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Prevalence of Eye Conditions, Utilization of Eye Health Care Services, and Ophthalmic Medications After Entering Residential Aged Care in Australia

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Purpose: This study aims to evaluate the burden and trends of eye diseases, utilisation of eye health care services, and ophthalmic medications among older people living in residential aged care facilities in Australia.

Methods: A cross-sectional study was conducted using data from the Registry of Senior Australians. Individuals aged ≥65 years who entered permanent residential aged care facilities between 2008 and 2015 were included. The prevalence (95% confidence interval [CI]) of eye diseases by year, eye health care services, and ophthalmic medication use within a year of entry into the service were evaluated. Poisson regression models estimated adjusted rate of change using prevalence ratio (PR) by age, sex, state, and frailty scores.

Results: Of the 409,186 people studied, 43.6% ($N = 178,367$) had an eye condition. Of the total cohort, 32.9% ($N = 134,566$) had chronic eye conditions and 19.7% ($N = 80,661$) had an acute eye condition. Common chronic eye conditions were glaucoma (13.6%, $N = 55,830$), cataract (8%, ($N = 32,779$), blindness (4.5%, $N = 18,856$), and poor vision (10.3%, $N = 42,245$). Prevalence of any eye condition (2008: 42.7%, 95% CI = 42.2%–43.2% and 2015: 41.2%, 95% CI = 40.8–41.6%, PR = 0.99, 95% CI = 0.99–0.99, $P < 0.001$), acute eye conditions (2008: 19.8%, 95% CI = 19.4%–20.2% and 2015: 17.4%, 95% CI = 17.1%–17.6%, PR = 0.97, 95% CI = 0.97–0.98, $P < 0.001$), and blindness (2008: 5.2%, 95% CI = 5.0%–5.4% and 2015: 3.7%, 95% CI = 3.5%–3.9%, PR = 0.93, 95% CI = 0.93–0.94, $p < 0.001$). decreased over the study period. The prevalence of glaucoma (2008: 13.5%, 95% CI = 13.2%–13.8% and 2015: 13.8%, 95% CI = 13.5%–13.7%; PR = 1.01, 95% CI = 0.99–1.10, $P < 0.001$) and cataract (2008: 7.4%, 95% CI = 7.2%–7.7% and 2015: 8.5%, 95% CI = 8.3%–8.7%, PR = 1.00, 95% CI = 1.00–1.01, $P < 0.001$) remained stable or slightly increased. Overall, 46.4% ($N = 82,769$) of individuals with eye conditions, accessed at least one eye health service within the first year of entering residential care and 70.5% ($N = 125,673$) used at least one ophthalmic medication. Optometric services (41.7%, $N = 74,358$) were the most used eye health care services and anti-infective eye drops (37.2%, $N = 66,331$) were the most commonly dispensed medications.

Conclusions: The prevalence of blindness among older Australian using residential aged care services decreased over the study period. However, the burden of eye diseases remained high between 2008 and 2015, whereas the use of eye health care services was disproportionately low. This study provides evidence of a significant need for eye health care services for older people with an eye disease in residential aged care facilities.

Translational Relevance: Four in ten long term aged care residents in Australia had at least one eye condition over the study period, indicating potential for a high eye health care needs in aged care settings.

translational vision science & technology

Introduction

The global population is ageing rapidly with similar trends in Australia; almost a quarter of the total population will be aged ≥65 years by 2066, an estimated growth of 7% from 2017.[1] When compared to younger people (<65 years), older Australians have high health care needs, with four times the rate of hospitalisations, double the rates of general practitioner visits and almost 50% more days spent in hospital.[2] Approximately 7% (244,363) of Australians aged ≥65 years and older lived in long term aged care facilities or nursing homes in 2019 to 2020 (termed residential aged care facilities [RACFs] in Australia),[3] with an upward trend of increased aged care services utilisation continuing throughout the last decade.[4]

Studies have suggested that up to 70% of people with an eye disease in RACFs could have their vision and quality of life improved with simple and effective corrections, including glasses, medical and surgical interventions (e.g. cataract surgery).[5–7] However, once admitted into a facility, residents are less likely to access an eye health assessment and vision-restoration services, with only 2% uptake of recommended ophthalmic services and treatments reported.[8,9] Such a stark discrepancy between the prevalence of eye diseases and access to appropriate eye health care services may lead to a higher prevalence of untreated eye diseases and vision impairment,[8] leading to reduced vision-specific functioning, emotional well-being, and quality of life.[7,10,11] However, a new targeted, person-centered eye care service model implemented in Australia was found to be effective in improving clinical, mental health, and quality of life outcomes among RACFs residents.[7,12]

There are international estimates that suggest two thirds of older people living in RACFs are visually impaired, with one third of individuals requiring high level expensive ophthalmic care (e.g. surgical interventions).[5,6] Although nationwide surveys on the prevalence and causes of vision loss in Australia have been published,[13,14] only smaller Australian studies have reported the prevalence of eye diseases in RACF population.[10,15,16] For example, Lamoureux et al. (2009)[10] reported up to 60% of residents (N = 76) aged 70 years and over had visual impairment when compared to 7% among community dwellers.[16] Similarly, a research commissioned by the Macular Degeneration Foundation Australia reported that more than three quarters of the 193 residents examined had an eye condition that required ongoing monitoring or treatment.[15] In the absence of national level survey data specific to RACFs until this date, the literature only presents a patchy picture of a burden of eye diseases and associated eye health service and ophthalmic medication use among residents in RACFs. However, national level epidemiological data are of a great value for understanding the disease burden in any population for future forecasting and informing appropriate response through changes in practice and policies.[17]

Since 2017, the Registry of Senior Australians (ROSA), a cross-sector national multidisciplinary platform, is harbouring Australian National historical aged care and healthcare administrative claims data for researchers to synthesise evidence to inform aged care policy and practice in Australia.[18] Such a large scale National level administrative aged and healthcare linked data of older Australians who used RACFs offers a feasible way to explore important epidemiological questions regarding the burden of eye disease and eye health care use in a nationally representative sample. Therefore, leveraging the ROSA National cohort data, this study aims to examine the national burden and trends of eye diseases between 2008 and 2015, characteristics of those with and without an eye condition, utilisation of eye health care services, and eye-related medication use by older people living in Australian RACFs.

Methods

Study Design, Data Sources, and Setting

A population based cross-sectional study using data from the ROSA National Historical Cohort was conducted.[18] The ROSA Historical Cohort has been previously described.[18] Briefly, the ROSA dataset includes individuals accessing aged care services (namely residential aged care, home care packages, transition care, and respite care) for which an aged care eligibility assessment is required. ROSA contains de-identified linked information from the Australian Institute of Health and Welfare (AIHW), National Aged Care Data Clearinghouse (NACDC), Australian Government Medicare Benefits Schedule (MBS), Pharmaceutical Benefits Scheme (PBS), National Death Index (NDI), and the states hospitalisation and emergency department data. For this study, eye heath care service use was obtained from the MBS and ophthalmic pharmaceuticals from the PBS datasets. In Australia, universal health care and aged care service benefits are available and are provided either free or through subsidised access for all Australians. The Australian health and aged care systems are funded by the Government primarily through taxation revenue.

Participants

Older Australians (≥65 years), not of Aboriginal or Torres Islander (ATSI) descent, who entered RACFs between July 1, 2008 (implementation year for the Aged Care Funding Instrument [ACFI]) and December 31, 2015 (data available for research at the time of the analysis) and who were not Department of Veterans' Affairs (DVA) concession card holders were included. The DVA concession card holders were excluded because MBS claims data do not capture all services provided to them. ATSI people were excluded because we did not have ethics approval to conduct this analysis on their data at this time.

Eye Conditions Ascertainment

Eye conditions were ascertained using multiple data sources including from health conditions recorded in the aged care eligibility assessment (referred to as an "ACAT," as it is performed by an Aged Care Assessment Team), health conditions recorded in the entry into permanent care assessments (referred to as an "ACFI," as it is collected using the Aged Care Funding Instrument), ophthalmic medication history (from the PBS), and ophthalmic health care service history (from the MBS), determined in the 12 month period before and after entry into the cohort (entry into RACFs). The Rx-Risk-V, a validated pharmacy-based measure of comorbidity, was used to ascertain glaucoma from PBS data.[19]

Supplementary Table S1 provides details on the specific datasets and coding used to ascertain each eye condition. Supplementary Table S2 shows eye-specific codes excluded from defining eye conditions. Eye conditions were classified as any, chronic, or acute. An individual with "any" eye condition was defined as someone with at least one record of an eye condition in any of the datasets evaluated. Someone with a chronic eye condition was defined as an individual with a record of cataract, glaucoma, blindness, poor vision, or other eye conditions, or the dispensing of anti-VEGF, anti-glaucoma, and anti-inflammatory agents steroid medications. Someone with an acute eye condition was defined as an individual with a record of eye trauma, or antibiotics, and decongestant/anti-allergic eye drops medications dispensed. In 2016, chloramphenicol was removed from the Australian Government PBS listing (became available over-the-counter) and the trends in prevalence of any eye condition and acute eye condition, affected by this change were only estimated until 2014. For all others, 2015 was the final year. PBS listing of other medications examined did not change during the study period.

Eye Health Care and Ophthalmic Medication Ascertainment

Australian Government Medicare subsidised eye health care and ophthalmic medication use for one year from the date of entry into RACFs were obtained (for all codes see Supplementary Table S1). All ophthalmic health services and medications utilisation was obtained up to December 31, 2016, to ensure a full year of service use history.

Covariates

Individual characteristics examined included age, sex, states (States and Territories of Australia), country of birth, language spoken at home, remoteness (location of residential aged care facilities), Socio-Economic Index of Relative Socio-economic Disadvantage (IRSD), Socio-Economic Index of Education and Occupation (IEO),[20] depressive symptoms, and frailty index scores. The depressive symptoms of the cohort were assessed using the Cornell Scale of Depression in Dementia (CSDD).[21] The CSDD has 19 items across 5 dimensions (Mood-related sign, Behaviour disturbance, Physical sign, Cyclic functions, and Ideational disturbance), each item is rated for severity of 0 to 2 (0 = absent, 1 = mild or intermittent, and 2 = severe) and scores across the items are added. A CSDD total score of <6, 6 to 9, 10 to 12, and >13 represent absence of significant depressive symptoms, presence of depressive symptoms, probable major depression, and definite major depression, respectively. The frailty index (FI) scores of the cohort were estimated using a validated FI developed for the aged care eligibility assessment dataset.[22]

Statistical Analysis

The individuals' demographic and other characteristics were summarised as frequencies and percentages or mean and standard deviation (SD) or medians and interquartile ranges (IQRs). The prevalence of eye conditions was estimated as the proportion of people who had an eye condition (any, chronic, acute, glaucoma, cataract, blindness, and poor vision) out of the total number of individuals in RACFs. Prevalence and 95% confidence interval (CI) were reported. Of those with an eye condition, prevalence of use of eye health services and ophthalmic medications were calculated for each study year as the proportion of service or medication use within 12 months from entry to RACF.

Poisson regression with robust variance estimation was used to calculate prevalence ratios (PRs) over the study period.[23] The crude PRs and age, sex, state, and

FI adjusted PRs and 95% CI were estimated. The goodness-of-fit chi-squared tests were used to assess model fit and non-statistically ($P > 0.05$) significant tests were considered a good fit. All the tests were two sided with the significance level alpha set at 0.05. Statistical analyses were conducted on STATA version 15.0.[24]

This study has ethics approval from the University of South Australia's human ethics committee (Ref: 200489) and the AIHW ethics committee (Ref: EO2018/1/418) and adheres to the Declaration of Helsinki.

Results

Of the 409,186 older people who entered RACFs during the study period, 178,367 (43.6%) had at least one eye condition. When compared to those with no eye condition, the group with any eye condition were older (mean age [SD], 85.6 [6.7] vs. 83.3 [6.7]), comprised of more women (63.2% vs. 60.7%), were more frail (mean FI score [SD], 0.27 [0.06] vs. 0.25 [0.06]), born in Australia (72.0% vs. 67.5%), and English speaking (91.8% vs. 89.6%). Of the 409,186 older people evaluated, 134,556 (32.9%) had a chronic eye condition, 80,661 (19.7%) had an acute condition, 55,830 (13.6%) had glaucoma, 32,779 (8%) had cataracts, 18,856 (4.5%) had blindness, and 42,245 (10.3%) had poor vision (Table 1).

The proportion of people with history of dementia, diabetes, depressive and mood affective disorders, and cancers were slightly higher among people with no eye condition (see Table 1). Definitive depressive symptoms were present in 27.9% of people with any eye condition, 27.1% people with chronic eye condition, 28.9% of people with acute eye condition, 25.5% of people with glaucoma, 27.4% of people with cataract, 27.1% of people with blindness, and 27.3% of people with poor vision (see Table 1) at entry into RACF.

Burden and Trends of Eye Conditions

The prevalence of any eye condition (2008: 42.7%, 95% CI = 42.2%–43.2% and 2014: 44.5%, 95% CI = 44.1%–44.9%; adjusted PR = 0.99, 95% CI = 0.99–0.99, $P < 0.001$), chronic (2008: 31.9%, 95% CI = 31.4%–32.2% and 2015: 33.3%, 95% CI = 32.9%–33.7%; adjusted PR = 0.99, 95% CI = 0.98–0.99, $P < 0.001$), and acute eye diseases (2008: 19.8%, 95% CI = 19.4%–20.2% and 2014: 20.6, 95% CI = 20.3–21.3; adjusted PR = 0.97, 95% CI = 0.97–0.98, $P < 0.001$) remained high over the study period. The prevalence remained stable for glaucoma (2008: 13.6%, 95% CI = 13.2%–13.8% and 2015: 13.8%, 95% CI = 13.5%–14.1%; adjusted PR = 1.00, 95% CI = 0.99–1.01, $P < 0.001$), cataract (2008: 7.4%, 95% CI = 7.2%–7.7% and 2015 8.5%, 95% CI = 7.9%–8.1%; adjusted PR = 1.00, 95% CI = 1.00–1.01, $P < 0.001$), and poor vision (2008: 9.6%, 95% CI = 9.3%–9.9% and 2015: 10.2%, 95% CI = 10.0%–10.5%; adjusted PR = 0.98, 95% CI = 0.97–0.98, $P < 0.001$). The prevalence of blindness (2008: 5.2%, 95% CI = 5.0%–5.4% and 2015: 3.7%, 95% CI = 3.5%–3.9%; adjusted PR = 0.93, 95% CI = 0.93–0.94, $P < 0.001$) decreased significantly over the study period (Fig. 1, Table 2).

Use of Ophthalmic Health Services and Medications

Commonly used ophthalmic health services and medications are shown in Table 3. Of those with any eye condition, only 82,769 (46.4%) used at least one eye-related health service within a year of entry into RACFs. Of the health services evaluated, optometric services (2008: 36.9%, 95% CI = 36.1%–37.6% and 2015: 47.4%, 95% CI = 46.7%–48.0%; adjusted PR = 1.34, 95% CI = 1.30–1.38, $P < 0.001$), and other surgical procedures (2008: 3.1%, 95% CI = 2.8%–3.3% and 2015: 6.7%, 95% CI = 6.3%–7.0%; adjusted PR = 2.41, 95% CI = 2.18–2.66, $P < 0.001$) increased in utilisation during the study period (see Table 3, Fig. 2).

Of the 178,367 individuals with an eye condition, 125,673 (70.5%) were dispensed at least one ophthalmic medication within a year of entry into RACFs. Out of 55,830 with glaucoma 45,622 (82.4%) had been prescribed at least one anti-glaucoma drug. Anti-infective ophthalmic medications use significantly decreased over the study period from 40.6% in 2008 to 25.8% in 2015 (PR = 0.95, 95% CI = 0.92–0.98, $P = 0.003$) and use of anti-vascular endothelial growth factor (VEGF) eye injections increased significantly between 2008 and 2015 from 1.1% to 4.5% (PR = 4.60, 95% CI = 3.94–5.38, $P < 0.001$; see Table 3, Fig. 3).

Discussion

To our best knowledge, this is the first national-level population-based epidemiological study that used linked national aged and health care datasets to investigate prevalence of eye conditions, eye health care services, and medication use by older Australians residing in RACFs. Our findings indicate that the prevalence of blindness decreased over the study period, however, the prevalence of eye conditions remained high among

Table 1. Demographic Characteristics of People With and Without an Eye Condition Using Residential Aged Care Services in Australia Between 2008 and 2015 (People Can be in More Than One Group)

Characteristics	Total (*N* = 409,186, 100%)	Any Eye Condition (*N* = 178,367, 43.6%)	No Eye Condition (*N* = 230,819, 56.4%)	Chronic (*N* = 134,566, 32.9%)	Acute (*N* = 80,661, 19.7%)	Cataract (*N* = 32,779, 8.0%)	Glaucoma (*N* = 55,830, 13.6%)	Blindness (*N* = 18,856, 4.5%)	Poor Vision (*N* = 42,245, 10.3%)
Age (years)									
Mean (SD)	84.3 (7.0)	85.6 (6.7)	83.3 (7.1)	85.9 (6.5)	85.3 (6.8)	85.1 (6.3)	86.1 (6.4)	87.0 (6.7)	86.6 (6.7)
Median (IQR)	85 (80–89)	86 (82–90)	85 (79–88)	87 (82–90)	86 (81–90)	86 (81–89)	87 (82–90)	88 (83–92)	87 (83–91)
Range	65–115	65–115	65–110	65–115	65–112	65–109	65–112	65–115	65–112
Age group, N (%)									
65–79 years	93,645 (22.9)	30,449 (17.1)	63,196 (27.4)	20,972 (15.6)	14,910 (18.5)	5883 (17.9)	7829 (14.0)	2326 (12.5)	5935 (14.0)
80–89 years	219,502 (53.6)	96,322 (54.0)	123,180 (53.4)	72,862 (54.1)	43,367 (53.8)	18,807 (57.4)	30,860 (55.3)	9216 (49.6)	21,341 (50.5)
≥90 years	96,039 (23.5)	51,596 (28.9)	51,596 (19.2)	40,732 (30.3)	22,384 (27.7)	8089 (24.7)	17,141 (30.7)	7044 (37.9)	14,969 (35.4)
Sex, N (%)									
Women	252,829 (61.8)	112,746 (63.2)	140,083 (60.7)	87,217 (64.8)	49,231 (61.0)	22,046 (67.3)	35,054 (62.79)	11,893 (64.0)	27,971 (66.2)
Men	156,357 (38.2)	65,621 (36.8)	90,736 (39.3)	47,349 (35.2)	31,430 (39.0)	10,733 (32.7)	20,776 (37.2)	6,693 (36.0)	14,274 (33.8)
Frailty Index scores									
Mean (SD)	0.26 (0.1)	0.27 (0.06	0.25 (0.06)	0.27 (0.06)	0.26 (0.06)	0.26 (0.06)	0.27 (0.06)	0.27 (0.06)	0.27 (0.06)
Median (IQR)	0.27 (0.21–0.30)	0.27 (0.22–0.32)	0.25 (0.20–0.29)	0.27 (0.23–0.32)	0.27 (0.23–0.32)	0.27 (0.23–0.32)	0.27 (0.23–0.32)	0.27 (0.23–0.32)	0.27 (0.23–0.32)
Range	0–0.41	0–0.41	0–0.41 +	0–0.41	0–0.41	0.02–0.41	0–0.41	0–0.41	0–0.41
Country of birth, N (%)									
Australia	284,413 (69.5)	128,506 (72.0)	155,907 (67.5)	96,921 (72.0)	58,854 (73.0)	22,609 (69.0)	40,717 (72.9)	13,531 (72.8)	31,051 (73.5)
Overseas	123,142 (30.1)	49,159 (27.6)	73,983 (32.1)	37,110 (27.6)	21,493 (26.6)	10,032 (30.6)	14,885 (26.7)	4998 (26.9)	11,029 (26.1)
Missing	1,631 (0.4)	702 (0.4)	929 (0.4)	535 (0.4)	314 (0.4)	138 (0.4)	228 (0.4)	57 (0.3)	165 (0.4)
Language, N (%)									
English	370,625 (90.6)	163,708 (91.8)	206,917 (89.6)	123,845 (92.0)	74,097 (91.9)	29,707 (90.6)	51,619 (92.5)	17,229 (92.7)	39,201 (92.8)
Other	38,029 (9.3)	14,421 (8.1)	23,608 (10.2)	10,543 (7.8)	6,457 (8.0)	3,031 (9.3)	4,128 (7.4)	1,333 (7.2)	2,988 (7.1)
Missing	532 (0.1)	238 (0.1)	294 (0.1)	178 (0.1)	107 (0.1)	41 (0.1)	83 (0.1)	25 (0.1)	56 (0.1)
Remoteness, N (%)									
Major cities	263,406 (64.4)	114,397 (64.1)	149,009 (64.6)	85,114 (63.2)	53,136 (65.9)	20,573 (62.8)	36,400 (65.2)	11,781 (63.4)	25,406 (60.1)
Inner regional	94,196 (23.0)	41,018 (23.0)	55,178 (23.0)	31,523 (23.4)	17,884 (22.2)	7,624 (23.3)	12,505 (22.4)	4,299 (23.1)	10,650 (25.2)
Outer regional	45,061 (11.0)	20,298 (11.4)	24,763 (10.7)	15,917 (11.8)	8,458 (10.5)	4,041 (12.3)	6,157 (11.0)	2,229 (12.0)	5,508 (13.0)
Remote	4,538 (1.1)	1,873 (1.1)	2,665 (1.1)	1,413 (1.0)	857 (1.1)	400 (1.2)	529 (0.9)	191 (1.0)	484 (1.2)
Very remote	1,266 (0.3)	505 (0.3)	761 (0.3)	390 (0.3)	297 (0.3)	93 (0.3)	144 (0.3)	62 (0.3)	129 (0.3)
Missing	719 (0.2)	276 (0.2)	443 (0.2)	209 (0.2)	119 (0.3)	48 (0.1)	95 (0.2)	24 (0.1)	68 (0.2)
IRSD quintile									
5 (most advantaged)	108,306 (26.5)	48,303 (27.1)	60,003 (26.0)	36,403 (27.0)	21,951 (27.2)	8,648 (26.4)	16,078 (28.8)	4,950 (26.6)	10,786 (25.5)
4	76,085 (18.6)	33,203 (18.6)	42,882 (18.6)	24,768 (18.4)	15,378 (19.1)	5,977 (18.2)	10,277 (18.4)	3,349 (18.0)	7,698 (18.2)
3	74,316 (18.2)	32,091 (18.0)	42,225 (18.3)	24,118 (17.9)	14,591 (18.1)	4,884 (17.9)	9,899 (17.7)	3,467 (18.6)	7,665 (18.1)
2	74,710 (18.3)	32,854 (18.4)	41,856 (18.1)	25,070 (18.6)	14,641 (18.1)	6,681 (20.4)	9,805 (17.6)	3,571 (19.2)	7,948 (18.8)
1 (least advantaged)	75,044 (18.3)	31,639 (17.7)	43,405 (18.8)	23,997 (17.8)	13,981 (17.3)	5,541 (16.9)	9,675 (17.3)	3,225 (17.3)	8,080 (19.1)
Missing	725 (0.2)	277 (0.2)	448 *0.2)	210 (0.2)	119 (0.1)	48 (0.1)	96 (0.2)	24 (0.1)	68 (0.2)
IEO quintile									
5 (most advantaged)	111,230 (27.2)	61,897 (26.8)	49,333 (27.7)	37,315 (27.7)	22,215 (27.5)	16,404 (29.4)	16,404 (29.4)	5,149 (27.7)	11,121 (26.3)
4	72,925 (17.8)	40,691 (17.6)	32,234 (18.1)	23,971 (17.8)	14,958 (18.5)	10,071 (18.0)	10,071 (18.0)	3,241 (17.4)	7,577 (17.9)
3	73,833 (18.0)	41,632 (18.0)	32,201 (18.1)	24,355 (18.1)	14,572 (18.1)	9,844 (17.6)	9,844 (17.6)	3,413 (18.4)	7,839 (18.6)
2	72,229 (17.6)	40,766 (17.7)	31,463 (17.6)	24,355 (18.1)	14,258 (17.7)	9,455 (16.9)	9,455 (16.9)	3,431 (18.5)	7,444 (17.6)
1 (least advantaged)	78,244 (19.2)	45,385 (19.7)	32,859 (18.4)	24,903 (18.5)	14,539 (18.0)	9,960 (17.8)	9,960 (17.8)	3,328 (17.9)	8,196 (19.4)
Missing	725 (0.2)	448 (0.2)	277 (0.2)	210 (0.2)	119 (0.1)	48 (0.1)	96 (0.2)	24 (0.1)	68 (0.2)

Table 1. Continued

Characteristics	Total (*N* = 409,186, 100%)	Any Eye Condition (*N* = 178,367, 43.6%)	No Eye Condition (*N* = 230,819, 56.4%)	Chronic (*N* = 134,566, 32.9%)	Acute (*N* = 80,661, 19.7%)	Cataract (*N* = 32,779, 8.0%)	Glaucoma (*N* = 55,830, 13.6%)	Blindness (*N* = 18,856, 4.5%)	Poor Vision (*N* = 42,245, 10.3%)
State/Territory, N (%)									
Australian Capital Territory	4,417 (1.1)	2,635 (1.1)	1,782 (1.0)	1,341 (1.0)	728 (0.9)	291 (0.9)	551 (1.0)	261 (1.4)	421 (1.0)
New South Wales	138,078 (33.7)	73,260 (31.7)	64,818 (36.3)	49,357 (36.7)	29,028 (36.0)	11,691 (35.7)	20,552 (36.8)	6,959 (37.4)	16,336 (38.7)
Northern Territory	644 (0.2)	359 (0.2)	285 (0.2)	222 (0.2)	104 (0.1)	75 (0.2)	71 (0.1)	37 (0.2)	73 (0.2)
Queensland	73,842 (18.0)	42,486 (18.4)	31,356 (17.6)	23,395 (17.4)	14,093 (17.5)	4,622 (14.1)	10,228 (18.3)	3,082 (16.6)	8,030 (19.0)
South Australia	39,200 (9.6)	23,244 (10.1)	15,956 (8.9)	12,245 (9.1)	6,777 (8.4)	2,699 (8.2)	5,242 (9.4)	2,144 (11.5)	3,751 (8.9)
Tasmania	11,829 (2.9)	6,959 (3.0)	4,870 (2.7)	3,760 (2.8)	2,194 (2.7)	772 (2.4)	1,541 (2.8)	464 (2.5)	1,265 (3.0)
Victoria	107,292 (26.2)	62,150 (26.9)	45,142 (25.3)	34,102 (24.3)	20,071 (24.9)	9,476 (28.9)	13,477 (24.1)	4,170 (22.4)	10,397 (24.6)
Western Australia	33,884 (8.3)	19,726 (8.6)	14,158 (7.9)	10,144 (7.5)	7,666 (9.5)	3,152 (9.6)	4,168 (7.5)	1,469 (7.9)	1,971 (4.7)
Comorbidities, *N* (%)									
Diabetes	88,759 (21.7)	38,256 (21.4)	50,503 (21.9)	29,083 (21.6)	16,822 (20.9)	6,724 (20.5)	12,567 (22.5)	3,973 (21.4)	8,465 (20.0)
Hypertension	216,219 (52.8)	94,465 (53.0)	121,754 (52.7)	71,149 (52.9)	42,958 (53.3)	17,399 (53.1)	29,796 (53.4)	9,374 (50.4)	21,788 (51.6)
Depression and mood affective disorders	197,670 (48.3)	85,037 (47.7)	112,633 (48.8)	63,266 (47.0)	39,469 (48.9)	15,104 (46.1)	26,303 (47.1)	8,453 (45.5)	19,380 (45.9)
Dementia	199,626 (48.8)	80,787 (42.3)	118,839 (51.5)	58,951 (43.8)	37,014 (45.9)	14,788 (45.1)	25,027 (44.8)	7,194 (38.7)	18,060 (42.7)
Cancers	89,559 (21.9)	37,416 (21.0)	52,143 (22.6)	27,831 (20.7)	17,027 (21.1)	6,876 (21.0)	11,750 (21.0)	3,734 (20.1)	8,207 (19.4)
Falls	112,637 (27.5)	49,950 (28.0)	62,687 (27.2)	37,527 (27.9)	22,749 (28.2)	8,747 (26.7)	15,453 (27.7)	5,037 (27.1)	12,079 (28.6)
Fractures	59,914 (14.6)	26,091 (14.6)	33,823 (14.7)	19,503 (14.5)	11,922 (14.8)	4,830 (14.7)	8,239 (14.8)	2,559 (13.8)	5,580 (13.2)
Cornell Scale of Depression									
<6	71,232 (17.4)	32,546 (18.3)	38,686 (16.8)	25,200 (18.7)	14,543 (18.0)	6,545 (20.0)	10,130 (18.1)	3,411 (18.3)	7,877 (18.6)
6–9	58,736 (14.3)	26,250 (14.7)	32,486 (14.1)	19,861 (14.8)	12,079 (15.0)	4,922 (15.0)	8,115 (14.5)	2,688 (14.5)	6,222 (14.7)
10–12	56,047 (13.7)	24,652 (13.8)	31,395 (13.6)	18,516 (13.8)	11,298 (14.0)	4,531 (13.8)	7,761 (13.9)	2,562 (13.8)	5,792 (13.7)
>13	116,877 (28.6)	49,791 (27.9)	67,086 (29.1)	36,518 (27.1)	23,297 (28.9)	8,357 (25.5)	15,297 (27.4)	5,039 (27.1)	11,528 (27.3)
Missing	106,294 (26.0)	45,128 (25.3)	61,166 (26.5)	34,471 (25.6)	19,444 (24.1)	8,424 (25.7)	14,527 (26.0)	4,886 (26.3)	10,826 (25.6)

IRSD = Index of Relative Socio-economic Disadvantage; IEO = Index of Education and Occupation.

Eye conditions determined by any eye condition noted in ACAT, ACFI, Rx-risk, MBS and PBS or combined. Codes used to determine eye conditions are presented in Appendix.

Co-morbidities determined by ACAT, ACFI and Rx-risk. Except for cancer, falls, fractures which was determined from ACAT and ACFI.

Cornell Sale of Depression categories: <6 absence of significant depressive symptoms, 6–9 = Presence of depressive symptoms, 10–12 = Probable major depression, >13 = definite major depression

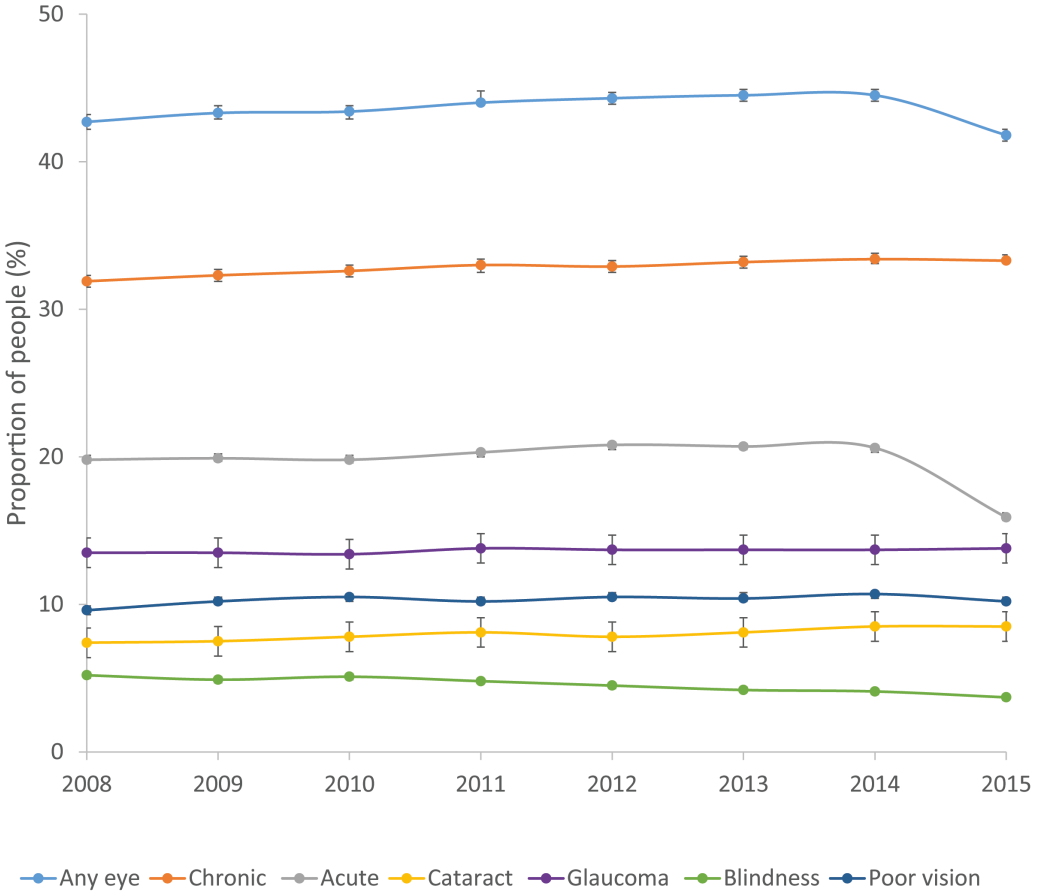

Figure 1. Trends in prevalence (and 95% confidence intervals) of eye conditions in people using residential aged care services between 2008 and 2015. Note: Any eye = include chronic and acute eye conditions; Chronic = chronic eye conditions; Acute: acute eye conditions; Blindness: blindness in both eyes or in one eye and low vision in other eye; Poor vision = low vision in both eyes, one eye, unspecified visual loss.

older people living in RACFs, with 4 in 10 older people having at least one eye condition, indicating the potential for high eye health care needs in these settings.

Our study found that the prevalence of blindness in Australian older people using aged care services reduced over the study period (from 5.2% in 2008 to 3.7% in 2015). Albeit not specific to aged care settings, the trends we observed in our study cohort was similar to the global data, which also shows that the prevalence of blindness in adults (>50 years) has decreased over the last 30 years (between 1990 to 2020).[25] However, the blindness was almost four times higher in our RACFs cohort than reported in the community.[14,26] Older people face more challenges and disparities to access eye care when compared to younger people and the disparity is often exacerbated when they enter residential aged care, which is not particularly designed to address eye care needs of the residents.[27] Unaddressed vision and rehabilitation needs could significantly increase risks of falls, fractures, and associated negative outcomes, such as injuries, hospitalisation, risk of social isolation, and mental health conditions. Almost 50% of our cohort with at least one eye condition had depressive symptoms, 28% had falls, and 15% had fractures. Studies have shown direct benefits of providing regular eye care services with improved vision, quality of life, increased participation in activities of daily living, improved mental health outcomes, with fewer falls depressive symptoms, and lower level of distress.[7,14,28,29]

The prevalence of cataract (8%) in our cohort was relatively lower than reported in other studies despite cataract being very common in this age group.[29–31] Our cataract estimate was also lower than reported in an Australian study published in 2005, which reported prevalence of cataract was 14%.[32] Unlike our study that relied on aged care assessments and administrative health records, other studies were cross-sectional evaluations of information collected using comprehensive eye examinations, which likely identified and reported

Table 2. Prevalence and Prevalence Ratios of Eye Conditions in People Using Residential Aged Care Services Between 2008 and 2015

	Crude Prevalence (95% CI)						
Year	Any Eye Condition[b]	Chronic Eye Condition	Acute Eye Condition[b]	Cataract	Glaucoma	Blindness	Poor Vision
2008	42.7 (42.2–43.2)	31.9 (31.4–32.3)	19.8 (19.4–20.2)	7.4 (7.2–7.7)	13.5 (13.2–13.8)	5.2 (5.0–5.4)	9.6 (9.3–9.9)
2009	43.3 (42.9–43.7)	32.3 (31.9–32.7)	19.9 (19.6–20.3)	7.5 (7.3–7.8)	13.5 (13.2–13.8)	4.9 (4.7–5.1)	10.2 (10.0–10.5)
2010	43.4 (43.0–43.8)	32.6 (32.2–33.0)	19.8 (19.4–20.1)	7.8 (7.6–8.0)	13.4 (13.1–13.7)	5.1 (4.9–5.3)	10.5 (10.2–10.7)
2011	44.0 (43.6–44.4)	33.0 (32.6–33.4)	20.3 (19.9–20.6)	8.1 (7.8–8.3)	13.8 (13.5–14.1)	4.8 (4.7–5.0)	10.2 (10.0–10.5)
2012	44.3 (43.9–44.8)	32.9 (32.5–33.3)	20.8 (20.5–21.2)	7.8 (7.6–8.1)	13.7 (13.4–14.0)	4.5 (4.3–4.7)	10.5 (10.3–10.8)
2013	44.5 (44.1–45.0)	33.2 (32.8–33.6)	20.7 (20.4–21.1	8.1 (7.9–8.4)	13.7 (13.4–14.0)	4.2 (4.1–4.4)	10.4 (10.2–10.8)
2014	44.5 (44.1–44.9)	33.4 (33.0–33.8)	20.6 (20.3–21.0)	8.5 (8.3–8.8)	13.7 (13.4–13.9)	4.1 (3.9–4.3)	10.7 (10.4–10.9)
2015	41.2 (40.8–41.6)	33.3 (32.9–33.7)	17.4 (17.1–17.6)	8.5 (8.3–8.7)	13.8 (13.5–14.1)	3.7 (3.5.3.9)	10.2 (10.0–10.5)
Overall	43.8 (43.7–44.0)	32.9 (32.7–33.0)	19.7 (19.6–19.8)	8.0 (7.9–8.1)	13.6 (13.5–13.7)	4.5 (4.4–4.6)	10.3 (10.2–10.4)
Crude PR (95% CI), *P* value	1.01 (1.00–1.01), <0.001	1.00 (1.00–1.01), <0.001	1.01 (1.00–1.01), <0.001	1.02 (1.01–1.02), <0.001	1.00 (0.99–1.01), 0.05	0.95 (0.94–0.96), <0.001	1.01 (1.00–1.01,) = 0.001
[a]Adjusted PR (95% CI), *P* value	0.99 (0.99–0.99), <0.001	0.99 (0.98–0.99), <0.001	0.97 (0.97–0.98), <0.001	1.00 (1.00–1.01), <0.001	1.01 (0.99–1.02) <0.001	0.93 (0.93–0.94) <0.001	0.98 (0.98–0.99) <0.001

PR = prevalence ratio; CI = confidence interval.

[a]Adjusted by age, sex, state, and frailty score.

[b]The 2015 decrease in any eye and acute eye condition occurred because of changes made to the Australian Government Pharmaceutical Benefits Scheme (PBS) list of subsidized medications. In May, chloramphenicol eye preparation started to be dispensed without a prescription and, in January 2016, it was completely removed from the PBS and made available as an over the counter medication. To mitigate the effect of decline in chloramphenicol dispensing through PBS on the estimates, trends for any eye and acute eye conditions were estimated only up to 2014.

Table 3. Overall and Yearly Utilisation of Ophthalmic Health Services and Medications Among Those With any Eye Condition ($N = 178,367$) Within a Year of Entry into Residential Age Care Service Between 2008 and 2015

	All Ophthalmic Health Services ($N = 82,769$; 46.4%)	Optometric Services ($N = 74,358$; 41.7%)	Diagnostic Procedures ($N = 13,380$; 7.5%)	Cataract Surgery ($N = 9,171$; 5.1%	Glaucoma Surgery ($N = 941$; 0.5%)	Other Surgical Procedures ($N = 8,259$; 4.6%)
Year	% (95% CI)					
2008	41.8 (40.6–42.1)	36.9 (36.1–37.6)	6.8 (6.4–7.2)	5.0 (4.7–5.4)	0.5 (0.4–0.6)	3.1 (2.8–3.3)
2009	41.6 (40.9–42.2)	37.0 (36.3–37.6)	7.3 (7.0–7.7)	5.2 (4.9–5.5)	0.6 (0.5–0.7)	3.4 (3.1–3.6)
2010	42.8 (42.2–43.5)	37.5 (37.8–39.1)	7.2 (6.8–7.5)	5.0 (4.7–5.3)	0.5 (0.4–0.6)	3.8 (3.5–4.0)
2011	44.7 (44.0–45.3)	39.9 (39.3–40.5)	7.4 (7.1–7.8)	5.3 (5.0–5.5)	0.5 (0.4–0.6)	4.2 (3.9–4.4)
2012	46.2 (45.6–46.8)	41.6 (41.0–42.2)	7.6 (7.3–7.9)	5.2 (4.9–5.4)	0.5 (0.4–0.6)	4.6 (4.3–4.9)
2013	49.0 (48.3–49.6)	44.0 (41.0–42.2)	7.6 (7.3–8.0)	5.2 (4.9–5.5)	0.5 (0.4–0.6)	5.2 (4.9–5.5)
2014	50.8 (50.2–51.4)	46.1 (45.4–46.7)	7.6 (7.2–7.9)	5.1 (4.8–5.3)	0.6 (0.5–0.7)	5.6 (5.3–5.9)
2015	52.5 (51.9–53.1)	47.4 (46.7–48.0)	8.3 (7.9–8.6)	5.2 (4.9–5.5)	0.6 (0.5–0.7)	6.7 (6.3–7.0)
Unadjusted PR (95% CI), *P* value	1.27 (1.23–1.30), <0.001	1.28 (1.25–1.32), <0.001	1.02 (1.01–1.03), <0.001	1.03 (0.95–1.13), 0.452	1.01 (0.98–1.06), 0.110	2.16 (1.96–2.38), <0.001
[a]Adjusted PR (95% CI), *P* value	1.36 (1.30–1.37), <0.001	1.34 (1.30–1,38), <0.001	1.00 (0.99–1.01), <0.001	1.00 (1.00–1.01), <0.001	1.00 (0.99–1.10), 0.007	2.41 (2.18–2.66), <0.001
	All ophthalmic medications ($N = 125,673$; 70.5%)[b]	Anti-infectives ($N = 66,331$; 37.2%)[b]	Hypermellose ($N = 53,405$; 29.9%)	Anti-glaucoma ($N = 45,622$; 25.6%)	Steroids ($N = 17,151$; 9.6%)	Anti-VEGF ($N = 4,772$; 3.0%)
	% (95% CI)					
2008	71.7 (71.0–72.4)	40.6 (39.8–41.3)	29.0 (28.3–29.7)	25.6 (25.0–26.3)	10.5 (10.0–10.9)	1.1 (0.96–1.3)
2009	70.7 (70.1–71.3)	39.4 (38.8–40.1)	29.0 (28.4–29.6)	25.3 (24.7–25.9)	10.0 (9.6–10.4)	1.5 (1.3–1.6)
2010	70.6 (69.9–71.2)	38.9 (38.2–39.5)	29.5 (28.9–30.1)	25.3 (24.8–25.9)	9.5 (9.1–9.8)	1.8 (1.6–2.0)
2011	71.1 (70.6–71.7)	38.9 (38.2–39.6)	30.1 (29.5–30.7)	25.6 (25.1–26.2)	9.8 (9.1–9.8)	2.4 (2.2–2.6)
2012	71.5 (70.9–72.0)	39.4 (38.8–40.0)	30.2 (29.6–30.8)	25.5 (24.9–26.0)	9.5 (9.2–9.9)	2.7 (2.5–2.9)
2013	71.1 (70.5–71.7)	38.6 (38.0–39.2)	30.3 (29.8–30.9)	25.2 (24.6–25.8)	9.4 (9.0–9.7)	3.2 (3.0–3.4)
2014	70.5 (69.9–71.1)	37.3 (36.7–37.9)	30.8 (30.2–31.4)	25.2 (24.7–25.8)	9.0 (8.6–9.3)	3.6 (3.4–3.8)
2015	66.9 (66.3–67.5)	25.8 (25.3–26.4)	30.2 (29.6–30.8)	26.8 (26.2–27.3)	9.7 (9.3–10.4)	4.5 (4.3–4.8)
Unadjusted PR (95% CI), *P* value	0.98 (0.96–1.00), 0.15	0.92 (0.89–0.95), <0.001	1.04 (1.00–1.08), 0.03	1.04 (1.00–1.09), 0.03	0.92 (0.86–0.97), 0.008	4.09 (3.50–4.77), <0.001
[a]Adjusted PR (95% CI), *P* value	1.00 (0.99–1.03), 0.43	0.95 (0.92–0.98), 0.003	1.03 (1.00–1.08), 0.05	1.06 (1.02–1.10), 0.003	1.05 (0.99–1.12), 0.11	4.60 (3.94–5.38), <0.001

CI = confidence interval; anti-VEGF = anti vascular endothelial growth factor; PR = prevalence ratios.

[a]Adjusted by age, sex, state, and frailty score.

[b]The 2015 decrease in anti-infectives occurred because of changes made to the Australian Government Pharmaceutical Benefits Scheme (PBS) list of subsidized medications. In May 2010, chloramphenicol eye preparation started to be dispensed without a prescription and, in January 2016, it was completely removed from the PBS and made available as an over the counter medication. To mitigate the effect of decline in chloramphenicol dispensing through PBS on the estimates, trends for anti-infectives were estimated only up to 2014.

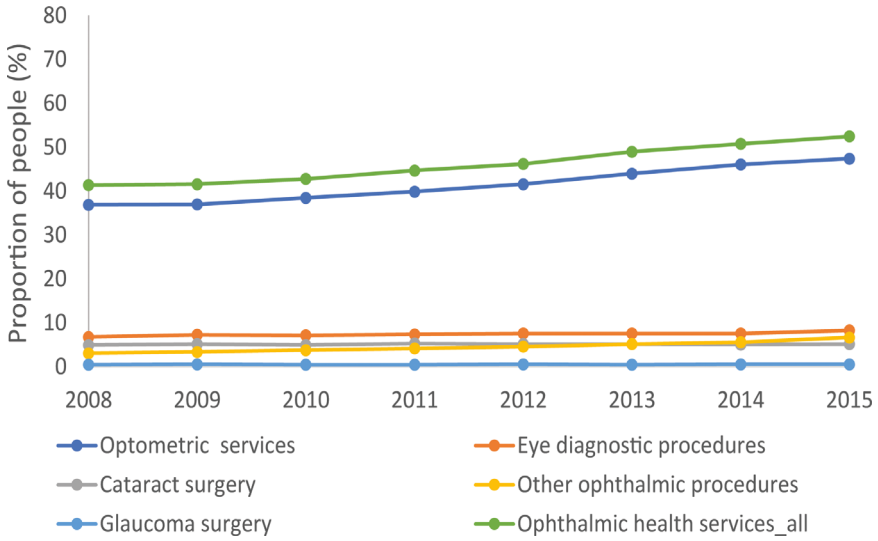

Figure 2. Trends in utilisation (and 95% confidence intervals) of top five Medicare subsidised ophthalmic health care services used by individuals with an eye condition within a year of entry in residential aged care services between 2008 and 2015. Note: Ophthalmic health services_all = Medical Benefits Schedule subsidised ophthalmic health services codes aggregated.

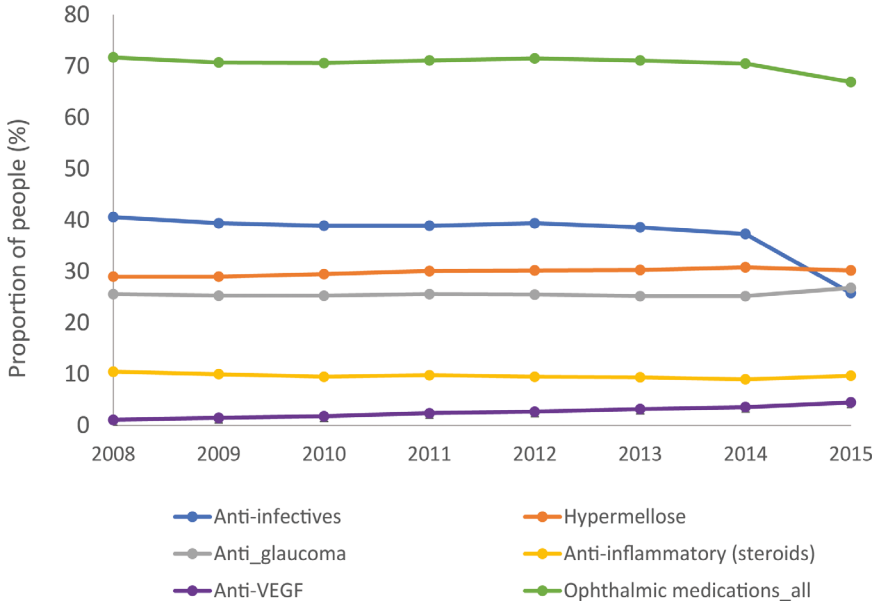

Figure 3. Trends in utilisation (and 95% confidence intervals) of top five ophthalmic medications by individuals with an eye condition within a year of entry in residential aged care services between 2008 and 2015. Note: Anti-VEGF = anti-vascular endothelial growth factor, eye injection. Ophthalmic medications_all = Pharmaceutical Benefits Scheme subsided ophthalmic medication codes aggregated.

even mild forms of cataracts leading to a higher estimates.[30,33] In addition, due to increased access to cataract surgery in Australia, it is possible that many older people may have undergone cataract surgery before entering into RACFs. However, still a significant number of older people ($N = 32{,}779$) in RACFs had cataracts and only 28% of those with cataract used MBS subsidised services specific to cataract surgery, indicating a low uptake of cataract surgery after entering into RACFs.[8] Given that cataract can be easily and effectively treated with surgery, a timely detection and surgical intervention can avoid unnecessary visual impairment, blindness, and associated poor health outcomes among older people in RACFs.[8,25]

Given that glaucoma is one of the leading causes of irreversible vision loss in this age group, it is a concern

that a significantly high proportion of older people had glaucoma in RACFs, about four times higher than reported in a recently published population-based study.[34] Of those with glaucoma, 82% were using anti-glaucoma medications. Because of the high proportion of individuals in our cohort with multiple comorbidities who also experience polypharmacy,[35,36] anti-glaucoma medications can cause systemic adverse effects (e.g. β-blockers may cause bradycardia, decrease in blood pressure, and asthma attack) and may interfere with the efficacy and safety of other medications.[37] Therefore, a regular medication review in RACFs to monitor potential symptoms is necessary to minimise or prevent these potential drug-related adverse reactions.[33]

Of those with any eye disease, less than half used at least one eye health care-specific service, indicating poor uptake of eye care services in this cohort.[8,38,39] Although only 41.7% with an eye condition used an optometric service, this accounts for almost 90% of all the eye health care services used within a year of entry into residential aged care services. This shows a significant involvement and engagement of the optometry workforce in providing eye care services to older Australians in RACFs, an important clinical and educational human resource that could be utilised to provide other unmet eye care needs in this sector.[40]

More than two thirds of the cohort with any eye condition used at least one ophthalmic medication within a year of entry into RACF. Over the study period, the uptake of anti-VEGF eye injections to treat the disorders of the blood vessels (retinopathies) vascularisation in the retina associated with age-related macular degeneration and/or diabetic related eye diseases and/or observed a sharp rise. Only listed in 2008 in the PBS, the increase in uptake of anti-VEGF treatment probably coincided with the growing evidence that these drugs are effective in treating previously untreatable blinding retinal conditions.[41] Although only 3.0% of total ophthalmic medications dispensed were anti-VEFG eye preparations in our study, these medications form some of the most expensive drugs listed in the PBS. For example, Aflibercept is the fifth most expensive drug and costs Aus $1286 per prescription and Ranbizumab is the sixth most expensive drug and costs Aus $1255 per prescription. Together these two anti-VEGF agents alone cost the Australian government $6 million in 2016 to 2017.[42] However, the uptake was still relatively low (only 3%) despite retinal conditions being leading causes of blindness in this age group as reported in the literature.[29,43] Given that aged related macular degeneration and diabetic retinopathy are the common causes of vision loss in older people, the use of anti-VEGF drugs to treat retinal diseases among RACFs residents and the associated costs to the Australian health system are expected to rise in the future.

Visual impairment remains one of the most common and least recognised or treated disabilities among people in RACFs.[9,29,44] Once in residential aged care, older people are less likely to receive an eye health assessment and vision-restoration services (only 2% uptake recommended treatment) resulting in a higher prevalence of untreated eye disorders.[8,38,39,45,46] The Australian aged care system does not mandate routine eye health assessments for older people living in RACFS. Therefore, eye care services for aged care residents are often provided outside their RACFs and typically only by request. As such, many residents who are frail with significant functional limitations that could benefit substantially from receiving adequate eye care are falling through the gaps in the current system.[9] Whereas blindness and visual impairment remain one of the most common but least recognised disability in RACFs, residents with poor vision require high levels of care as they have greater difficulty in transfer ability, eating, washing the upper and lower body, and dressing than comparable residents without visual impairment, leading to a significantly increased level of dependency and costly long-term care.[38,44] Most importantly, it has been estimated that about 70% of people in residential aged care with an eye condition could improve vision and quality of life with simple and effective corrections with glasses, and with medical and surgical interventions.[44,47,48] A commissioned report submitted by the Vision Australia (a leading national provider of low vision and blindness services) to the Royal Commission into Aged Care Quality and Safety has clearly noted that the current aged care assessment process fails to adequately cater for people who are blind and visually impaired.[49] Any provision of ongoing eye care screening and service model specific to aged care may help to address health issues and care needs of the individual with eye problems.[38,40,50,51]

This study has several limitations. As this is an observational study that relies on administrative and aged care assessments and records as data sources, the data sources used do not report specific eye conditions (other than cataract and glaucoma) that are the major causes of irreversible and progressive vision loss in this age group, such as age-related macular degeneration, diabetic retinopathy, and uncorrected refractive error. If these common blinding conditions are not identified and recorded, it is likely that older people would miss out on receiving appropriate treatment leading to irreversible visual impairment and blindness. Further, care needs of the RACFs residents with blinding eye conditions may not be adequately catered

if care-givers are not aware of the residents' eye conditions. Another limitation was that the datasets used only captured Australian Government MBS subsidised health care services and it does not capture privately funded services and services provided to individuals in public hospitals (e.g. our data do not capture information on cataract surgery in public hospitals). Further, our study is an epidemiological study of linked national administrative data where chances of eye conditions being under-reported is possible. The aged care eligibility (ACAT) and entry into permanent care (ACFI) assessment tools used to ascertain the history of cataract only records up to ten (ACAT) and three (ACFI) health conditions; the trained aged care assessors collecting these data only report conditions sourced from the medical records that have been diagnosed by a suitably qualified individual and impact on the person's need for assistance. However, a comprehensive visual screening is not part of the aged care eligibility assessment in Australia. Therefore, it is possible that an eye condition, such as cataract, was not reported because it was not considered the condition most significantly impacting someone's need for assistance. Therefore, the actual prevalence of eye conditions was likely much higher than reported in our study. Further, due to inherent limitations associate with any administrative claims data, which only capture services and/or medication dispensing, our study is unable to comment and indication, appropriateness, compliance, and adherence of ophthalmic services and medications use. Our study could also have suffered from missing data, incorrect linkage, and miscoding. We attempted to minimise these issues by conducting several logic checks, excluding the cases with no linkage records (<1%), and checking whether the missing data was different between the groups studied.

Strengths of this study include its large sample size, population-based coverage, and use of national-level linked aged, health care, and pharmaceutical datasets to identify individuals with eye conditions. Our cohort captures a nationally representative sample of individuals accessing RACFs for which an aged care eligibility assessment is required in Australia; in the 2015to 2016 financial year, the number of individuals accessing these services was approximately 5.6% of the population over the age of 65 years.[4]

In conclusion, the prevalence of blindness decreased among older Australian living in RACFs over the study period. However, the burden of eye conditions remained high, but the use of eye health care services was low among those with an eye condition. Given the significant potential impacts of eye conditions on quality of life, our study shows a clear need for appropriate resource allocation (including appropriate access to eye health care services and medications) and evaluation of future eye health care needs for older people with an eye condition in RACFs. Further, our study relied on administrative claims data to identify eye conditions therefore it is likely that the prevalence of eye conditions is much higher than reported in this study. Therefore, routine eye health and vision screening is urgently warranted in this population to identify and render appropriate eye care services for those who are in need.

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