Use of medical services by older Australian women with dementia: a longitudinal cohort study

Julie Byles,[1] Dominic Cavenagh,[1] Jamie Bryant,[2] Danielle Mazza,[3] Colette Browning,[4] Sally O'Loughlin,[5] Rob Sanson-Fisher[2]

Abstract

Objective: To assess the use of Medicare-subsidised health services by women with and without dementia.

Methods: Data from women of the 1921–26 birth cohort of the Australian Longitudinal Study on Women's Health were linked to various administrative datasets to ascertain dementia diagnosis. The use of subsidised general practitioner (GP) services (75+ health assessments [HAs], chronic disease management meetings [CDMs], multidisciplinary case conferences [MCCs]) and specialist and allied health services between 2000 and 2013 for these women was analysed using longitudinal GEE models.

Results: A total of 9,683 women were included with 1,444 (15%) women identified as having dementia. Compared to women with no dementia indication, women with dementia had more yearly non-emergency GP attendances (short [<30 minutes] IRR=1.11 [1.07, 1.13]; long [>30 minutes] IRR=1.11 [1.04, 1.19]) and fewer specialist attendances (IRR=0.91 [0.85, 0.97]) and were more likely to have an emergency GP attendance (OR=2.29 [2.05, 2.57]). There were no significant differences in the odds of having either a HA or CDM or using allied health services for women with and without dementia indicators.

Conclusions: The overall use of services designed to improve the prevention and coordination of the care of older people with chronic conditions was low. Women with dementia were no more likely to access these services.

Implications for public health: There is underuse of some primary and allied healthcare services designed for people with complex chronic conditions. These could be better used by women with dementia to improve the management of complex comorbidities (e.g. CDMs), to prevent the onset of disability (e.g. physiotherapy), and enhance needs assessment and service access (e.g. HAs).

Key words: health service use, dementia, general practice, health assessments, longitudinal study

The Australian Institute of Health and Welfare estimates that dementia affects almost 1 in 10 (8.8%) people aged 65 and over,[1] and research shows it is increasingly prevalent as populations age.[2] This common set of conditions can be particularly complex to diagnose and manage given the gradual onset and progressive nature of dementia, and the impact of the disease on multiple behavioural and cognitive functions.[3] Moreover, dementia is often comorbid with multiple other conditions that interact to increase the complexity of healthcare needs and is coincident with physical frailty.[4,5] The management of people with dementia is therefore complex and requires a comprehensive approach to care coordination across multiple services.[6]

General practitioners (GPs) are the cornerstone of medical care for people with dementia.[7,8] With continuity of care, GPs have knowledge of a person's healthcare history and a long relationship with the patient and their carer. They are well placed to identify early signs of dementia and are often the first clinician to become aware of the person's concerns about cognitive decline.[9] After diagnosis, the ongoing care and medical management of dementia is also principally coordinated by the GP, in partnership with the person and their family, with specialist consultation.[10]

In providing this multidisciplinary care, GPs in Australia can make use of a range of service opportunities that are subsidised through Medicare, including health assessments (items 700–715), chronic disease management services (CDM, 721–732) and multidisciplinary case conferences (735–779).[11] These various items are designed to enable GPs to have comprehensive and ongoing involvement in the person's overall care, with particular attention to health risks, preventing loss of independence, managing symptoms and preventing adverse events. However, despite research to indicate that these approaches can be effective in improving outcomes,[12,13] their uptake is incomplete and there is room to improve their use, particularly by frail older people with chronic disease.[14-17]

1. Centre for Women's Health Research, The University of Newcastle, New South Wales
2. Health Behaviour Research Group, The University of Newcastle, New South Wales
3. Department of General Practice, Monash University, Victoria
4. School of Health, Federation University, Victoria
5. Service Specialist Excellence, Uniting, New South Wales
Correspondence to: Mr Dominic Cavenagh, Centre for Women's Health Research, Faculty of Medicine, University of Newcastle, Level 4 West, HMRI, Lot 1, Kookaburra Circuit, New Lambton Heights, NSW 2305; e-mail: dominic.cavenagh@newcastle.edu.au
Submitted: October 2020; Revision requested: March 2021; Accepted: June 2021
The authors have stated they have no conflicts of interest.

Aust NZ J Public Health. 2021; 45:497-503; doi: 10.1111/1753-6405.13146

The aim of this study was to assess healthcare use (GP, specialist, and allied health) for women with dementia compared to those with no dementia. We hypothesised that, compared to other women of the same age and after accounting for comorbidities and other predisposing, enabling and need factors, women with dementia would have more overall GP attendances, GP health assessments, chronic disease management services and allied health services. However, we expected that the use of health assessments, chronic disease management and allied health would be low overall, with the opportunity to improve uptake for women with dementia. For instance, all people over the age of 75 are eligible to have a health assessment once each year. For women with dementia, most would have other complex comorbidities,[4] such as cardiovascular disease, as well as reduced abilities for daily living activities, and would benefit from chronic disease management and allied health services. Previous research has identified these services as being well-positioned to identify geriatric disorders and the need for care.[18] Therefore, we expected most women with dementia to be eligible for these services on an annual basis.

Method

Data sources

Data were from the 1921–26 birth cohort of the Australian Longitudinal Study on Women's Health (ALSWH).[19] These women have been surveyed every three years since 1996, and their survey data are linked to Medicare Benefits Schedule (MBS) data, Pharmaceutical Benefits Scheme (PBS), hospital and aged care data, and the National Death Index (NDI). Women were included in this analysis if they had completed Survey 2 (1999) and were eligible for data linkage. Participants consented to follow-up surveys and data linkage through the ALSWH. Ethics approval was obtained from the Human Research Ethics Committees of the universities of Newcastle (H-076-0795/H-2011-0371) and Queensland (2004000224/2012000950).

Dementia

Women with dementia were identified from multiple data sources including: ALSWH surveys (diagnosis of dementia); PBS (anti-dementia drugs identified by Anatomical Therapeutic Chemical codes N06DA/NO6DX); NSW, ACT, WA, QLD and SA hospital admissions (ICD-10 AM codes F00/F01/F03/G30); aged care services (Aged Care Assessment Program and Aged Care Funding Instrument codes for dementia); and the National Death Index (ICD-10 AM codes F00/F01/F03/G30 for cause of death) using methods described by Waller et al.[20]

Medical services

The broad type of service (BTOS), item groups and numbers were used to measure the use of Medicare services. GP attendances (BTOS A, B, M), where a length of service was included in the item information and the item was not included in one of the other service groupings (item groups: A01, A02, A05, A06, A11, A1502, A16, A2102, A22, A23, A35), were grouped into emergency GP attendances (urgent attendance required), short GP attendances (median length of service <30 minutes) and long GP attendances (median length of service ≥30 minutes). The median length of GP service was defined as the maximum plus minimum length of service listed for each item divided by two. Specialist attendances (BTOS C), health assessments (items 700–715), chronic disease management services (items 721–732), multidisciplinary case conferences (items 735–779) and allied health services (items 10950–10970 and allied health use through Home and Community Care [HACC] collapsed together) were also analysed.

Other measures

Participants' baseline age and country of birth were taken from ALSWH Survey 1 (1996). Other measures were taken from ALSWH surveys for 2000–2013, with measures for each survey carried over to the two years between surveys. These measures included area of residence[21] (major city, inner regional, outer regional/rural/remote), marital status (partnered or not partnered), self-reported chronic conditions (0, 1, 2 or more of diabetes, heart disease, hypertension, osteoporosis, cancer, arthritis), private health insurance, DVA cover, healthcare concession card, and body mass index (BMI).[22] Participants were classified as to whether they were in their last calendar year of life (NDI date of death).

Statistical analysis

Women's characteristics in the baseline year (2000, aged 73–78) were tabulated and chi-square tests were used to compare group differences for those who did and did not have an indicator of dementia in 2000–2013. The mean number of attendances for short/long GP and specialist attendances as well as the percentage of the women having at least one emergency GP attendance, health assessment, chronic disease management meeting, multidisciplinary case conference or allied health service were tabulated annually. Adherence to yearly health assessments was described as the percentage of years women had a health assessment and was tabulated by dementia status. The five most common specialist attendances, by dementia status, were calculated as a percentage of total specialist attendances.

Longitudinal GEE models (2000–2013) were used to investigate associations between dementia and medical service use while accounting for other predisposing, need and enabling factors. Yearly counts of GP (long/short) and specialist attendances were modelled using a negative binomial distribution with a log link. Emergency GP attendances, health assessments, chronic disease management consultations and allied health services were treated as binary outcomes (did/did not have at least one attendance in a year) modelled using a binomial distribution with a logit link. Due to a later introduction to Medicare, chronic disease management and the allied health outcomes were modelled for 2005–2013 only. Based on low counts, multidisciplinary case conferences were not modelled. For each outcome modelled, an offset of the log of the number of days alive in a year was specified. Multiple imputation by fully conditional specification[23] was used to fill missing values for BMI (9% missing), marital status (<0.1% missing) and area of residence (<0.1% missing). Ten imputed datasets were produced, and analysis conducted on each, with the results pooled to give final estimates. Incidence rate ratios are reported for the negative binomial models and odds ratios for the binomial models. Analysis was conducted in SAS 9.4. A p-value of 0.05 was used to determine statistical significance.

Results

A total of 9,683 participants who completed Survey 2 (1,444 with dementia in at least one year 2000–2013) were included in all the models except for the chronic disease management and allied health models (6,783 participants – 1,208 with dementia in at least one year 2005–2013). Most women

with dementia (~70%) were identified by more than one source. The most common combinations of indicators were from aged care and death data, aged care and hospital data, or all three of these sources. The most common sole source of dementia information was from aged care. Few women (<4%) were identified only through surveys. There were significant differences across all baseline characteristics except for number of chronic conditions, private insurance and DVA card status (Table 1).

Women's yearly mean number of GP and specialist attendances increased between 2000 and 2013. There were large increases in the percentage of women having a health assessment, chronic disease management and using an allied health service. Very few women (fewer than 1.5% in any year) had a multidisciplinary case conference (Supplementary Table 1). Women with dementia were more likely to have at least one health assessment at any time in the study period compared to women without dementia (75.55% vs. 63.51%). Few women, both with and without dementia, had health assessments in half (or more) of the observation years (Supplementary Table 2). The most common CDM item was the preparation of GP management plans (44.7% of all CDM claims for women without dementia, 33.6% of all CDM claims for women with dementia). Women with dementia had a higher percentage of CDM item claims in an aged care facility (25.2% vs. 3.16%) compared to women without dementia (Supplementary Table 3). For women without dementia, the most common specialist items were ophthalmology, general medicine, cardiology, general surgery and anaesthetics. For women with dementia, the most common specialist items were general medicine, geriatrics, ophthalmology, cardiology and rehabilitation (Supplementary Table 4). The most common allied health items claimed through the MBS were podiatry and physiotherapy, which together accounted for more than 90% of allied health services among women both with and without dementia (Supplementary Table 5). Note: it is not possible to determine which allied health service is used through the HACC data. Due to the introduction of the MBS items (and uptake afterwards) in 2004, initially, most women (~85%) were using allied health through HACC (in 2004). This proportion gradually changed to almost the opposite by 2013, i.e. 75% of allied health users were getting it through the MBS with 19% getting it through HACC in 2013. Note: there was a small proportion of allied health users (approximately 6%) that were getting a service through both MBS and HACC each year.

Table 1: Baseline characteristics of women who did and did not have indicators for dementia.

	Has/will indicate dementia			
	No		Yes	
	N	%	N	%
	8,239	100	1,444	100
Age at baseline (1996)*				
70	546	6.63	69	4.78
71	1,883	22.85	326	22.58
72	1,748	21.22	267	18.49
73	1,592	19.32	293	20.29
74	1,416	17.19	291	20.15
75	1,054	12.79	198	13.71
Area of residence*				
Major metropolitan	3,130	37.99	610	42.24
Inner regional	3,436	41.7	547	37.88
Outer regional/rural/remote	1,673	20.31	287	19.88
Country of birth				
Australia	6,555	79.56	1162	80.47
Other English speaking country	1,002	12.16	172	11.91
Non-English speaking country	682	8.28	110	7.62
Marital status*				
Partnered	4,143	50.29	783	54.22
Not partnered	4,093	49.68	661	45.78
Count of chronic conditions				
None	1,424	17.28	255	17.66
1	2,761	33.51	474	32.83
2 or more	4,054	49.21	715	49.52
Private insurance				
No	4,933	59.87	847	58.66
Yes	3,306	40.13	597	41.34
DVA card				
No	7,409	89.93	1,293	89.54
Yes	830	10.07	151	10.46
Concession card*				
No	4,517	54.82	677	46.88
Yes	3,722	45.18	767	53.12
BMI group*				
Underweight	259	3.14	47	3.25
Acceptable weight	3,721	45.16	698	48.34
Overweight	2,516	30.54	441	30.54
Obese	1,062	12.89	151	10.46
Final Calendar year of life*				
No	8,082	98.09	1,436	99.45
Yes	157	1.91	8	0.55

NOTE:
Characteristics at Survey 2 (age 73-78 years) unless specified.
N-sizes vary due to missing data for specific items.
Chi-square tests used to test group differences.
**significant at p<0.05*

Based on the longitudinal GEE models, women with dementia had significantly more short (IRR=1.11 [1.07, 1.14]) and long (IRR=1.11 [1.04, 1.19]) GP attendances per year, compared to women with no indicators of dementia (Table 2). Women with dementia had significantly fewer specialist attendances (IRR=0.91 [0.85, 0.97]) per year than those with no indicators of dementia.

Women with dementia had much higher odds (almost 2.3 times) of having an emergency GP visit in a year, compared to women with no indicators of dementia (Figure 1. See Supplementary Table 6 for full figure data). There were no significant

differences in the odds of having either a health assessment, chronic disease management or using an allied health service for women with and without indicators of dementia each year.

Discussion

Women with dementia had more GP attendances and fewer specialist attendances compared to women without dementia. However, they were no more likely to have had health assessments or chronic disease management or to use allied health services whether through Medicare or community services. Overall, fewer than half of all women used Medicare items designed to improve prevention and coordination of care for older people with chronic conditions. The patterns of use we identified indicate an opportunity to improve the use of these items for older people, particularly for people with dementia who have multiple complex needs that are likely to change as dementia progresses. This vulnerable group are likely to benefit from comprehensive assessments of their needs and support from interdisciplinary care providers.[24-28] A number of patient, provider and system-level barriers to providing ongoing high-quality care to people with dementia have been previously identified. These barriers include reluctance to acknowledge cognitive decline, patient non-adherence to management plans, lack of GP training and confidence in providing care, a lack of time during consultations to address issues, and a lack of comprehensive support services to refer patients to. Educational interventions to increase awareness of the advantages of using these items among GPs, carers and the families of people with dementia may be beneficial in addressing some of these issues.[29]

Dementia Care Guidelines for Australia[30] and many other countries[31] emphasise the importance of case management, care coordination and service integration. Services provided by allied health providers such as physiotherapists, occupational therapists, social workers, dieticians and psychologists may assist in supporting people living with dementia to remain living in the community as long as possible rather than in aged care facilities, which is preferred by most people with dementia and their carers.[32] However, our data suggest these services are rarely used.

The higher number of GP visits by women with dementia is consistent with a higher level of more complex needs among this group. In addition, visits were further increased for women with increasing numbers of comorbid conditions. The higher

Table 2: Longitudinal GEE models incidence rate ratios for number of short/long GP and specialist attendances per year 2000 to 2013.

Parameter	Level	Shorter GP Attendances		Longer GP Attendances		Specialist Attendances	
		Incidence Rate Ratio (95% CI)	P	Incidence Rate Ratio (95% CI)	P	Incidence Rate Ratio (95% CI)	P
Dementia indicated?	No (ref)						
	Yes	1.11 (1.07, 1.14)	<.0001	1.11 (1.04, 1.19)	0.0019	0.91 (0.85, 0.97)	0.0059
Age at baseline	70 (ref)						
	71	1.03 (0.98, 1.08)	0.2645	1.12 (1.01, 1.23)	0.0248	1.02 (0.93, 1.11)	0.6804
	72	1.03 (0.98, 1.08)	0.3228	1.08 (0.98, 1.19)	0.1137	0.99 (0.91, 1.09)	0.9068
	73	1.03 (0.98, 1.08)	0.2607	1.09 (0.99, 1.2)	0.0945	1.01 (0.93, 1.11)	0.7688
	74	1.08 (1.02, 1.13)	0.0046	1.14 (1.03, 1.26)	0.01	1.01 (0.92, 1.1)	0.8821
	75	1.07 (1.01, 1.13)	0.0159	1.13 (1.02, 1.26)	0.0253	1.02 (0.93, 1.12)	0.6165
Residential area group	Major Metro (ref)						
	Inner Regional	0.96 (0.94, 0.98)	0.0004	0.82 (0.78, 0.86)	<.0001	0.74 (0.71, 0.77)	<.0001
	Outer Regional / Rural / Remote	0.96 (0.94, 0.99)	0.0064	0.77 (0.72, 0.82)	<.0001	0.56 (0.53, 0.59)	<.0001
Country of birth group	Australia (ref)						
	English Speaking Country	0.96 (0.93, 0.99)	0.0139	0.98 (0.92, 1.05)	0.5344	0.87 (0.82, 0.92)	<.0001
	Non-English speaking country	0.97 (0.93, 1.02)	0.2326	1.07 (0.98, 1.17)	0.1554	0.92 (0.86, 1)	0.039
Marital status group	Partnered (ref)						
	Non-partnered	0.97 (0.95, 0.99)	0.0009	1.02 (0.98, 1.06)	0.4483	1.02 (0.99, 1.06)	0.1573
Number of Chronic conditions	None (ref)						
	One	1.15 (1.12, 1.18)	<.0001	1.19 (1.12, 1.27)	<.0001	1.21 (1.15, 1.28)	<.0001
	Two or more	1.31 (1.27, 1.34)	<.0001	1.51 (1.42, 1.61)	<.0001	1.62 (1.53, 1.71)	<.0001
Private insurance	No (ref)						
	Yes	1.01 (0.99, 1.02)	0.5228	1 (0.96, 1.04)	0.99	1.56 (1.51, 1.62)	<.0001
DVA card	No (ref)						
	Yes	1.04 (1.02, 1.06)	<.0001	1.11 (1.07, 1.15)	<.0001	1.43 (1.38, 1.48)	<.0001
Concession Card	No (ref)						
	Yes	0.95 (0.94, 0.97)	<.0001	0.93 (0.89, 0.96)	<.0001	0.82 (0.79, 0.84)	<.0001
BMI	Underweight	1 (0.97, 1.04)	0.8809	1.01 (0.93, 1.09)	0.8539	1.04 (0.96, 1.12)	0.3317
	Acceptable Weight (ref)						
	Overweight	1 (0.98, 1.01)	0.8078	0.99 (0.96, 1.02)	0.5668	0.98 (0.95, 1.01)	0.2267
	Obese	1 (0.97, 1.02)	0.8061	1.04 (0.99, 1.09)	0.1316	0.96 (0.91, 1.01)	0.1019
Final year of life	No (ref)						
	Yes	1.51 (1.45, 1.57)	<.0001	1.91 (1.78, 2.06)	<.0001	2.62 (2.37, 2.9)	<.0001

Note:
All models adjusted for year

number of emergency visits also reflects this vulnerability but may also reflect missed opportunities for better care coordination and prevention. However, our finding is at odds with a UK study that found that people with dementia, and particularly women, received less primary healthcare than people without dementia.[33] This may reflect better access to primary healthcare in the Australian setting.

Fewer specialist attendances for women with dementia may indicate a reluctance by GPs and carers to seek out specialist advice for those with dementia. The management of comorbid conditions among people with dementia can be impeded by a concentration on the dementia in clinical encounters and a lack of attention to comorbidities where a specialist may be consulted.[34] It may also reflect greater difficulty accessing specialist care in residential care, where many women with dementia spend their later years.[35] A study of claims data from Germany found that women with higher needs for long-term care tended to have fewer specialist visits, however, the effect was not consistent across all specialities. In the case of neurology/psychiatry, aged care residents with higher levels of need tended to receive a higher intensity of specialist care. For most other specialties, after controlling for comorbidities, those with higher needs had fewer visits.[36] Recommendation 58 of the recent Royal Commission into Aged Care Quality and Safety concerns access to health practitioners through multidisciplinary outreach services. These would provide services in a person's place of residence through multidisciplinary teams including relevant specialists, nurse practitioners and allied health, and would include proactive care rehabilitation and palliative care when required.[37]

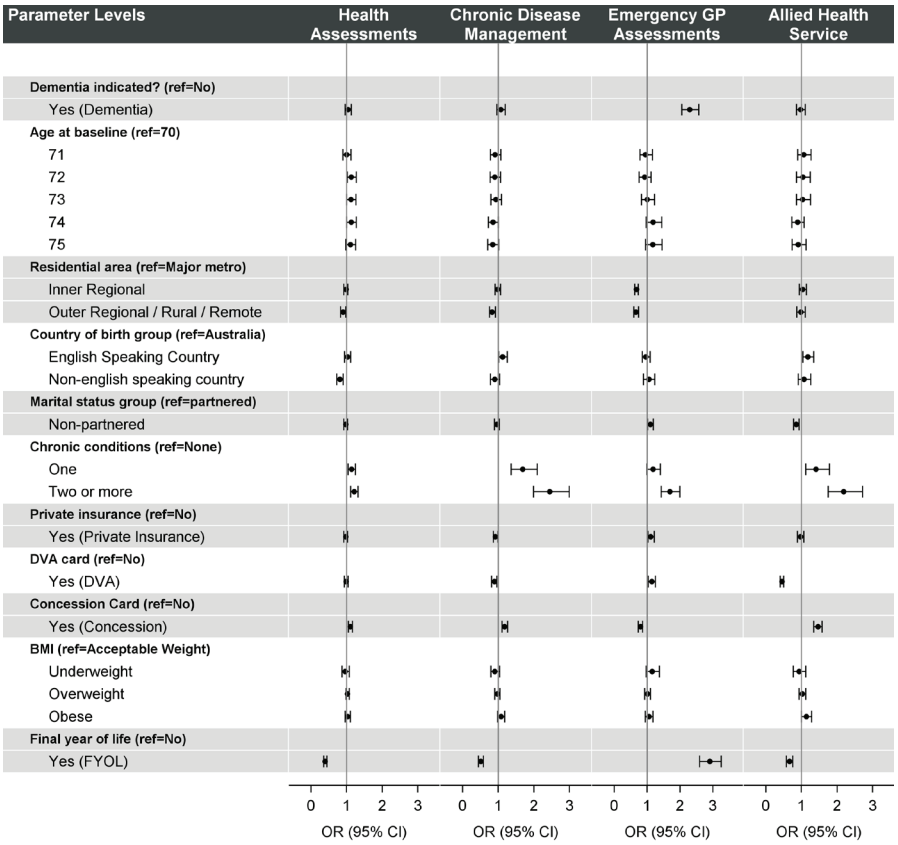
Women in their final year of life had a large increase in both general practitioner and specialist attendances and higher odds of emergency GP visits. However, they were less likely to have health assessments, chronic disease management or allied health services. It is known that the greatest healthcare costs are not associated with age, but with closeness to death.[38,39] There is a need to better understand how to improve healthcare services that meet the needs of people in their final years.

The use of these services may also be affected by women's ability to access them. This issue of accessibility is reflected in the lower use of all services by women in outer regional and remote areas. In Australia, the number of GPs per 100,000 of population varies from around 93 in outer regional areas to around 103 in major cities[40] and people living outside major cities have fewer after-hours services.[41] Specialist services are also limited in rural areas. Access may also be affected by women's ability to pay, with higher use of most services by women with private health insurance or DVA coverage. Conversely, these women had lower use of emergency GP visits. There was a small effect indicating non-partnered women had fewer short GP attendances and were slightly less likely to use allied health services. While this effect was small it may indicate some increased ability to access services for women with partners, who may be entirely reliant on them for transportation.[42]

Women from non-English speaking backgrounds were less likely to receive health assessments. Culturally and linguistically diverse (CALD) populations may experience restricted access to health services because of the lack of interpreters and low health literacy.[43] In a UK study, the authors concluded that the access to dementia care by ethnic minority groups was compromised by lack of knowledge about dementia by carers and health professionals and cultural norms around stigma associated with treatment seeking.[44] To improve the uptake of health assessments, GPs need to develop trusting relationships with their CALD patients and ensure that health assessments can be provided in a way that is culturally acceptable. The use of bilingual/bicultural workers, GPs or other healthcare staff should be considered to improve the uptake of health assessments.[45]

The Medicare items examined in this study were designed to improve the planning and coordination of healthcare for people with chronic conditions. These items would appear to be of potential benefit to older people, including those with dementia. Most older people have multiple chronic conditions, and few people have dementia without having comorbid conditions and other functional disabilities. The care of these complex comorbid conditions can become fragmented and confusing. Chronic disease management items can assist with better integration of different care components.

Figure 1: Forest plot of parameter estimates from health assessment, CDM consultations, emergency GP attendance and allied health services modelling.



Note:
See Supplementary Table 6 for full figure data.

Likewise, numerous studies have shown that health assessments can benefit older people.[46,47] Allied health consultations may also benefit people with dementia, for instance through dietary advice, social work or other supports. Currently, the main use of these services appears to be for podiatry and physiotherapy. It is of interest that podiatry is more widely used than other services, and this may limit the use of other services that people may also need. We suggest that the service limit may be increased to allow podiatry as a base for those who qualify (e.g. people with diabetes) and for other services to be added where there is a need. There is also an opportunity for greater integration of care at the primary health level so that allied health services can be tailored to people's needs.

This study does have some limitations. Firstly, chronic disease management, health assessments, allied health and emergency GP attendances are measured by a binary variable, while short and long GP visits and specialist use are measured by a count variable, and covariate effects cannot be directly compared across these models. These analyses are also limited in that women are only included in the models for up to three years from their most recent survey, and women with dementia are less likely to complete the surveys. This effect may have resulted in an underestimate of the effects for women with dementia in that those with more advanced dementia may be less likely to be included. We would expect women with more advanced dementia to be using these services even less, particularly if they are in residential aged care. Further, dementia is ascertained from linked data that may not capture all women with dementia including those who are undiagnosed. However, the study is strengthened using multiple sources of ascertainment, which produces dementia rates in line with national prevalence estimates.[20,48]

It should also be considered that changes over time are likely to reflect the women's increasing age but may also reflect changes in the healthcare environment. In the case of health assessments, chronic disease management and allied health items, this increase in use could also reflect changes in provider behaviour with greater uptake of these items since their introduction. The residential setting may also affect the use of these Medicare items. We have not accounted for periods when women were resident in hospital or residential care. However, we do know that women with dementia are more likely to be admitted to hospital in the last years of life, and to residential aged care,[35] as reflected in the allied health data. Our study only includes women; further research could compare service use by women and men.

Conclusion

This study shows increased GP and decreased specialist visits by women with dementia. Women in their final year of life had more general GP and specialist attendances. It also demonstrates an underuse of specific Medicare items for assessment and care coordination that may be used to improve health outcomes for women with complex conditions. Addressing barriers to providing care; providing provider, patient and carer education; offering and providing care in culturally appropriate ways; building trusting relationships between patients and providers; possible expansion of services offered for women with complex care needs; and investigating the use of multidisciplinary outreach teams to women in residential care facilities have all been identified as possible solutions to the problems of underuse identified. Enhanced use of health assessments, chronic disease management and allied health may have benefits for older people, particularly those with dementia.

Acknowledgements

The authors wish to acknowledge: the Department of Health, Veterans' Affairs, and Medicare Australia for providing MBS, PBS and Aged Care data and the Australian Institute of Health and Welfare (AIHW) as the integrating authority; Centre for Health Record Linkage (CHeReL), NSW Ministry of Health and ACT Health for the NSW Admitted patients and the ACT Admitted Patient Care Data Collections; Queensland Health, including the Statistical Services Branch, for the QLD Hospital Admitted Patient Data Collection; Department of Health Western Australia, including the Data Linkage Branch and the WA Hospital Morbidity Data Collection; SA NT Datalink and SA Health, for the SA Public Hospital Separations Data Collections; the assistance of the Data Linkage Unit at the Australian Institute of Health and Welfare (AIHW) for undertaking the data linkage to the National Death Index (NDI).

This work was supported by a National Health and Medical Research Council Dementia Research Team Grant (APP1095078). This research was also supported by infrastructure funding from the Hunter Medical Research Institute.

The research on which this paper is based was conducted as part of the Australian Longitudinal Study on Women's Health by the University of Queensland and the University of Newcastle. We are grateful to the Australian Government Department of Health for funding and to the women who provided the survey data.

Jamie Bryant is supported by an NHMRC-ARC Dementia Research Development Fellowship.

References

1. Australian Institute of Health and Welfare. *Australia's Health 2018*. Australia's Health Series Catalogue No.: 16. AUS 221. Canberra (AUST): AIHW; 2018.
2. Stephan B, Birdi R, Tang EY, et al. Secular trends in dementia prevalence and incidence worldwide: A systematic review. *J Alzheimers Dis.* 2018;66(2):653-80.
3. Duong S, Patel T, Chang F. Dementia: What pharmacists need to know. *Can Pharm J (Ott).* 2017;150(2):118–29.
4. Bunn F, Burn AM, Goodman C, et al. Comorbidity and dementia: A scoping review of the literature. *BMC Med.* 2014;12:192.
5. Clague F, Mercer SW, McLean G, et al. Comorbidity and polypharmacy in people with dementia: Insights from a large population-based cross-sectional analysis of primary care data. *Age Ageing.* 2017;46:33–9.
6. Grand JH, Caspar S, Macdonald SW. Clinical features and multidisciplinary approaches to dementia care. *J Multidiscip Healthc.* 2011;4:125–47.
7. Villars H, Oustric S, Andrieu S, et al. The primary care physician and Alzheimer's disease: An international position paper. *J Nutr Health Aging.* 2010;14:110.
8. De Vries K, Brooker DJ, Smith P. Dementia skills and competencies for primary care liaison: A model for improving identification and timely diagnosis. *Prim Health Care Res Dev.* 2013;14:240–9.
9. Speechly C, Bridges-Webb C, Passmore E. The pathway to dementia diagnosis. *Med J Aust.* 2008;189(9):487–9.
10. Dyer S, Laver K, Pond C, et al. Clinical practice guidelines and principles of care for people with dementia in Australia. *Aust Fam Physician* 2016;45(12):884-9.
11. Australian Department of Health. *MBS Online – Medicare Benefits Schedule* [Internet]. Canberra (AUST): Government of Australia; 2019 [cited 2019 Jul 8]. Available from: http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/Home
12. Byles JE, Tavener M, Higginbotham NH, et al. Randomised controlled trial of health assessments for older Australian veterans and war widows. *Med J Aust.* 2004;181(4):186-90.
13. Vitry AI, Nguyen TA, Ramsay EN, et al. Care plans effective for heart failure. *Intern Med J.* 2014;44:1117-23.
14. Vitry AI, Roughead EE, Ramsay EN, et al. Chronic disease management: Does the disease affect likelihood of care planning? *Aust Health Rev.* 2012;36:419–23.
15. Byles JE, Young AF, Wheway VL. Annual health assessments for older Australian women: Uptake and equity. *Aust N Z J Public Health.* 2007;31(2):170-3.
16. Dolja-Gore X, Tavener M, Majeed T, et al. Uptake, prevalence and predictors of first-time use for the 75+ Health Assessment Scheme. *Aust J Prim Health.* 2017;23(5):476-81.
17. Turner LR, Pearce C, Brijnath B, et al. General practice utilisation of Medicare Benefits Schedule items to support the care of older patients: Findings from the REDIRECT study. *Aust J Prim Health.* 2017;24(1):54-8.

18. Pond CD, Regan C. Improving the delivery of primary care for older people. *Med J Aust.* 2019;211(2):60-2.e61.
19. Dobson AJ, Hockey R, Brown WJ, et al. Cohort profile update: Australian Longitudinal Study on Women's Health. *Int J Epidemiol.* 2015;44(5):1547-1547f.
20. Waller M, Mishra GD, Dobson AJ. Estimating the prevalence of dementia using multiple linked administrative health records and capture-recapture methodology. *Emerg Themes Epidemiol.* 2017;4:3.
21. Hugo Centre for Population and Migration Studies. *Measuring Remoteness: Accessibility/Remoteness Index of Australia (ARIA)* [Internet]. Revised ed. Adelaide (AUST): The University of Adelaide School of Social Sciences Faculty of Arts; 2001 [cited 2015 Jan 16]. Available from: https://www.adelaide.edu.au/hugo-centre/spatial_data/aria/
22. World Health Organization. *BMI Classification* [Internet]. Geneva (CHE): WHO; 2015 [cited 2015 Jan 16]. Available from: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html
23. Liu Y, De A. Multiple imputation by fully conditional specification for dealing with missing data in a large epidemiologic study. *Int J Stat Med Res.* 2015;4(3):287-95.
24. Wu CY, Rodakowski JL, Terhorst L, et al. A scoping review of nonpharmacological interventions to reduce disability in older adults. *Gerontologist.* 2020;60(1):e52–e65.
25. Reilly S, Miranda-Castillo C, Malouf R, et al. Case management approaches to home support for people with dementia. *Cochrane Database of Syst Rev* 2015;1(1):CD008345.
26. Pilotto A, Cella A, Pilotto A, et al. Three decades of comprehensive geriatric assessment: evidence coming from different healthcare settings and specific clinical conditions. *J Am Med Dir Assoc.* 2017;18(2):192.e1-192.e11.
27. Stoop A, Lette M, van Gils PF, et al. Comprehensive geriatric assessments in integrated care programs for older people living at home: A scoping review. *Health Soc Care Community.* 2019;27:e549–e66.
28. Draper B, Low L-F, Brodaty H. Integrated care for adults with dementia and other cognitive disorders. *Int Rev Psychiatry.* 2018;30(6):272-91.
29. Mansfield E, Noble N, Sanson-Fisher R, et al. Primary care physicians' perceived barriers to optimal dementia care: A systematic review. *Gerontologist.* 2019;59(6):e697-e708.
30. Laver K, Cumming RG, Dyer SM, et al. Clinical practice guidelines for dementia in Australia. *Med J Aust.* 2016;204(5):191-3.
31. Chow S, Chow R, Wan A, et al. National dementia strategies: What should Canada learn? *Can Geriatr J.* 2018;21:173–209.
32. Low L-F, White F, Jeon Y-H, et al. Desired characteristics and outcomes of community care services for persons with dementia: What is important according to clients, service providers and policy. *Australas J Ageing.* 2013;32:91-6.
33. Cooper C, Lodwick R, Walters K, et al. Inequalities in receipt of mental and physical healthcare in people with dementia in the UK. *Age Ageing.* 2017;46:393–400.
34. Fox C, Smith T, Maidment I, et al. The importance of detecting and managing comorbidities in people with dementia? *Age Ageing.* 2014;43(6):741-3.
35. Dobson AJ, Waller MJ, Hockey R, et al. Impact of dementia on health service use in the last 2 years of life for women with other chronic conditions. *J Am Med Dir Assoc.* 2020;21(11):1651-7.
36. Schulz M, Czwikla J, Tsiasioti C, et al. Differences in medical specialist utilization among older people in need of long-term care – results from German health claims data. *Int J Equity Health*. 2020;19:22.
37. Royal Commission into Aged Care Quality and Safety. *Final Report Volume 1: Summary and Recommendations*. Canberra (AUST): Royal Commission into Aged Care Quality and Safety; 2021.
38. von Wyl V. Proximity to death and health care expenditure increase revisited: A 15-year panel analysis of elderly persons. *Health Econ Rev.* 2019;9:9.
39. Howdon D, Rice N. Health care expenditures, age, proximity to death and morbidity: Implications for an ageing population. *J Health Econ.* 2018;57:60-74.
40. The Royal Australian College of General Practitioners. *General Practice: Health of the Nation 2019* [Internet]. East Melbourne (AUST): RACGP; 2019 [cited 2020 Jul 2]. Available from: https://www.racgp.org.au/FSDEDEV/media/documents/Special%20events/Health-of-the-Nation-2019-Report.pdf
41. Duckett S, Breadon P, Ginnivan L. *Access all Areas: New Solutions for GP Shortages in Rural Australia*. Melbourne (AUST): Grattan Institute; 2013.
42. van Gaans D, Dent E. Issues of accessibility to health services by older Australians: A review. *Public Health Rev*. 2018;39:20.
43. Komaric N, Bedford S, van Driel ML. Two sides of the coin: Patient and provider perceptions of health care delivery to patients from culturally and linguistically diverse backgrounds. *BMC Health Serv Res*. 2012;12:322.
44. Kenning C, Daaker-White G, Blakemore A, et al. Barriers and facilitators in accessing dementia care by ethnic minority groups: A meta-synthesis of qualitative studies. *BMC Psychiatry.* 2017;17:316.
45. Shanley C, Boughtwood D, Adams J, et al. A qualitative study into the use of formal services for dementia by carers from culturally and linguistically diverse (CALD) communities. *BMC Health Serv Res.* 2012;12:354.
46. Beswick AD, Rees K, Dieppe P, Ayis S, Gooberman-Hill R, Horwood J, et al. Complex interventions to improve physical function and maintain independent living in elderly people: A systematic review and meta-analysis. *Lancet*. 2008;371(9614):725-35.
47. Wu C Y, Rodakowski JL, Terhorst L, Karp JF, Fields B, Skidmore ER. A scoping review of nonpharmacological interventions to reduce disability in older adults. *Gerontologist.* 2020;60(1):e52–e65.
48. Welberry HJ, Brodaty H, Hsu B, Barbieri S, Jorm LR. Measuring dementia incidence within a cohort of 267,153 older Australians using routinely collected linked administrative data. *Sci Rep*. 2020;10(1):8781.

Supporting Information

Additional supporting information may be found in the online version of this article:

Supplementary Table 1: Means and frequencies of health service use 2000-2013 for all women.

Supplementary Table 2: Frequency of health assessment use (2000-2013).

Supplementary Table 3: Individual CDM item use (2000-2013).

Supplementary Table 4: Most common specialist attendances as a percentage of specialist claims.

Supplementary Table 5: Frequencies of MBS allied health items.

Supplementary Table 6: Data from figure 1 – Logistic regression GEE parameter estimates for Health Assessments, Chronic Disease Management, Emergency GP, and Allied Health Service items.