeting took approximately 1.5 hours and was conducted via Microsoft Teams, organised by the research team upon receipt of details of the reference group members.

Key topics discussed

- Client referral processes for the CN program
- Client assessment processes and ACAT involvement
- Decision making – what services to be offered, by whom, for how long and client involvement in decision making
- Continuity of services (short-term and long-term) – both actual or estimated at the start (i.e. if the service needs change what is the process?)
- Characteristics of DVA members (their values and attitudes concerning the use of community care/support)
- Interaction between My Aged Care and DVA CN services
- Accessing residential aged care homes
- Role of GPs
- Clients' understanding of different services – from the providers' perspective
- Clients' communication with DVA – from the providers' perspective

A summary of discussions

Referral processes for CN services

All providers need to be DVA approved and have an official DVA provider number which is used when claims are made. Some providers offer services across states. Approved providers are listed on the DVA website and providers reported they try to let their local hospitals and GP services know they are DVA approved providers.

Providers reported that most people with a DVA Gold Card inform their GP they have the card, and most GPs understand DVA Gold Card benefits for clients and DVA service providers.

Referrals for CN services come from a variety of sources – including hospital discharges, word of mouth and GPs – people tend to know who DVA providers are. The majority of referrals come from hospitals (via patient discharge process) and from GPs. Hospital referrals are only valid for 7 days, so providers contact GPs for an ongoing referral. There are some 'informal referrals' from allied health and in these cases providers will contact the client's GP and request a referral via a D904 form. Family members may contact DVA providers/managers and request a referral and they are then advised to contact the client's GP for a D904 referral. However, CN service providers can provide clients with contact details for VHC services if these services are deemed necessary.

Importantly, upon referral, a service provider needs to check the referred client is not receiving CN services from another provider. The service cannot be duplicated by two different providers, unless the initial service provider cannot provide all the care required. It could be, for instance, that two DVA CN providers work together to provide a service if one does not have a nurse who is able to provide all the services required in the client's area.

Comprehensive assessment
Once the referral is received and approved, a registered nurse (RN) conducts a comprehensive assessment during the first home visit. Notably, the first contact after referral is approved is usually done within a few days.

The assessment and review process include identification of, for instance, client cognitive issues, continence, and wound management needs, as well as a WHS & safety risk assessment, a nutritional assessment (if client needs help with meals), a falls risk assessment and preparation of the required DVA pandemic plan (during the pandemic). If the environment is safe, the RN will go back for a next visit to do a clinically required personal care assessment (writing a task list and how often the task(s) need to be done) and write a comprehensive care plan specifically for the support worker.

Prior to their first home visit, nurses do not usually have specific details about the client's level of care needs as part of DVA referral. This is a significant difference between the two population groups of interest for the project (DVA clients and non-DVA clients). Clients referred through the Regional Assessment Service or the Aged Care Assessment Team as part of My Aged Care have information about their care needs and home care staff may rely on this pre-existing information for their care. However, the DVA nurse assessment tends to be more comprehensive for all clients.

For VHC, assessment is done by an agency and it is not as in-depth as the CN program nursing assessment. It may or may not be a nurse who goes out to the client to set them up for their services.

Care plan and reviews
Following the initial assessment, the RN develops a plan of care and required services and discusses them with the client, and their family (carer) if present. The RN may organise further referrals if necessary and sends a letter to the GP so that the GP has information about the CN services the client will be receiving. For further services that are not within the CN service scope, the RN refers the client back to the health professional who made the initial referral (e.g., GP) or speaks to the health professional (e.g., for allied health) directly.

Whilst GPs can be very helpful and involved, working with GPs can be a one-sided process from DVA service providers' perspectives. DVA providers endeavour to work in collaboration with clients' GPs (i.e., information sharing), but if a GP changes their own care plan (for example) they may not notify the DVA provider. DVA providers sometimes need to chase GPs for authorisations (for example to change a catheter) which can be very frustrating.

Once admitted to the CN service, clients are required to be reviewed once every 28 days by a nursing clinician (could be a RN or an enrolled nurse, (EN)) and every three months by an RN if they have complex clinical care needs, for example, catheter or ongoing wound care. Whilst the CN program does not usually offer a case manager, clients receive an ongoing care plan review every month, and changes to the plan may be recommended and implemented by an RN. If the need is outside the scope of DVA services, the client may be referred to My Aged Care.

Intensive DVA CN care provision
Many CN clients receive more than one visit per day, and some with exceptional case funding for even more frequent or longer care hours. If a client's clinical needs exceed three visits per day they can apply for

'exceptional case funding' which could, for example, cover up to 12 hours overnight funding. But for 24/7 care needs DVA prefers residential aged care home admission.

In one organisation, 50% of the case load was on a two visits per day basis and 15-20% on a three visits per day basis. Other clients would typically be on one visit per day or three visits per week basis. It is highly unusual to discharge clients from VHC but they could be discharged from the CN program and then re-admitted later if needed. For high needs, complex clients, case management can be arranged through DVA Coordinated Client Support areas, not through the CN program.

Timely service response and service durations tailored to individual clients' needs
Time between assessment (or referral) to the provision of CN services is quite short – usually within a few days, but depending on staff availability. Most clients need ongoing support, unless it is for a clinical need that has been resolved (e.g., wound care, skin treatment, eye drops, etc.) then they are "discharged" if there has been no face-to-face visit for 28 days. Most services are for personal care, medication administration, insulin and diabetes, catheters, wound care, wellbeing checks; sometimes short-term care becomes long term if the monthly review pick up other needs. Some CN providers have a community dementia nurse to facilitate provision of care, support the family, provide information, and ensure a multidisciplinary/holistic approach.

Client choice and flexibility
Clients' needs can be catered for flexibly, being scaled up or down depending on complexity of each client needs. Clients can choose what services they receive (within the scope of the CN program service offering) and how often. However, there are certain limitations, for example, the CN program, or the VHC program, does not provide social support. DVA does not have a consumer directed care model, which is part of the My Aged Care service model, and CN clients tend to choose DVA services as there is no co-payment.

DVA services (CN services and VHC) versus My Aged Care (CHSP and HCP)
DVA CN clients can concurrently receive HCP if the CN program alone cannot meet the client's needs (e.g., for social needs not funded by DVA).

Complex care needs can be better managed and funded through the DVA CN program than through HCP which does not always support expensive care needs for many chronic and complex conditions.

CN services can be easily scaled up or down depending on the client's needs (and one-on-one clinical nursing assessment), compared with My Aged Care services/non-DVA channels which are usually pre-determined by assessment outcomes by the Regional Assessment Service or the Aged Care Assessment Team, not by those who provide direct care and support.

DVA services can be too complex for many clients to fully understand. However, most clients prefer DVA also for simplicity and familiarity. CN clients do not need to go through Medicare and Centrelink's income tested fee which are required for accessing My Aged Care services. DVA Gold Card holders may be required to co-contribute for services they receive from My Aged Care (e.g., HCP). If the client is assigned to a high-level HCP via My Aged Care assessment processes then they would not be able to access DVA funded services using their Gold Card (i.e., Gold Card entitlement is fully based on client needs while HCP has a capped amount based on the assessment outcome by RAS or ACAT). In exceptional circumstances, a client could be allowed both a high-level HCP and DVA CN services as long as the care/services are not duplicated.

CN providers prefer My Aged Care funding arrangements over DVA funding arrangements. However, ease of administering DVA services is better for scaling up/down of services compared to HCP where reassessment needs to be conducted to scale up (and clients do not usually want to scale down and lose funding allocated). Changing the claiming process in DVA services would be crucial but the idea of bringing all the assessments in line with My Aged Care where the assessments are done externally can be detrimental to CN services.

Clients prefer one service provider managing all the services they need to access if they require services from DVA and my Aged Care. Some CN providers deliver both HCP and DVA CN services as a one-stop shop so they do not need to "broker" for services. To maximise and optimise funding, service brokerage occurs for some CN providers who do not provide HCPs themselves. When a service is not available through the CN program the service provider may need to refer the client back to the GP who made the referral or assist their client in contacting My Aged Care.

Consumer Directed Care (CDC) has limitations as clients do not always understand their own clinical needs. With HCP, people may spend resources on services that may not be very important in their case, but lack

understanding of the importance for them, for instance, of medication prompting. The DVA CN program is perceived to be better as clients usually take clinical advice related to what is needed.

Maintaining independence and remaining at home
Compared to non-DVA clients, DVA clients tend to remain at home longer and die at home. Some are admitted to residential aged care later and die in the RAC home. Longer term support at home for DVA clients is possible due to excellent service cover and funding.

Older DVA clients tend to highly value independence, they are stoic and keen to stay in their own home for as long as possible, avoiding admission into residential aged care. They also tended to make full use of their gold card and maximise services in their home. A sense of entitlement is common with DVA clients who feel they have earned the right to have access to the DVA services they are receiving. They are very confident about using the services, but usually not aware of the costs involved.

DVA clients tended to receive services (and regular nursing or clinical assessment) in a more timely manner so their health has not deteriorated as much as that of people waiting for a home care package, particularly if they have complex medical nursing needs. DVA clients also do not have the possibility of funding running out as can happen for those on home care packages.

Clients have to have an ACAT assessment for entry to residential aged care so the CN provider/RN can help the client or their family member navigate the process. CN providers with aged care facilities can further assist with timely and smooth transition processes.

Workforce issues
Staff shortages across all aged care services, including CN services, are common, but particularly so in community programs. The majority of community staff are casual employees.

The DVA CN program facilitates engagement of clinical and care teams, which is helpful for ensuring clients' needs are met. It is a good strategy for assessments and care plans to be done by RNs; this is done by case managers in HCP who may not be RNs and so clinical needs are sometimes overlooked.

Clear CN career paths are important, but also flexibility in work hours. DVA CNs have a minimum requirement of 3 years community experience. This is seen as a positive aspect, but also sometimes a challenge due to recruitment issues.

Conclusion

This research demonstrates that DVA CN clients are remaining at home considerably longer than HCP clients. There are multiple (and possibly intersecting) factors contributing to this situation as shown in the findings from RQ1 (e.g., receiving the majority of care from RNs and a higher total number of clinical care). The client interview findings and consultations with CN providers (Research Question 4) further offer potential explanations as to why CN clients are able to remain at home much longer than their counterparts. Most notable CN program related factors include: timely support tailored to clients' specific needs; a timely and comprehensive assessment (offered almost immediately after a referral and ongoing care plan and reviews by a registered nurse; continuity of care; time-limited and task focused service driven by the efficiency and expertise of nurses; flexibility to offer services to those who need more intensive and frequent care; and ease of scaling services up and down. However, transferability of the interview findings to a wider context needs a careful attention due to a small sample size (n=16 clients).

A sound understanding of the relationship between the characteristics of CN clients and services and primary outcomes, such as time to permanent RAC admission or death at home, is crucial to further planning and enhancement of DVA client services and home-based support programs for older people. This better understanding can inform better service provision and improve policy development.

Appendix A: All CN services included in the database (N = 288)

Service Name	Freq
Clinical Care Add-On - 1 to 4 visits (Long: 21 mins or more per visit)	65503
Clinical Care Add-On - 1 to 4 visits (short: 20 mins or less per visit)	17561
Clinical Care Add-On - 10 to 15 visits (Long: 21 mins or more per visit)	3499
Clinical Care Add-On - 10 to 15 visits (Short: 20 mins or less per visit)	1996
Clinical Care Add-On - 16 to 20 visits (Long: 21 mins or more per visit)	657
Clinical Care Add-On - 16 to 20 visits (Short: 20 mins or less per visit)	703
Clinical Care Add-On - 21 to 25 visits (Long: 21 mins or more per visit)	360
Clinical Care Add-On - 21 to 25 visits (Short: 20 mins or less per visit)	600
Clinical Care Add-On - 26 or more visits (Long: 21 mins or more per visit)	621
Clinical Care Add-On - 26 to 30 visits (Short: 20 mins or less per visit)	1047
Clinical Care Add-On - 31 to 35 visits (Short: 20 mins or less per visit)	176
Clinical Care Add-On - 36 to 49 visits (Short: 20 mins or less per visit)	242
Clinical Care Add-On - 5 to 9 visits (Long: 21 mins or more per visit)	10481
Clinical Care Add-On - 5 to 9 visits (Short: 20 mins or less per visit)	3926
Clinical Care Add-On - 50 or more visits (Short: 20 mins or less per visit)	277
Clinical Care Core - 1 to 2 visits (Short term support)	1458
Clinical Care Core - 1 to 4 visits (Long: 21 mins or more per visit)	26975
Clinical Care Core - 1 to 4 visits (Short: 20 mins or less per visit)	5400
Clinical Care Core - 10 to 15 visits (Long: 21 mins or more per visit)	8275
Clinical Care Core - 10 to 15 visits (Short: 20 mins or less per visit)	2102
Clinical Care Core - 16 to 20 visits (Long: 21 mins or more per visit)	1676
Clinical Care Core - 16 to 20 visits (Short: 20 mins or less per visit)	929
Clinical Care Core - 21 to 25 visits (Long: 21 mins or more per visit)	1371
Clinical Care Core - 21 to 25 visits (Short: 20 mins or less per visit)	1038
Clinical Care Core - 26 or more visits (Long: 21 mins or more per visit)	3772
Clinical Care Core - 26 to 30 visits (Short: 20 mins or less per visit)	3113
Clinical Care Core - 3 to 5 visits (Short term support)	795
Clinical Care Core - 31 to 35 visits (Short: 20 mins or less per visit)	263
Clinical Care Core - 36 to 45 visits (Short: 20 mins or less per visit)	2
Clinical Care Core - 36 to 49 visits (Short: 20 mins or less per visit)	1007
Clinical Care Core - 46 to 55 visits (Short: 20 mins or less per visit)	1
Clinical Care Core - 5 to 9 visits (Long: 21 mins or more per visit)	16595
Clinical Care Core - 5 to 9 visits (Short: 20 mins or less per visit)	3428
Clinical Care Core - 50 or more visits (Short: 20 mins or less per visit)	3053
Clinical Care Core - Post-Operative Eye Drops (85 or more visits)	26
Clinical Care Second Worker - 1 to 4 visits (Long: 21 mins or more per visit)	29
Clinical Care Second Worker - 1 to 4 visits (Short: 20 mins or less per visit)	7
Clinical Care Second Worker - 10 to 15 visits (Long: 21 mins or more per visit)	2
Clinical Care Second Worker - 5 to 9 visits (Long: 21 mins or more per visit)	3

Clinical Care Second Worker - 5 to 9 visits (Short: 20 mins or less per visit)	2
Clinical Overnight Care - Active. 10-11 hours.	1
Clinical Overnight Care - Active. 11-12 hours.	30
Clinical Overnight Care - Active. 7-8 hours.	1
Clinical Overnight Care - Active. 9-10 hours.	136
Comm Nursing Clinical Care Schedule - Medication Administration - Post Operative Eye Drops	41
Community Nursing - Additional Travel	1935
Community Nursing - Acute/Post Acute (public agency) - Medium term (GNC/Tech)	1
Community Nursing - Acute/Post Acute (public agency) - medium term (TECH/GNC)	7
Community Nursing - Acute/Post Acute (public agency) - short term	19
Community Nursing - Acute/Post Acute (public agency) -medium term (GNC)	2
Community Nursing - Acute/Post Acute (public agency) -medium term (Tech)	16
Community Nursing - Acute/Post Acute(outliers) - medium term (Tech)	3
Community Nursing - Additional Travel	694
Community Nursing - Assessment	22701
Community Nursing - Assessment Only	1371
Community Nursing - Assessment only - no other services required	644
Community Nursing - Bereavement follow up	603
Community Nursing - Bereavement Follow-up	656
Community Nursing - Clinical Assessment - ECU	32
Community Nursing - CVC Initial Care Coordination	245
Community Nursing - CVC Subsequent Care Coordination	5711
Community Nursing - Exceptional Case - ECU	972
Community Nursing - Exceptional Case - High Cost	445
Community Nursing - Medication Administration (Private Agency) - Daily - 5 days per week.	1
Community Nursing - Medication Administration (Private Agency) - Daily.	4
Community Nursing - Medication Administration (Public Agency) - Daily - 5 days per week.	1
Community Nursing - Medication Administration (Public Agency) - Daily.	11
Community Nursing - Medication Administration (Public Agency) - Twice Daily - 5 days per week.	2
Community Nursing - Medication Administration (Public Agency) - Twice Daily.	9
Community Nursing - Nursing Consumables - Cost Range $0.01 - $14.99	15485
Community Nursing - Nursing Consumables - Cost Range $105.00 - $114.99	1649
Community Nursing - Nursing Consumables - Cost Range $115.00 - $124.99	1456
Community Nursing - Nursing Consumables - Cost Range $125.00 - $134.99	1294
Community Nursing - Nursing Consumables - Cost Range $135.00 - $144.99	1074
Community Nursing - Nursing Consumables - Cost Range $145.00 - $154.99	1989
Community Nursing - Nursing Consumables - Cost Range $15.00 - $24.99	8548
Community Nursing - Nursing Consumables - Cost Range $155.00 - $164.99	574
Community Nursing - Nursing Consumables - Cost Range $165.00 - $174.99	421
Community Nursing - Nursing Consumables - Cost Range $175.00 - $184.99	534
Community Nursing - Nursing Consumables - Cost Range $185.00 - $194.99	395
Community Nursing - Nursing Consumables - Cost Range $195.00 - $204.99	393
Community Nursing - Nursing Consumables - Cost Range $205.00 - $214.99	370
Community Nursing - Nursing Consumables - Cost Range $215.00 - $224.99	335
Community Nursing - Nursing Consumables - Cost Range $225.00 - $234.99	251
Community Nursing - Nursing Consumables - Cost Range $235.00 - $244.99	232

Community Nursing - Nursing Consumables - Cost Range $245.00 - $254.99	242
Community Nursing - Nursing Consumables - Cost Range $25.00 - $34.99	6546
Community Nursing - Nursing Consumables - Cost Range $255.00 - $264.99	238
Community Nursing - Nursing Consumables - Cost Range $265.00 - $274.99	156
Community Nursing - Nursing Consumables - Cost Range $275.00 - $284.99	209
Community Nursing - Nursing Consumables - Cost Range $285.00 - $294.99	109
Community Nursing - Nursing Consumables - Cost Range $295.00 - $304.99	513
Community Nursing - Nursing Consumables - Cost Range $305.00 - $314.99	68
Community Nursing - Nursing Consumables - Cost Range $315.00 - $324.99	56
Community Nursing - Nursing Consumables - Cost Range $325.00 - $334.99	51
Community Nursing - Nursing Consumables - Cost Range $335.00 - $344.99	53
Community Nursing - Nursing Consumables - Cost Range $345.00 - $354.99	43
Community Nursing - Nursing Consumables - Cost Range $35.00 - $44.99	5176
Community Nursing - Nursing Consumables - Cost Range $355.00 - $364.99	54
Community Nursing - Nursing Consumables - Cost Range $365.00 - $374.99	39
Community Nursing - Nursing Consumables - Cost Range $375.00 - $384.99	37
Community Nursing - Nursing Consumables - Cost Range $385.00 - $394.99	41
Community Nursing - Nursing Consumables - Cost Range $395.00 - $404.99	34
Community Nursing - Nursing Consumables - Cost Range $405.00 - $414.99	38
Community Nursing - Nursing Consumables - Cost Range $415.00 - $424.99	33
Community Nursing - Nursing Consumables - Cost Range $425.00 - $434.99	21
Community Nursing - Nursing Consumables - Cost Range $435.00 - $444.99	28
Community Nursing - Nursing Consumables - Cost Range $445.00 - $454.99	23
Community Nursing - Nursing Consumables - Cost Range $45.00 - $54.99	4344
Community Nursing - Nursing Consumables - Cost Range $455.00 - $464.99	33
Community Nursing - Nursing Consumables - Cost Range $465.00 - $474.99	18
Community Nursing - Nursing Consumables - Cost Range $475.00 - $484.99	18
Community Nursing - Nursing Consumables - Cost Range $485.00 - $494.99	22
Community Nursing - Nursing Consumables - Cost Range $495.00 - $504.99	105
Community Nursing - Nursing Consumables - Cost Range $505.00 - $554.99	69
Community Nursing - Nursing Consumables - Cost Range $55.00 - $64.99	3570
Community Nursing - Nursing Consumables - Cost Range $555.00 - $604.99	19
Community Nursing - Nursing Consumables - Cost Range $605.00 - $654.99	29
Community Nursing - Nursing Consumables - Cost Range $65.00 - $74.99	3021
Community Nursing - Nursing Consumables - Cost Range $655.00 - $704.99	17
Community Nursing - Nursing Consumables - Cost Range $705.00 - $754.99	12
Community Nursing - Nursing Consumables - Cost Range $75.00 - $84.99	2555
Community Nursing - Nursing Consumables - Cost Range $755.00 - $804.99	13
Community Nursing - Nursing Consumables - Cost Range $805.00 - $854.99	10
Community Nursing - Nursing Consumables - Cost Range $85.00 - $94.99	2131
Community Nursing - Nursing Consumables - Cost Range $855.00 - $904.99	9
Community Nursing - Nursing Consumables - Cost Range $905.00 - $954.99	9
Community Nursing - Nursing Consumables - Cost Range $95.00 - $104.99	1898
Community Nursing - Nursing Consumables - Cost Range $955.00 - $1,000.00	19
Community Nursing - Nursing Consumables - Cost Range Over $1,000.00	12
Community Nursing - Palliative - Deteriorating	684

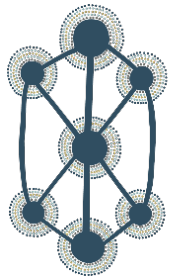
Community Nursing - Palliative - Stable	2920
Community Nursing - Palliative - Terminal	228
Community Nursing - Palliative - Unstable	618
Community Nursing - Palliative Overnight - ECU	14
Community Nursing - Palliative, Stable (public agency) - (GNC)	1
Community Nursing - Personal Care (Private Agency) - Daily - Long.	5
Community Nursing - Personal Care (Private Agency) - Daily - Medium.	7
Community Nursing - Personal Care (Private Agency) - Daily - Short.	1
Community Nursing - Personal Care (Private Agency) - Twice Daily - Long.	1
Community Nursing - Personal Care (Private Agency) - Twice Daily - Medium.	3
Community Nursing - Personal Care (Public Agency) - Daily - Long.	4
Community Nursing - Personal Care (Public Agency) - Daily - Medium.	1
Community Nursing - Personal Care (Public Agency) - Twice Daily - Medium.	1
Community Nursing - Personal Care (Public Agency) - Twice Daily - Short.	1
Community Nursing - Second Worker	705
Community Nursing - Support & Maintenance - High Dependency - (public agency)Long Term(Tech)	4
Community Nursing - Support & Maintenance - Long Term - Activities of Daily Living - Plus (Private Agency)	5
Community Nursing - Support & Maintenance - Long Term - Activities of Daily Living - Plus (Public/Not for Profit)	1
Community Nursing - Support & Maintenance - Long Term - Activities of Daily Living - Extra (Private Agency)	30
Community Nursing - Support & Maintenance - Long Term - Activities of Daily Living - Extra (Public Agency/Not for Profit)	16
Community Nursing - Support & Maintenance - Long Term - Activities of Daily Living - Standard (Private Agency)	4
Community Nursing - Support & Maintenance - Long Term - Activities of Daily Living - Standard (Public Agency/Not for Profit)	6
Community Nursing - Support & Maintenance - Low Dependency - public agency) Long Term (Other)	24
Community Nursing - Support & Maintenance(outlier) - Low dependency - long term (Other)	1
Community Nursing - Support & Maintenance(outlier) - Low Dependency long term (GNC/Tech)	1
Community Nursing - Support & Maintenance(outlier) - Low Dependency long term (Tech/GNC)	2
Community Nursing - Support & Maintenance(outlier) - Low dependnecy - long term (Tech)	5
Community Nursing - Support & Maintenance(outliers) - Low dependency long term (GNC)	6
Community Nursing - Support & Maintenance-High Dependency -(public agency)Long Term(Other)	1
Community Nursing- Acute/Post Acute(public agency) - medium term (Other)	2
Community Nursing Clinical Care Schedule - Medication Administration (1 to 7 visits)	3235
Community Nursing Clinical Care Schedule - Clinical Monitoring	28606
Community Nursing Clinical Care Schedule - General (High Dependency)	2182
Community Nursing Clinical Care Schedule - General (Low Dependency)	12708
Community Nursing Clinical Care Schedule - Medication Administration (15 to 21 visits)	1731
Community Nursing Clinical Care Schedule - Medication Administration (22 to 28 visits)	5447
Community Nursing Clinical Care Schedule - Medication Administration (8 to 14 visits)	1870
Community Nursing Clinical Care Schedule - Technical (visit length 20 minutes or less per visit)	6217
Community Nursing Clinical Care Schedule - Technical (visit length 21 minutes or more per visit)	33444
Community Nursing Clinical Care Variation - General Variation (High Dependency)	166
Community Nursing Clinical Care Variation - General Variation (Low Dependency)	467
Community Nursing Clinical Care Variation - Medication Administration (29 to 40 visits)	1162
Community Nursing Clinical Care Variation - Medication Administration (41 to 56 visits)	1566

Community Nursing Clinical Care Variation - Medication Administration (57 or more visits)	432
Community Nursing Clinical Care Variation - Technical Variation (20 minutes or less)	691
Community Nursing Clinical Care Variation - Technical Variation (21 minutes or more)	2850
Community Nursing ECU Schedule - Assessment Only	48
Community Nursing ECU Schedule - Clinical Monitoring	1
Community Nursing ECU Schedule - General	4091
Community Nursing ECU Schedule - Medication Administration	15
Community Nursing ECU Schedule - Palliative Care	159
Community Nursing ECU Schedule - Palliative Care - Deteriorating	160
Community Nursing ECU Schedule - Palliative Care - Terminal	58
Community Nursing ECU Schedule - Palliative Care - Unstable	26
Community Nursing ECU Schedule - Personal Care	509
Community Nursing ECU Schedule - Technical	2053
Community Nursing Personal Care Schedule - (LONG) 28 to 34 visits for 46 minutes or more per visit	1917
Community Nursing Personal Care Schedule - (LONG) 35 to 46 visits for 91 minutes total per day	134
Community Nursing Personal Care Schedule - (LONG) 47 - 56 visits for 91 or more minutes per day	775
Community Nursing Personal Care Schedule - (MEDIUM) 28 to 34 visits for 31 to 45 minutes per visit	4199
Community Nursing Personal Care Schedule - (MEDIUM) 35 to 46 visits for 61 to 90 minutes total per day	404
Community Nursing Personal Care Schedule - (MEDIUM) 47 to 56 visits for 61 to 90 minutes total per day	2751
Community Nursing Personal Care Schedule - (SHORT) 28 to 34 visits for 15 to 30 minutes per visit	3693
Community Nursing Personal Care Schedule - (SHORT) 35 to 46 visits less then 60 minutes total per day	1477
Community Nursing Personal Care Schedule - (SHORT) 47 to 56 visits for less than 60 minutes total per day	5894
Community Nursing Personal Care Schedule - 1 to 5 visits in a 28 day period	9704
Community Nursing Personal Care Schedule - 12 - 17 visits in a 28 day period	21733
Community Nursing Personal Care Schedule - 18 to 23 visits in a 28 day period	8819
Community Nursing Personal Care Schedule - 24 to 27 visits in a 28 day period	6210
Community Nursing Personal Care Schedule - 6 - 11 visits in a 28 day period	16858
Community Nursing -Support & Maintenance - Low Dependency - public agency) Long Term (GNC/Tech)	5
Community Nursing -Support & Maintenance - Low Dependency - public agency) Long Term (Tech)	50
Community Nursing -Support & Maintenance - Low Dependency - public agency) Long Term (Tech/GNC)	22
Community Nursing-Support & Maintenance- Low Dependency -(Public agency) Long Term(GNC)	16
Domiciliary nursing - visit up to 2 hours weekday	7
Personal Care Add-On - 36 to 40 visits (Long: 46 mins or more per visit)	6
Personal Care Add-On - 36 to 40 visits (Medium: 31-45 mins per visit)	8
Personal Care Add-On - 36 to 40 visits (Short: 15-30 mins per visit)	127
Personal Care Add-On - 36 to 45 visits (Short: 15-30 mins per visit)	111
Personal Care Add-On - 41 to 46 visits (Long: 46 mins or more per visit)	1
Personal Care Add-On - 41 to 46 visits (Medium: 31-45 mins per visit)	4
Personal Care Add-On - 41 to 46 visits (Short: 15-30 mins per visit)	77
Personal Care Add-On - 46 to 55 visits (Short: 15-30 mins per visit)	13
Personal Care Add-On - 47 or more visits (Long: 46 mins or more per visit)	21
Personal Care Add-On - 47 or more visits (Medium: 31-45 mins per visit)	14
Personal Care Add-On - 47 or more visits (Short: 15-30 mins per visit)	723
Personal Care Add-Ons - 1 to 5 visits	8704
Personal Care Add-Ons - 11 to 15 visits	3276
Personal Care Add-Ons - 16 to 20 visits	1202

Personal Care Add-Ons - 21 to 24 visits	639
Personal Care Add-Ons - 25 to 30 visits	1651
Personal Care Add-Ons - 31 to 35 visits	186
Personal Care Add-Ons - 6 to 10 visits	4080
Personal Care Core - 21 to 24 visits	6714
Personal Care Core - 25 to 30 visits	22839
Personal Care Core - 31 to 35 visits	1846
Personal Care Core - 36 to 40 visits (long ie. 46 mins or more per visit)	299
Personal Care Core - 36 to 40 visits (medium ie. 31-45 mins per visit)	658
Personal Care Core - 36 to 40 visits (short ie. 15-30 mins per visit)	1344
Personal Care Core - 41 to 46 visits (medium ie. 31-45 mins per visit)	684
Personal Care Core - 41 to 46 visits (short ie. 15-30 mins per visit)	1552
Personal Care Core - 1 to 5 visits	8868
Personal Care Core - 11 to 15 visits	27050
Personal Care Core - 16 to 20 visits	14081
Personal Care Core - 41 to 46 visits (Long: 46 mins or more per visit)	316
Personal Care Core - 47 or more visits (Long: 46 mins or more per visit)	2872
Personal Care Core - 47 or more visits (Medium: 31-45 mins per visit)	6983
Personal Care Core - 47 or more visits (Short: 15-30 mins per visit)	13451
Personal Care Core - 6 to 10 visits	17390
Personal Care Second Worker - 1 to 5 visits (Long: 46 mins or more per visit)	4
Personal Care Second Worker - 1 to 5 visits (Medium: 31-45 mins per visit)	4
Personal Care Second Worker - 1 to 5 visits (Short: 15-30 mins per visit)	14
Personal Care Second Worker - 11 to 15 visits (Long: 46 mins or more per visit)	1
Personal Care Second Worker - 11 to 15 visits (Medium: 31-45 mins per visit)	4
Personal Care Second Worker - 11 to 15 visits (Short: 15-30 mins per visit)	1
Personal Care Second Worker - 16 to 20 visits (Long: 46 mins or more per visit)	1
Personal Care Second Worker - 16 to 20 visits (Medium: 31-45 mins per visit)	15
Personal Care Second Worker - 21 to 24 visits (Long: 46 mins or more per visit)	1
Personal Care Second Worker - 21 to 24 visits (Medium: 31-45 mins per visit)	2
Personal Care Second Worker - 21 to 24 visits (Short: 15-30 mins per visit)	1
Personal Care Second Worker - 25 to 30 visits (Long: 46 mins or more per visit)	8
Personal Care Second Worker - 25 to 30 visits (Medium: 31-45 mins per visit)	3
Personal Care Second Worker - 25 to 30 visits (Short: 15-30 mins per visit)	1
Personal Care Second Worker - 31 to 35 visits (Long: 46 mins or more per visit)	3
Personal Care Second Worker - 36 to 40 visits (Long: 46 mins or more per visit)	1
Personal Care Second Worker - 41 to 46 visits (Long: 46 mins or more per visit)	1
Personal Care Second Worker - 41 to 46 visits (Medium: 31-45 mins per visit)	5
Personal Care Second Worker - 41 to 46 visits (Short: 15-30 mins per visit)	2
Personal Care Second Worker - 47 or more visits (Long: 46 mins or more per visit)	41
Personal Care Second Worker - 47 or more visits (Medium: 31-45 mins per visit)	31
Personal Care Second Worker - 47 or more visits (Short: 15-30 mins per visit)	4
Personal Care Second Worker - 6 to 10 visits (Medium: 31-45 mins per visit)	2
Personal Care Second Worker - 6 to 10 visits (Short: 15-30 mins per visit)	3
Personal Overnight Care - Active. 11-12 hours.	238
Personal Overnight Care - Active. 9-10 hours.	1

Personal Overnight Care - Active. Up to 6 hours.	34
Personal Overnight Care - Inactive. 10-11 hours.	132
Personal Overnight Care - Inactive. 11-12 hours.	175
Personal Overnight Care - Inactive. 6-7 hours.	3653
Personal Overnight Care - Inactive. 7-8 hours.	549
Personal Overnight Care - Inactive. 8-9 hours.	629
Personal Overnight Care - Inactive. 9-10 hours.	273
TDS Core - Personal/Clinical Care - 1 to 4 days (Long: 31-60 mins per visit)	285
TDS Core - Personal/Clinical Care - 1 to 4 days (Short: 0-30 mins per visit)	846
TDS Core - Personal/Clinical Care - 13 to 16 days (Long: 31-60 mins per visit)	17
TDS Core - Personal/Clinical Care - 13 to 16 days (Short: 0-30 mins per visit)	43
TDS Core - Personal/Clinical Care - 17 to 20 days (Long: 31-60 mins per visit)	14
TDS Core - Personal/Clinical Care - 17 to 20 days (Short: 0-30 mins per visit)	37
TDS Core - Personal/Clinical Care - 21 to 24 days (Long: 31-60 mins per visit)	16
TDS Core - Personal/Clinical Care - 21 to 24 days (Short: 0-30 mins per visit)	30
TDS Core - Personal/Clinical Care - 25 to 28 days (Long: 31-60 mins per visit)	181
TDS Core - Personal/Clinical Care - 25 to 28 days (Short: 0-30 mins per visit)	251
TDS Core - Personal/Clinical Care - 5 to 8 days (Long: 31-60 mins per visit)	60
TDS Core - Personal/Clinical Care - 5 to 8 days (Short: 0-30 mins per visit)	162
TDS Core - Personal/Clinical Care - 9 to 12 days (Long: 31-60 mins per visit)	44
TDS Core - Personal/Clinical Care - 9 to 12 days (Short: 0-30 mins per visit)	70
Unknown	49

Appendix B: ROSA DVA Home Care Comparison Report



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DVA Home Care Comparison Report

Prepared for the DVA community nursing project

V3 14th October 2022

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Abbreviations

ACAT/S/P	Aged Care Eligibility Assessment Team/Service/Program
AIHW	Australian Institute of Health and Welfare
CACP	Community Aged Care Package
DVA	Department of Veterans' Affairs
EACH	Extended Aged Care at Home
HCP	Home Care Package
IQR	Interquartile Range (25^{th} to 75^{th} percentile)
NDI	National Death Index
PBS	Pharmaceutical Benefits Scheme
RACF	Residential Aged Care Facility
ROSA	Registry of Senior Australians

1. Background

The Registry of Senior Australians (ROSA)

Data from the Historical Cohort of the Registry of Senior Australians (ROSA) was used for this project.[1, 2] The ROSA Historical Cohort integrates data from the aged care and health care sectors in Australia to examine the health, medicines use, health service use, mortality and other outcomes for all older Australians who access Australian Government-subsidised aged care services. ROSA contains de-identified demographic, clinical, health service and pharmaceutical utilisation information for all older people who access government-subsidised aged care services in Australia. ROSA captures data collected for the Aged Care Assessment Program (ACAP), the Aged Care Funding Instrument (ACFI), aged care service episodes, the Australian Institute of Health and Welfare (AIHW) National Death Index, State (QLD, NSW, VIC, and SA) Admitted Hospitalisation and Emergency Department Records, and Medicare Benefits Schedule (MBS) and Pharmaceutical Benefits Scheme (PBS) claims datasets.

The ROSA datasets used for this project are summarised below.

- The ACAP dataset includes information on the assessments performed by a member of the Aged Care Assessment Team (ACAT) to determine an individual's eligibility for aged care services.[3]
- The Aged Care Episodes datasets provide information about entry and exit dates for each home care package and residential aged care service accessed, the level of services received and provider characteristics.
- The AIHW National Death Index (NDI) provides date of death and cause of death.

Home Care Package Program

The Home Care Package (HCP) program is an Australian Commonwealth government subsidised program, which aims to provides support to assist older people to live independently in their own homes. An ACAT assessment is required for access to an HCP. This program was implemented in August 2013 and replaced the three previous programs (i.e., Community Aged Care Packages (CACP), Extended Aged Care at Home (EACH), and Extended Aged Care at Home Dementia (EACH-D)) in existence to support older people living at home as part of the Living Longer Living Better aged care reforms. In 2021, the annual government subsidy for Home Care Packages ranged from $9,026 for a level 1 package to $52,377 for a level 4 package.[4] While it is uncertain how services and hours of support vary by provider and person, in 2016 as part of its now retired "Home Care Today" project the Council on the Ageing reported that a level 1 package corresponded to approximately 2 hours per week of support and a level 4 package corresponded to 10-13 hours per week.[5]

Project Aim: To address RQ3 of DVA Report

RQ 3: The research will also analyse the trajectory from receiving care at home to moving to residential aged care or palliative care, and how this differs between clients who receive community nursing (CN) services at varying degrees, those that don't receive CN services and potentially an age/gender matched sample of the general population

1) *What are the differences in independence and age at entry to permanent residential care or palliative care between the general population and DVA clients?*

2. Methods

Data Sources/Sampling Frame: please see ROSA background information. The sampling frame was all recipients of HCP nationally during the study period.

Study Cohort: The study cohort included all individuals aged >=65 years old (and <=100) accessing **HCP for the first time between 1st January 2010 and 31st December 2014 and** who do not have a DVA card, **with follow up period to 30th June 2017.** DVA card status was used to exclude individuals and was ascertained using the concession card status information collected in the PBS dispending records prior to the access to HCP. **HCP level presented was the level of care first received; it is possible individuals changed care level during the study period (generally to a higher level of care)**. During the study period the transition from CACP, EACH, and EACH-D occurred (August 2013). As in our prior work, prior home care programmes CACP and EACH/EACH-D were re-coded as HCP levels 1-2 and 3-4, respectively.[6]

In addition to the overall recipients of HCP nationally we also identified a *sample cohort* that was of similar age and gender distribution as the cohort being studied by the Jeon et al team. This selected sample was created via random selection of 1:1 individuals according to the age*gender distribution of the group in the DVA population being analysed by Jeon et al (see Appendix). No other variables were used to select the sample cohort (e.g. year of care entry). No identifiers or individual level information was used for 'matching' and no data was linked for this purpose. Age groups 60-64, which are included within the DVA dataset, were not matched to the ROSA as HCP eligibility is limited to those aged 65 or older (or 50 years or older for Aboriginal or Torres Strait Islander people).

Covariates of Interest: Demographic characteristics (age, gender) and geographical area of individuals were ascertained from the ACAP dataset. **Age at the time of entry into the HCP was used in the analysis.** Remoteness was determined based on postcode linked to Australian Bureau of Statistics geographical concordance. The number of health conditions for the cohort was determined using a modified Rx-Risk comorbidity index (i.e. changed PBS item codes used to identify people living with dementia). The Rx-Risk is a 46-item validated comorbidity scale that was applied to PBS claims data in the six months prior to accessing HCP. Dementia status was determined using only the Rx-Risk flag for dementia (ATC Codes:

N06DA02, N06DA03, N06DA04, N06DX01 AND (N05AX08 if PBS code: 8787L, 8788M, 8789N, 8790P, 9293D, 1842Y). As requested by Jeon et al, a second comorbidity count was determined based on a shortlist of 19 of the Rx-risk conditions.

Main Outcomes of Interest: Two outcomes are presented in this report: entry into a residential aged care facility (RACF) (including time to the event in months) and mortality (both before entry into RACF and ever, including time to both events in months). Entry into RACF was determined from the service records and the date of the first entry as a permanent resident was considered the date of the event. Mortality was determined from the NDI records.

Analysis: All analyses are descriptive. The sample and outcomes are described using frequencies, proportions, medians and interquartile ranges (IQR). All analyses were stratified by dementia status and separately by HCP level (1-2 and 3-4). The cumulative incidence of mortality and entry into RACF are described using a cumulative incidence plot for the whole cohort up to 31st December 2017, regardless of any gaps in HCP use in that time. Figures were created using SAS 9.4 and RStudio (package networkD3).

3. Results: All Home Care Package Recipients by Dementia Status

Table 1 Descriptives- all Home Care Package Recipients by Dementia Status

	HCP all N (%)	HCP dementia N (%)	HCP no dementia N (%)
TOTAL	99,701 (100.0)	11,491(100.0)	88,210(100.0)
Year (new entrants)= 2010	17,051 (17.1)	1,871(16.3)	15,180(17.2)
2011	20,308 (20.4)	2,362(20.6)	17,946(20.3)
2012	20,965 (21.0)	2,431(21.2)	18,534(21.0)
2013	20,820 (20.9)	2,450(21.3)	18,370(20.8)
2014	20,557 (20.6)	2,377(20.7)	18,180(20.6)
Wait time from ACAT Median (IQR), days	52 (21,128)	50 (21,125)	63 (26,156)
Age at first HCP service Median (IQR)	82 (77,86)	81(76,85)	82(77,87)
Female	63,690 (63.9)	6,941(60.4)	56,749(64.3)
Missing gender	18 (<0.1)	#	#
Aboriginal/Torres Strait Islander	3,034 (3.0)	176(1.5)	2,858(3.2)
Remoteness=Major Cities	62,119 (62.3)	7,577(65.9)	54,542(61.8)
Inner Regional	22,175 (22.2)	2,463(21.4)	19,712(22.3)
Outer Regional	11,700 (11.7)	1,167(10.2)	10,533(11.9)
Remote/ Very Remote	1,920 (1.9)	144(1.3)	1,776(2.0)
Missing	1,787 (1.8)	140(1.2)	1,647(1.9)
Number of Rx-Risk comorbidities median (IQR)	5 (3,7)	*5 (3,7)*	*5 (3,7)*
Number of Rx- Risk comorbidities			
0-4	39,520 (40.3)	4,730(41.2)	35,570(40.3)
5-7	38,663 (39.4)	4,780(41.6)	34,465(39.1)
8+	19,893 (20.3)	1,981(17.2)	18,175(20.6)
Has Carer	83,170 (83.4)	10,894(94.8)	72,276(81.9)
Missing Carer status	1,787 (1.8)	130(1.1)	1,657(1.9)
Age at first RACF service* Median (IQR)	85 (80,89)	82(78,86)	85 (80,89)
Age at death** Median (IQR)	86 (80,90)	84 (80,88)	86 (81,90)

*Those with RACF entry

**Those with death (with or without RACF)

n<5 or n<5 in neighbouring cell

Table 2 Selected Rx-risk conditions -- All by Dementia Status

	HCP Total N (%)	HCP Dementia N (%)	HCP no Dementia N (%)
TOTAL	99,701 (100.0)	11,491(100.0)	88,210(100.0)
Anticoagulants	18,276 (18.3)	1,268 (11.0)	17,008 (19.3)
Antiplatelets	32,363 (32.5)	3,429 (29.8)	28,934 (32.8)
Anxiety	10,993 (11.0)	1,060 (9.2)	9,933 (11.3)
Arrhythmia	12,245 (12.3)	843 (7.3)	11,402 (12.9)
Bipolar disorder	347 (0.3)	35 (0.3)	312 (0.4)
Chronic airways disease	21,782 (21.8)	1,398 (12.2)	20,384 (23.1)
Congestive heart failure	18,511 (18.6)	1,013 (8.8)	17,498 (19.8)
Depression	35,373 (35.5)	4,804 (41.8)	30,569 (34.7)
Diabetes	17,962 (18.0)	1,640 (14.3)	16,322 (18.5)
Hypertension	49,108 (49.3)	5,441 (47.4)	43,667 (49.5)
Inflammation/pain	12,616 (12.7)	1,104 (9.6)	11,512 (13.1)
Ischaemic heart disease: angina	12,095 (12.1)	786 (6.8)	11,309 (12.8)
Ischaemic heart disease: hypertension	42,971 (43.1)	4,144 (36.1)	38,827 (44.0)
Malignancies	3,063 (3.1)	171 (1.5)	2,892 (3.3)
Osteoporosis/Paget's	19,368 (19.4)	1,982 (17.2)	17,386 (19.7)
Pain	30,098 (30.2)	1,759 (15.3)	28,339 (32.1)
Psychotic illness	6,119 (6.1)	1,561 (13.6)	4,558 (5.2)
Pulmonary hypertension	84 (0.1)	0 (0.0)	84 (0.1)
Renal disease	1,986 (2.0)	89 (0.8)	1,897 (2.2)
Number of conditions, Median (IQR)	*3 (2,5)*	*3 (1,4)*	*3 (2,5)*

Table 3 Crude Outcomes -- all Home Care Package Recipients by Dementia Status

	HCP all N (%)	HCP dementia N (%)	HCP no dementia N (%)
TOTAL	99,701 (100.0)	21,888 (100.0)	77,813 (100.0)
Outcome= RACF Entry	53,546 (53.7)	8,636 (75.2)	44,910 (50.9)
Days to entry, Median (IQR)	444 (199,846)	360.5 (164,678)	466 (207,878)
Outcome = death (no RACF entry)	23,962 (24.0)	1,711(14.9)	22,251(25.2)
Days to death, Median (IQR)	447 (163,906)	431 (167,817)	449 (162,911)
outcome = none	22,193(22.3)	1,144 (10.0)	21,049 (23.9)
Days follow-up, Median (IQR)	1506 (1193,1963)	1396 (1148.5,1836.5)	1513 (1197,1969)
Outcome = Death overall (follow-up until 30th Jun 2017)	57,230 (57.4)	7,083 (61.6)	50,147 (56.8)
Days to death, Median (IQR)	764 (347,1244)	825 (435,1286)	755 (334,1238)

4. Results: All Home Care Package Recipients by Care Level

Table 4 Descriptive–All Home Care Package Recipients by Care Level

	HCP all N (%)	HCP level 1-2 N (%)	HCP level 3-4 N (%)
TOTAL	99,701 (100.0)	81,821 (100.0)	17,880 (100.0)
Year (new entrants)= 2010	17,051 (17.1)	14,680 (17.9)	2,371 (13.3)
2011	20,308 (20.4)	16,129 (19.7)	4,179 (23.4)
2012	20,965 (21.0)	17,043 (20.8)	3,922 (21.9)
2013	20,820 (20.9)	17,095 (20.9)	3,725 (20.8)
2014	20,557 (20.6)	16,874 (20.6)	3,683 (20.6)
Wait time from ACAT (days) Median (IQR)	52 (21,128)	51 (21,125)	53 (22,147)
Age at first HCP service Median (IQR)	82 (77,86)	82 (77,87)	81 (75,86)
Female	63,690 (63.9)	53,740 (65.7)	9,950 (55.6)
Aboriginal/Torres Strait Islander	3,034 (3.0)	2,659 (3.2)	375 (2.1)
Remoteness=Major Cities	62,119 (62.3)	51,164 (62.5)	10,955 (61.3)
Inner Regional	22,175 (22.2)	17,971 (22.0)	4,204 (23.5)
Outer Regional	11,700 (11.7)	9,493 (11.6)	2,207 (12.3)
Remote/ Very Remote	1,920 (1.9)	1,667 (2.0)	253 (1.4)
Missing	1,787 (1.8)	1,526 (1.9)	261 (1.5)
Number of Rx-Risk comorbidities Median (IQR)	5(3,7)	5(3,7)	5(3,7)
Number of Rx- Risk comorbidities			
0-4	40,300(40.4)	33,049(40.4)	7,251(40.6)
5-7	39,245(39.4)	32,391(39.6)	6,854(38.3)
8+	20,156(20.2)	16,381(20.0)	3,775(21.1)
Has Carer	83,170(83.4)	66,340(81.1)	16,830(94.1)
Missing Carer status	1,787(1.8)	1,555(1.9)	232(1.3)
Dementia (RX risk)	11,491(11.5)	7,856(9.6)	3,635(20.3)
Age at first RACF service Median (IQR)*	85(80,89)	85 (80,89)	83 (77,87)
*Age at death Median ** (IQR)*	86 (80,90)	86 (81,90)	84 (78,89)

*Those with RACF entry

**Those with death (with or without RACF)

Table 5 Selected Rx-risk Conditions: All Home Care Package Recipients by Care Level

	HCP all N (%)	HCP level 1-2 N (%)	HCP level 3-4 N (%)
TOTAL	99,701 (100.0)	81,821 (100.0)	17,880 (100.0)
Anticoagulants	18,276 (18.3)	15,103 (18.5)	3,173 (17.7)
Antiplatelets	32,363 (32.5)	26,528 (32.4)	5,835 (32.6)
Anxiety	10,993 (11.0)	9,092 (11.1)	1,901 (10.6)
Arrhythmia	12,245 (12.3)	10,272 (12.6)	1,973 (11.0)
Bipolar disorder	347 (0.3)	296 (0.4)	51 (0.3)
Chronic airways disease	21,782 (21.8)	18,122 (22.1)	3,660 (20.5)
Congestive heart failure	18,511 (18.6)	15,228 (18.6)	3,283 (18.4)
Depression	35,373 (35.5)	28,292 (34.6)	7,081 (39.6)
Diabetes	17,962 (18.0)	14,503 (17.7)	3,459 (19.3)
Hypertension	49,108 (49.3)	41,122 (50.3)	7,986 (44.7)
Inflammation/pain	12,616 (12.7)	10,715 (13.1)	1,901 (10.6)
Ischaemic heart disease: angina	12,095 (12.1)	10,082 (12.3)	2,013 (11.3)
Ischaemic heart disease: hypertension	42,971 (43.1)	36,290 (44.4)	6,681 (37.4)
Malignancies	3,063 (3.1)	2,452 (3.0)	611 (3.4)
Osteoporosis/Paget's	19,368 (19.4)	16,356 (20.0)	3,012 (16.8)
Pain	30,098 (30.2)	24,710 (30.2)	5,388 (30.1)
Psychotic illness	6,119 (6.1)	4,152 (5.1)	1,967 (11.0)
Pulmonary hypertension	84 (0.1)	63 (0.1)	21 (0.1)
Renal disease	1,986 (2.0)	1,584 (1.9)	402 (2.2)
Number of conditions, Median (IQR)	3(2,5)	3(2,5)	3(2,5)

Table 6 Crude Outcomes – All Home Care Package Recipients by Care Level

	HCP all N (%)	HCP level 1-2 N (%)	HCP level 3-4 N (%)
TOTAL	99,701 (100.0)	81,821 (100.0)	17,880 (100.0)
Outcome= RACF Entry	53,546(53.7)	43,978(53.7)	9,568(53.5)
Days to entry, Median (IQR)	444 (199,846)	476 (215,886)	325 (144,645)
Outcome = death (no RACF entry)	23,962(24.0)	17,927(21.9)	6,035(33.8)
Days to death, Median (IQR)	447 (163, 906)	496 (190,956)	315 (99,736)
outcome = none	22,193(22.3)	19,916(24.3)	2,277(12.7)
Days follow-up, Median (IQR)	1506 (1193,1963)	1516 (1198,1968)	1424 (1151, 1915)
Outcome = Death overall (follow-up until 30th Jun 2017)	57,230 (57.4)	44,393 (54.3)	12,837 (71.8)
Days to death, Median (IQR)	764 (347,1244)	812 (387,1295)	597 (236,1065)

5. Results: Matched Sample of Home Care Recipients by Dementia Status

Table 7 Descriptives–Matched Sample of Home Care Package Recipients by Dementia Status

	HCP all N (%)	HCP dementia N (%)	HCP no dementia N (%)
TOTAL	20,980 (100.0)	2,146 (100.0)	18,834 (100.0)
Year(new entrants)= 2010	3,577 (17.0)	339 (15.8)	3,238 (17.2)
2011	4,232 (20.2)	432 (20.1)	3,800 (20.2)
2012	4,292 (20.5)	446 (20.8)	3,846 (20.4)
2013	4,358 (20.8)	477 (22.2)	3,881 (20.6)
2014	4,521 (21.5)	452 (21.1)	4,069 (21.6)
Wait time from ACAT (days)	52 (21,131)	63 (26,162)	50 (21,127)
Age at first HCP service Median (IQR)	86 (82,89)	85 (81,88)	86 (82,89)
Female	11,863 (56.5)	1,225 (57.1)	10,638 (56.5)
Aboriginal/Torres Strait Islander	550 (2.6)	37 (1.7)	513 (2.7)
Remoteness=Major Cities	13,218 (63.0)	1,420 (66.2)	11,798 (62.6)
Inner Regional	4,651 (22.2)	457 (21.3)	4,194 (22.3)
Outer Regional	2,398 (11.4)	230 (10.7)	2,168 (11.5)
Remote/ Very Remote	339 (1.6)	20 (0.9)	319 (1.7)
Missing	374 (1.8)	19 (0.9)	355 (1.9)
Number of Rx-Risk comorbidities median (IQR)	5 (3,7)	5 (4,7)	5 (3,7)
Number of Rx- Risk comorbidities 0-4	9,088 (43.3)	855 (39.8)	8,233 (43.7)
5-7	8,172 (39.0)	906 (42.2)	7,266 (38.6)
8+	3,720 (17.7)	385 (17.9)	3,335 (17.7)
Has Carer	17,752 (84.6)	2,042 (95.2)	15,710 (83.4)
Missing Carer status	378 (1.8)	16 (0.7)	362 (1.9)
Age at first RACF service* Median (IQR)	88 (84,91)	86 (82,89)	88 (85,91)
Age at death** Median (IQR)	89 (86,92)	88 (84,91)	90 (86,93)

*Those with RACF entry

**Those with death (with or without RACF)

Table 8 Selected Rx-Risk conditions—Matched Sample by Dementia Status

	HCP all N (%)	HCP dementia N (%)	HCP no dementia N (%)
TOTAL	20,980 (100.0)	2,146 (100.0)	18,834 (100.0)
Anticoagulants	3,887 (18.5)	274 (12.8)	3,613 (19.2)
Antiplatelets	7,000 (33.4)	680 (31.7)	6,320 (33.6)
Anxiety	2,081 (9.9)	181 (8.4)	1,900 (10.1)
Arrhythmia	2,790 (13.3)	184 (8.6)	2,606 (13.8)
Bipolar disorder	51 (0.2)	#	#
Chronic airways disease	4,131 (19.7)	246 (11.5)	3,885 (20.6)
Congestive heart failure	4,111 (19.6)	230 (10.7)	3,881 (20.6)
Depression	6,410 (30.6)	842 (39.2)	5,568 (29.6)
Diabetes	3,178 (15.1)	262 (12.2)	2,916 (15.5)
Hypertension	10,346 (49.3)	1,031 (48.0)	9,315 (49.5)
Inflammation/pain	2,370 (11.3)	183 (8.5)	2,187 (11.6)
Ischaemic heart disease: angina	2,786 (13.3)	174 (8.1)	2,612 (13.9)
Ischaemic heart disease: hypertension	9,057 (43.2)	845 (39.4)	8,212 (43.6)
Malignancies	498 (2.4)	22 (1.0)	476 (2.5)
Osteoporosis/Paget's	4,134 (19.7)	386 (18.0)	3,748 (19.9)
Pain	5,810 (27.7)	326 (15.2)	5,484 (29.1)
Psychotic illness	1,021 (4.9)	261 (12.2)	760 (4.0)
Pulmonary hypertension	7 (0.0)	0 (0.0)	7 (0.0)
Renal disease	400 (1.9)	21 (1.0)	379 (2.0)
Number of conditions, Median (IQR)	3 (2,5)	3 (2,4)	3 (2,5)

#censored due to small cell counts <6

Table 9 Crude Outcomes –Matched Sample of Home Care Package Recipients by Dementia Status

	HCP all N (%)	HCP dementia Rx N (%)	HCP no dementia Rx N (%)
TOTAL	20,980 (100.0)	2,146 (100.0)	18,834 (100.0)
Outcome= RACF Entry	11,750 (56.0)	1,595 (74.3)	10,155 (53.9)
Days to entry, Median (IQR)	432 (195,815)	360 (157,664)	446 (202,842)
Outcome = death (no RACF entry)	5,349 (25.5)	363 (16.9)	4,986 (26.5)
Days to death, Median (IQR)	429 (155,879)	461 (155,860)	428 (155,880)
outcome = none	3,881 (18.5)	188 (8.8)	3,693 (19.6)
Days follow-up, Median (IQR)	1464 (1178,1922)	1432.5 (1171.5,1860)	1467 (1179,1927)
Outcome = Death overall (follow-up until 30th Jun 2017)	13,147 (62.7)	1,418 (66.1)	11,729 (62.3)
Days to death, Median (IQR)	747 (341,1219)	824 (418,1275)	736 (330,1211)

6. Results: Matched Sample of Home Care Package Recipients by Care Level

Table 10 Descriptive–Matched Sample of Home Care Package Recipients by Care Level

	HCP all N (%)	HCP level 1-2 N (%)	HCP level 3-4 N (%)
TOTAL	20,980 (100.0)	17,449 (100.0)	3,531 (100.0)
Year(new entrants)= 2010	3,577 (17.0)	3,112 (17.8)	465 (13.2)
2011	4,232 (20.2)	3,436 (19.7)	796 (22.5)
2012	4,292 (20.5)	3,523 (20.2)	769 (21.8)
2013	4,358 (20.8)	3,625 (20.8)	733 (20.8)
2014	4,521 (21.5)	3,753 (21.5)	768 (21.8)
Wait time from ACAT (days) Median (IQR)	52 (21,131)	52 (21,129)	50 (21,144)
Median age at first HCP service	86 (82,89)	86 (82,89)	86 (80,89)
Female	11,863 (56.5)	10,137 (58.1)	1,726 (48.9)
Aboriginal/Torres Strait Islander	550 (2.6)	483 (2.8)	67 (1.9)
Remoteness=Major Cities	13,218 (63.0)	11,013 (63.1)	2,205 (62.4)
Inner Regional	4,651 (22.2)	3,839 (22.0)	812 (23.0)
Outer Regional	2,398 (11.4)	1,984 (11.4)	414 (11.7)
Remote/ Very Remote	339 (1.6)	288 (1.7)	51 (1.4)
Missing	374 (1.8)	325 (1.9)	49 (1.4)
Number of Rx-Risk comorbidities median (IQR)	5 (3,7)	5 (3,7)	5 (3,7)
Number of Rx- Risk comorbidities 0-4	9,088 (43.3)	7,595 (43.5)	1,493 (42.3)
5-7	8,172 (39.0)	6,796 (38.9)	1,376 (39.0)
8+	3,720 (17.7)	3,058 (17.5)	662 (18.7)
Has Carer	17,752 (84.6)	14,415 (82.6)	3,337 (94.5)
Missing Carer status	378 (1.8)	339 (1.9)	39 (1.1)
Age at first RACF service Median (IQR)*	88 (84,91)	88 (85,91)	87 (82,90)
*Median Age at death** Median (IQR)*	89 (86,92)	90 (86,93)	88 (83,92)

*Those with RACF entry

**Those with death (with or without RACF)

Table 11 Selected Rx-Risk conditions – Matched Sample by Care Level

	HCP all N (%)	HCP level 1-2 N (%)	HCP level 3-4 N (%)
TOTAL	20,980(100.0)	17,449(100.0)	3,531(100.0)
Anticoagulants	3,887 (18.5)	3,273 (18.8)	614 (17.4)
Antiplatelets	7,000 (33.4)	5,785 (33.2)	1,215 (34.4)
Anxiety	2,081 (9.9)	1,760 (10.1)	321 (9.1)
Arrhythmia	2,790 (13.3)	2,348 (13.5)	442 (12.5)
Bipolar disorder	51 (0.2)	45 (0.3)	6 (0.2)
Chronic airways disease	4,131 (19.7)	3,495 (20.0)	636 (18.0)
Congestive heart failure	4,111 (19.6)	3,422 (19.6)	689 (19.5)
Depression	6,410 (30.6)	5,163 (29.6)	1,247 (35.3)
Diabetes	3,178 (15.1)	2,593 (14.9)	585 (16.6)
Hypertension	10,346 (49.3)	8,725 (50.0)	1,621 (45.9)
Inflammation/pain	2,370 (11.3)	2,036 (11.7)	334 (9.5)
Ischaemic heart disease: angina	2,786 (13.3)	2,335 (13.4)	451 (12.8)
Ischaemic heart disease: hypertension	9,057 (43.2)	7,743 (44.4)	1,314 (37.2)
Malignancies	498 (2.4)	400 (2.3)	98 (2.8)
Osteoporosis/Paget's	4,134 (19.7)	3,504 (20.1)	630 (17.8)
Pain	5,810 (27.7)	4,837 (27.7)	973 (27.6)
Psychotic illness	1,021 (4.9)	695 (4.0)	326 (9.2)
Pulmonary hypertension	7 (0.0)	#	#
Renal disease	400 (1.9)	327 (1.9)	73 (2.1)
Number of conditions, Median (IQR)	3 (2,5)	3 (2,5)	3 (2,5)

Table 12 Crude Outcomes –Matched Sample of Home Care Package Recipients by Care Level

	HCP all N (%)	HCP level 1-2 N (%)	HCP level 3-4 N (%)
TOTAL	20,980 (100.0)	17,449 (100.0)	3,531 (100.0)
Outcome = RACF Entry	11,750 (56.0)	9,862 (56.5)	1,888 (53.5)
Days to entry, Median (IQR)	432 (195,815)	457 (210,857)	311 (136.5,621)
Outcome = death (no RACF entry)	5,349 (25.5)	4,064 (23.3)	1,285 (36.4)
Days to death, Median (IQR)	429 (155,879)	464 (182.5,920)	311 (97,731)
outcome = none	3,881 (18.5)	3,523 (20.2)	358 (10.1)
Days follow-up, Median (IQR)	1464 (1178,1922)	1472 (1184,1932)	1383 (1136,1858)
Outcome = Death overall (follow-up until 30th Jun 2017)	13,147 (62.7)	10,422 (59.7)	2,725 (77.2)
Days to death, Median (IQR)	747 (341,1219)	793 (377,1260)	568 (224,1029)

7. Results: Figures – All Home Care Package Recipients

Figure 1 shows the status of residents after first access to an HCP. The nodes display prevalence at 1 year intervals of deceased (with or without residential care), received residential care, and received HCP only. Those with gaps in HCP who have not yet received residential care or died remain in the Home Care node. The bands show transitions from HCP to RACF, HCP to death, and RACF to death. Censored observations are not shown. The numbers corresponding to this figure are presented in Table 13.

Figure 1 Care Pathways from Home Care Package Entry

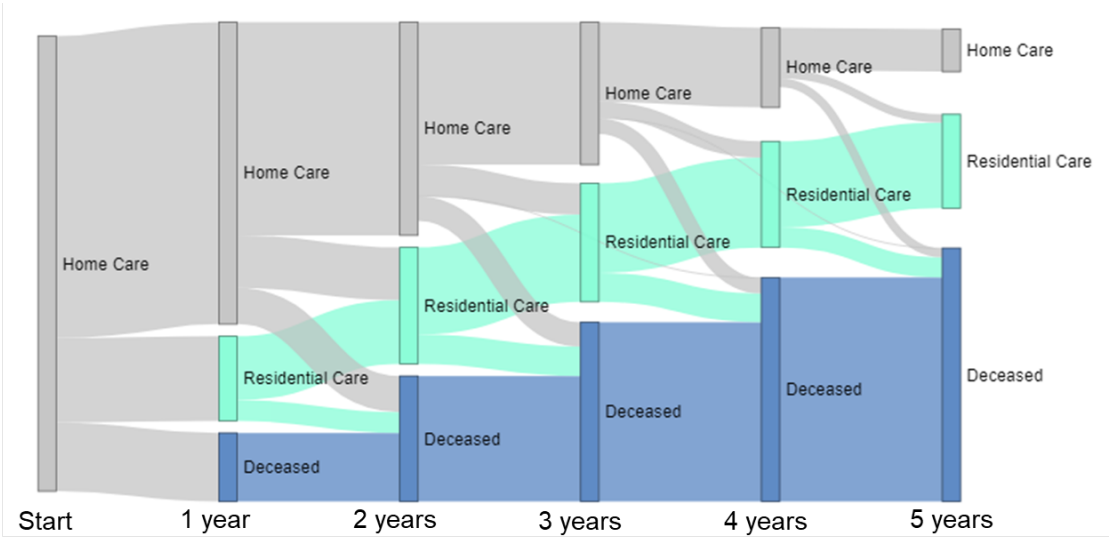

Table 133 Proportion of Individuals by Status after Home Care Package Entry

	Study entry	1 year	2 years	3 years	4 years	5 years
	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)
Home Care only	99,701 (100.0)	66,163 (66.4)	46,692 (46.8)	31,218 (31.3)	17,453 (17.5)	9,311 (9.3)
Residential Care		18,515 (18.6)	25,517 (25.6)	25,968 (26.0)	23,226 (23.3)	20,560 (20.6)
Deceased		15,023 (15.1)	27,492 (27.6)	39,263 (39.4)	49,048 (49.2)	55,520 (55.7)
Censored (30th June 2017)				3,252 (3.3)	9,974 (10.0)	14,310 (14.4)

Figure 2 shows cumulative incidence of entry into RACF and the competing risk of death after HCP entry. Observations have been censored at 30th June 2017. At 5 years after first access to an HCP, 55.2% (95%CI 54.9-55.5%) of residents had entered a RACF and 24.8% (95%CI 24.5-25.1%) had died without entering a RACF. **The median time to RACF entry (point at which 50% of people accessed RACF) was 1364 days.**

Figure 2 Cumulative Incidence of Entry into a Residential Aged Care Facility and Competing Risk of Death After 1st Entry into a Home Care Package

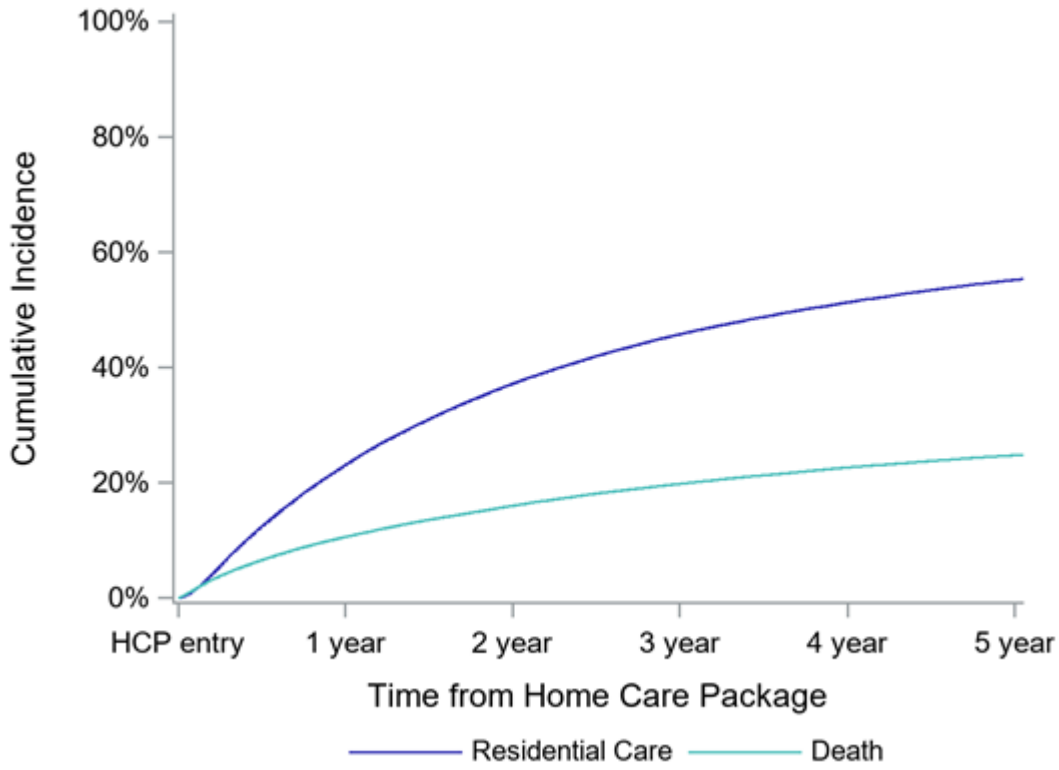

Table 14 Cumulative Incidence of Entry into RACF Accounting for the Competing Risk of Death

	1 year	2 years	3 years	4 years	5 years
	CI (95%CI)	CI (95%CI)	CI (95%CI)	CI (95%CI)	CI (95%CI)
Entry into RACF	23.0% (95%CI 22.8-23.3)	37.2% (95%CI 36.9-37.5)	45.8% (95%CI 45.4-46.1)	51.3% (95%CI 51.0-51.6)	55.2% (95%CI 54.9-55.5)
Deceased	10.6% (95%CI 10.4-10.8)	16.0% (95%CI 15.8-16.2)	19.8% (95%CI 19.6-20.1)	22.7% (95%CI 22.4-22.9)	24.8% (95%CI 24.5-25.1)

CI=Cumulative incidence. 95%CI=95% Confidence Interval.

8. Results: Figures – Matched Sample of Home Care Package Recipients

Figure 3 shows cumulative incidence of entry into RACF and the competing risk of death after HCP entry in the sample cohort. Observations have been censored at 30th June 2017. At 5 years after first access to an HCP, 58.7% (95%CI 58.1-59.4%) of residents had entered a RACF and 25.8% (95%CI 25.3-26.4%) had died without entering a RACF. **The median time to RACF entry (point at which 50% of people accessed RACF) was 1185 days.**

Figure 3 Cumulative Incidence of Entry into a Residential Aged Care Facility and Competing Risk of Death After 1st Entry into a Home Care Package

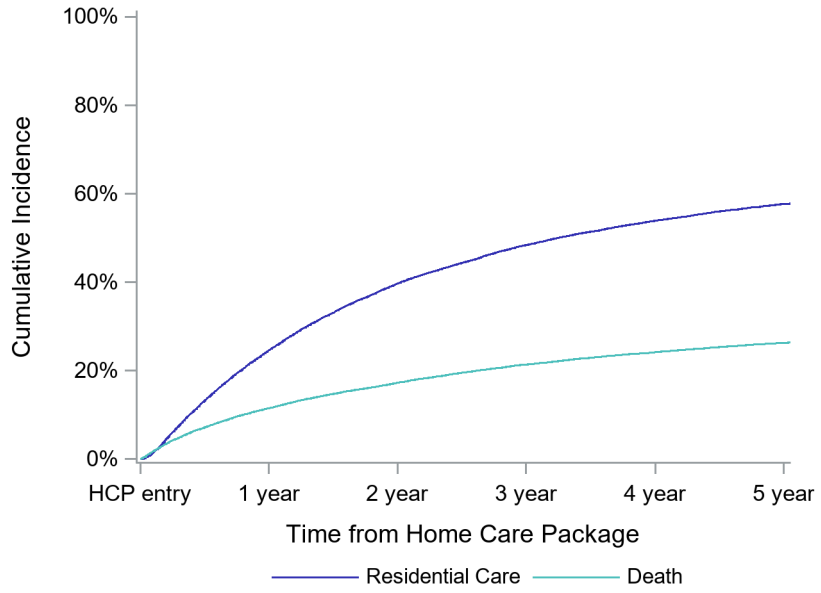

Table 15 Cumulative Incidence of Entry into RACF Accounting for the Competing Risk of Death

	1 year	2 years	3 years	4 years	5 years
	CI (95%CI)	CI (95%CI)	CI (95%CI)	CI (95%CI)	CI (95%CI)
RACF	24.6% (24.0-25.2)	39.7% (39.0-40.4)	48.4% (47.7-49.1)	53.9% (53.2-54.6)	57.6% (56.9-58.4)
Death	11.5% (11.1-11.9)	17.2% (16.7-17.8)	21.4% (20.8-21.9)	24.2% (23.6-24.8)	26.3% (25.7-26.9)
N at risk (for AIHW data checks)**	13418	9042	5783	3083	1561

CI=Cumulative incidence. 95%CI=95% Confidence Interval.

** note—the %s here are model outputs they don't refer to specific groups of people and exact numbers cannot be derived from them ** note—the %s here are model outputs they don't refer to specific groups of people and exact numbers cannot be derived from them

Additional information for cohorts with and without dementia 17 March 2022)

Cumulative incidence plot –matched sample, dementia

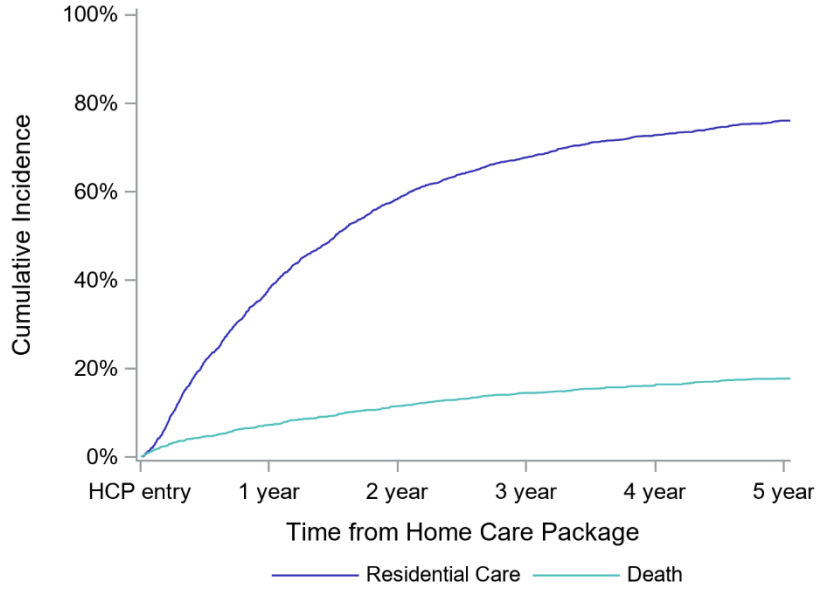

Table CIF, dementia=1;

	1 year	2 year	3 year	4 year	5 year
Entry into RACF	38.0% (35.9-40.0)	58.3% (56.2-60.4)	67.7% (65.7-69.6)	72.8% (70.8-74.6)	76.0% (74.1-77.9)
Deceased	7.2% (6.1-8.3)	11.5% (10.2-12.9)	14.4% (13.0-15.9)	16.2% (14.6-17.8)	17.7% (16.0-19.4)
N at risk**	1179	651	360	164	68

Cumulative incidence plot –matched sample, without dementia

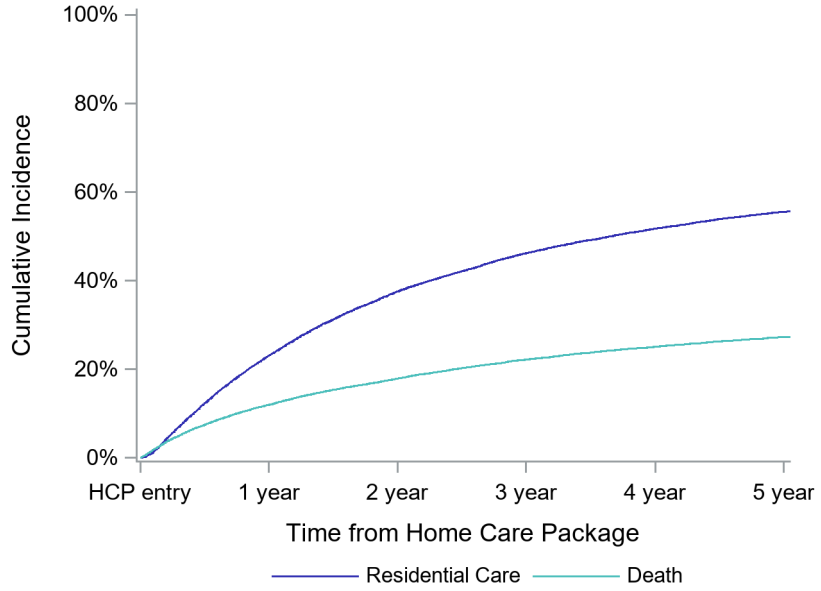

Table CIF, dementia=0;

	1 year	2 year	3 year	4 year	5 year
Entry into RACF	23.1% (22.5-23.7)	37.6% (36.9-38.3)	46.2% (45.5-46.9)	51.7% (51.0-52.4)	55.5% (54.8-56.3)
Deceased	12.0% (11.5-12.4)	17.9% (17.4-18.5)	22.2% (21.6-22.8)	25.1% (24.5-25.7)	27.3% (26.6-28)
N at risk** (for AIHW data checks)	12239	8391	5423	2919	1493

9. Results Summary

Overall cohort

This report describes characteristics of 99,701 recipients of HCP from 2010 -2014. Of these, 11,491 (11.5%) had dementia as defined by the RxRisk and 17,880 (17.9%) received HCP care levels 3-4. The median age was 82 (IQR 77-86) and 63,690 (63.9%) were female.

For the total cohort in the follow-up period to 2017, there were 53,546 (53.7%) who entered residential care and 23,962 (24.0%) who died without entering residential care. The cumulative incidence of entry into RACF after accounting for the competing risk of death was 55.2% (95%CI 54.9-55.5%) at 5 years and the time until 50% of individuals entered RACF was 1364 days.

Sample cohort

A matched sample of 20,980 HCP recipients was created. Of these, 2,146 (10.2%) had dementia as defined by the RxRisk and 3,531 (16.8%) were receiving HCP care levels 3-4. The median age was 86 (IQR 82-90) and 11,863 (56.5%) were female.

For the sample cohort and in the follow-up period to 2017, there were 11,750 (56.0%) who entered residential care and 5,349 (25.5%) who died without entering residential care. At 5 years after first access to an HCP, 57.6% (95%CI 56.9-58.4%) of residents had entered a RACF and 26.3% (95%CI 25.7-26.9%) had died without entering a RACF. The median time to RACF entry (point at which 50% of people accessed RACF) was 1185 days.

10. References

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11. Notes

1. For the purposes of this report we have used only the RxRisk to ascertain dementia. However, usually ROSA studies use several datasets to ascertain individual's co-morbidities. Dementia for home care package recipients in the ROSA datasets is usually ascertained based on their aged care eligibility assessment and RxRisk. If this was used the prevalence of dementia in this cohort would be 24.1% (19.9% in those in HCP level 1-2 and 42.9% in those in HCP level 3-4).

2. ROSA uses a modified RxRisk to ascertain dementia. The published RxRisk for dementia is any ATC code in: N06DA02, N06DA03, N06DA04, N06DX01. ROSA has modified this to also include N05AX08 (risperidone) when indicated on the PBS for behavioural symptoms of dementia (PBS item codes: 8787L*, 8788M, 8789N*, 8790P, 9293D, 1842Y). *Please note that * have been removed from PBS 2021-12-01 and authority restriction codes have changed in 2020-01-01.*

Appendix

Table 14 DVA counts used for sample matching

Age	F	M
65	14	243
66	43	253
67	43	183
68	40	168
69	49	128
70	61	116
71	61	119
72	72	137
73	74	126
74	95	131
75	107	122
76	113	119
77	162	137
78	221	123
79	303	126
80	377	162
81	445	123
82	634	152
83	705	207
84	879	294
85	983	437
86	1041	658
87	991	808
88	999	831
89	874	825
90	784	719
91	566	568
92	400	412
93	302	285
94	172	168
95	108	102
96	66	63
97	43	43
98	27	17
99	9	12
100	0	0

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