Chelsea Guymer, Robert Casson, Cate Howell and Nigel Stocks
The AgED Study. Age-related eye disease (AgED) in South Australian general practice: are we blind to early detection and intervention?
Australian Journal of Primary Health, 2017; 23(1):75-79

Originally Published at: http://dx.doi.org/10.1071/PY15189

The AgED Study. Age-related eye disease (AgED) in South Australian general practice: are we blind to early detection and intervention?

Chelsea Guymer[A,C,D], *Robert Casson*[B], *Cate Howell*[C] *and Nigel Stocks*[A]

[A]Discipline of General Practice, School of Medicine, University of Adelaide, Frome Road, Adelaide, SA 5000, Australia.

[B]South Australian Institute of Ophthalmology, University of Adelaide, Frome Rd, Adelaide, SA 5000, Australia.

[C]Adelaide to Outback General Practice Training Program, Lower Level, 183 Melbourne Street, North Adelaide, SA 5006, Australia.

[D]Corresponding author. Email: chelsguy@gmail.com

Abstract. The AgED Study aimed to evaluate the detection, awareness and management of age-related eye disease (AgED) in South Australian general practice. Three South Australian metropolitan general practices were recruited and all patients aged 75 years and older were invited to participate. A cross-sectional postal questionnaire and retrospective audit of consenting patients' medical records was performed. On average, patients had their last eye check 9 months ago; the majority (64.9%) performed by an optometrist. Only 7.6% had visited their GP for their last eye check, mostly (90.5%) for a mandatory 'Fitness to Drive' medical assessment. There were marked differences in GP recording *v.* self-reported AgED and a marked discrepancy in the prevalence rates of AgED, visual impairment and blindness in this study compared with Australian population-based prevalence surveys. Despite the lack of GP documentation of eye disease, the majority of patients engaged in timely eye checks with either an optometrist or ophthalmologist, and their overall visual function and vision-related quality of life (QoL) were satisfactory.

Introduction

In Australia, 96% of those aged 75 years and older report problems with vision, and 70% of those who are blind or visually impaired are aged 70 years and over (Access Economics Pty Ltd 2010; Vision 2020 2013). With an ageing population, chronic eye disease related to ageing is expected to be the most prevalent cause of avoidable visual impairment in the next few decades and will have significant economic implications (Australian Institute of Health and Welfare 2005; Taylor *et al*. 2005; World Health Organization 2013).

In 2004, the major causes of visual impairment and blindness (excluding refractive error) in Australians aged over 55 years were age-related macular degeneration (ARMD) (12 and 50% respectively), cataract (16 and 12% respectively) and glaucoma (3 and 16% respectively) (Australian Institute of Health and Welfare 2005; Access Economics Pty Ltd 2010; Vision 2020 2013). Vision impairment increases the risk of other age-related morbidity; falls are twice as likely (often leading to hospitalisation), hip fractures are four- to eight-fold more likely, depression is three-fold more common, and nursing home admissions occur, on average, 3 years earlier than that of elderly well-sighted individuals (Evans and Rowlands 2004; Australian Institute of Health and Welfare 2009; Access Economics Pty Ltd 2010; Vision 2020 2013, 2014, p. 7).

Historically, there has been fragmentation of eye care services, with limited communication across disciplines and resultant public confusion about the roles of various eye care practitioners (Australian Health Ministers' Conference 2005). In order to reduce the risk of eye disease and injury, the Australian Government has explicitly identified the need to increase the capacity of the primary care workforce to detect eye disease and engage the public in regular eye checks to detect treatable eye conditions early (Australian Health Ministers' Conference 2005).

Given the level of visual impairment among Australians aged 75 years and older in primary care, this pilot study aims to provide a baseline assessment of: (1) the current level of detection, awareness and management of age-related eye disease (AgED) documented in general practice records (compared with self-report); (2) the patients' uptake and willingness to engage in eye checks by their GP and the factors influencing this (i.e. mandatory 'Fitness to Drive' medical);

What is known about the topic?

- Eye disease related to ageing is a growing burden resulting in untimely morbidity. The extent of eye care service provision by GPs and its effect on patients is not known.

What does this paper add?

- Elderly patients accessed timely eye checks independent of their GP through optometrists or ophthalmologists and had adequate visual functioning. Improved integration of primary care eye services and enhanced GP involvement could provide further benefit.

(3) the patient's level of visual functioning and the effect on quality of life; and (4) community eye care service provision (among GPs, optometrists and ophthalmologists).

Methods

A cross-sectional postal questionnaire was administered and a retrospective audit of consenting patients' medical records was performed.

The principal GPs from a convenience sample of five general practices involved in registrar training were emailed an invitation to participate, detailing the aims and methods of the study. The GPs were then contacted by phone and a visit arranged to discuss the study. Three general practices from metropolitan Adelaide were recruited.

All patients aged 75 years and older who had attended each general practice at least once in the past 2 years were invited to participate with the following exclusion criteria: terminal illness, recent bereavement, cognitive impairment, non-English speaking and nursing home residents. Patients were identified from a search of each practice's medical software, and GPs from the practice determined which patients met the inclusion criteria.

A postal questionnaire was sent to all potential participants with a letter of endorsement from their GP. Participants were given the option of providing their identifying details and written consent to having their medical records audited on return of the questionnaire. Participants were requested to return their questionnaire within 8 weeks, with a reminder questionnaire sent to all non-responders after 6 weeks.

The self-administered postal questionnaire comprised the National Eye Institute Visual Function Questionnaire (NEI VFQ-25 version 2000) and an Eye Health Survey (see the Supplementary material to this paper). The postal questionnaire was piloted among colleagues and patients separate to the study population before distribution. The NEI VFQ-25 is a well-validated research tool with robust psychometric properties for studying eye conditions and primarily examines the influence that various eye diseases and interventions have on a patient's activities of daily living and quality of life (Mangione *et al.* 2001; Clemons *et al.* 2003; Chia *et al.* 2006).

A retrospective audit was performed by C. Guymer, which involved comprehensively reviewing the entirety of each consenting patient's GP electronic medical records, including all letters from eye health professionals. Progress notes, 'Fitness to Drive' medical examinations and 75+ Health Checks performed within the past 24 months were also examined. Information pertaining to the patient's eye health was extracted from the audit, including: patient's age, gender, post code, diagnosed eye disease, eye treatments, risk factors for the development of eye disease, visual acuity (VA), driving status and history of falls within the past 12 months.

This enabled the researchers to cross-check eye health data documented by the patient's GP against patient's self-report. The results obtained were compared with estimates of low vision and age-related eye disease from published population-based studies, namely the Blue Mountains Eye Study (BMES) and Melbourne Vision Impairment Project (MVIP), as a means to verify the accuracy of prevalence rates and NEI VFQ-25 scores found in this study.

IBM SPSS Statistics for Windows (ver. 22.0, IBM Corp, Armonk, NY, USA) software was used to collect the data and perform basic statistical analysis. Data are reported as prevalence estimates or means with confidence intervals as appropriate.

Ethics approval was granted from the University of Adelaide, Human Research Ethics Committee (H-2015-061).

Results

From the three recruited general practices, a total of 448 patients aged 75 years and older were invited to complete the postal questionnaire. An overall response rate of 38.2% was achieved (35.6% responded from Clinic 1 (Northern Outer Metropolitan Adelaide), 22.6% from Clinic 2 (North West Metropolitan Adelaide) and 67.4% from Clinic 3 (Adelaide City), with a further two anonymous respondents). The sex distribution of responders mirrored that of non-responders (44% were male and 56% were female). The age and sex distributions of questionnaire respondents are shown in Table 1. Medical records were audited for 93% of respondents, who had provided written consent. Of the patient records audited, 75.9% demonstrated regular attendance at the general practice (attended at least twice in the past 12 months).

The mean composite score for the NEI-VFQ 25 (average of the vision-targeted subscale scores, excluding the general health) was 91 (maximum score 100). The average sub-scale NEI-VFQ 25 scores are summarised in Table 2, in comparison to the BMES (Chia *et al.* 2006).

A history of falls within the past year was disclosed by 32.2% of respondents, and 12.7% attributed this to their eyesight. An eye check was performed for 91.6% of participants within the past 2 years. The service provision of patient's self-reported last eye check is summarised in Table 3. Of note, overlap exists with a limited number of patients accessing more than one provider for their eye care.

Overall, most of the patients were interested in their GP being more involved in their eye care (70.8%) and expressed a willingness to attend a yearly health check by their GP, including an eye check (84.8%).

The prevalence and treatment of AgED are listed in Tables 4 and 5 respectively.

Table 1. Age and sex distributions of respondents

Age group (years)	Research participants by age and sex (%) Men	Women	Total
75–79	23.4	26.9	50.3
80–84	14.6	19.3	33.9
85–89	3.5	6.4	9.9
90+	1.8	4.1	5.8

Table 2. National Eye Institute Visual Function Questionnaire (NEI-VFQ 25) scores, compared to the Blue Mountains Eye Study (BMES)
Numbers for each study (*n*) refer to the number of participants who completed the questionnaire

Sub-scale	Score (s.e.) (*n* = 94)	95% confidence interval	BMES (Chia *et al*. 2006) 70 years (*n* = 132)
General health	59 (2.1)	54–63	57 (2.0)
General vision	81 (1.3)	78–83	73 (1.2)
Ocular pain	89 (1.6)	86–92	86 (1.4)
Near activities	88 (1.5)	85–91	86 (1.2)
Distance activities	89 (1.3)	86–92	88 (1.0)
Vision specific			
Social functioning	96 (1.2)	93–98	97 (0.7)
Mental health	93 (1.3)	90–95	89 (1.2)
Role difficulties	93 (1.5)	90–95	87 (1.6)
Dependency	98 (1.2)	95–99	98 (0.4)
Driving	85 (1.3)	83–88	86 (1.4)
Colour vision	96 (1.2)	93–98	96 (0.8)
Peripheral vision	93 (1.6)	89–96	91 (1.3)
Composite score	91 (1.1)	89–93	86 (0.8)

Table 3. Community eye care service provision

Average last self-reported eye check in months (95% CI)	9.5 (8.2–10.8)
Service provider percentage (95% CI)	
Optometrist	64.9 (56.7–71.3)
Ophthalmologist	34.5 (28.1–42.7)
GP	7.6 (4.1–11.7)
Practice Nurse	1.2 (0–2.9)

The prevalence of AgED in our study compared with pooled data from Australia population-based studies (BMES and MVIP) is demonstrated in Table 6.

The prevalence of visual impairment and blindness in those who had binocular VA documented (after correction for refractive error) in their GP records is shown in Table 7.

Of those who had visual acuity recorded in their GP notes (50% of audited patient records), 88.6% were documented as part of obligatory 'Certificate of Fitness to Drive' medical assessments. This correlated with questionnaire data, with 67.8% of respondents reporting that their GP had checked their eyes, 90.5% of which were performed for a driving medical. Based on the NEI VFQ-25 data, 93.5% of patients reported they were still driving.

Table 4. Comparative prevalence of age-related eye disease
ARMD, age-related macular degeneration

Eye disease	Percentage reported by patients (95% CI)	Percentage documented by GP (95% CI)
Cataract	57.3 (49.7–64.3)	29.1 (22.2–36.7)
Glaucoma	7.6 (4.1–11.7)	5.7 (1.9–9.5)
ARMD	12.3 (7.6–17.5)	8.9 (5.1–13.3)

Table 5. Comparative prevalence of eye health treatments
ARMD, age-related macular degeneration

Eye health treatments	Percentage reported by patients (95% CI)	Percentage documented by GP (95% CI)
Laser	17.5 (11.1–23.4)	2.5 (0.6–5.1)
Cataract surgery	43.3 (35.7–50.3)	20.3 (14.6–26.6)
Eye injections for ARMD	5.8 (2.9–9.4)	3.8 (1.3–7.0)
Treatment for glaucoma	7 (3.5–11.1)	12.7 (8.2–18.4)

Discussion

There were marked differences in data recorded by GPs*v*. self-reported AgED (Tables 4, 5), and lower rates of AgED were found in our study compared with pooled data from population-based surveys (Table 6). There was limited recording of visual acuity in general practice records, which was more likely to have been performed if the patient had a mandatory'Fitness to Drive' medical examination. Despite this, the majority of patients engaged in timely eye checks with either an optometrist or ophthalmologist (Table 3) and their overall visual function and vision related quality of life (QoL) were satisfactory (Table2).

Patients reported that poor vision contributed to up to 39.4% of falls. Australian GP guidelines advise that there is no evidence for screening asymptomatic older people for reduced vision (Iliffe and Smeeth 2006; Royal Australian College of General Practitioners 2012). However, it is important for GPs to be aware of a patient's visual disability and coordinate appropriate care to reduce their risk of secondary morbidity. This is supported by the willingness of patients to have their GP more involved in their eye care (70.8%) and engage in a regular health check, including an eye check (84.8%).

Based on data from the BMES, 48.6% of patients had seen an optometrist and 50.2% had seen an ophthalmologist in the past 2 years (Wang *et al*. 1999). Jamous *et al*. (2014) identified that GPs were not as engaged in their referrals to optometrists or low vision services for AgED as they were for referrals to ophthalmologists. In Australia, a GP referral is not required to see an optometrist and optometrists are able to refer directly to an ophthalmologist thereby bypassing communication with a patient's GP. Chronic glaucoma requires treatment with ongoing medications often re-prescribed by the patients GP. In contrast, cataract surgery and laser therapy tend to be'once-off' procedures with potential resolution of the patients visual symptoms. These factors may contribute to the limited recording of eye health in GP records and may account for the discrepancy between patient self-report and GP records.

Table 6. Age-related eye disease (AgED) prevalence
ARMD, age-related macular degeneration

Study	Age group (years)	Cataract (%)	Glaucoma (%)	ARMD (%)
Vision problems among older Australians (Australian Institute of Health and Welfare2005)	75–79	51.3	3.13	3.68
	80+	74.7	6.44	14.75
The AgED Study (the present study) GP documented	75–79	8.9	1.9	2.5
	80+	20.3	3.8	6.3
The AgED Study (the present study) Patient self report	75–79	19.3	2.3	5.3
	80+	38	5.3	7

Table 7. Prevalence of visual impairment and blindness
VA, visual acuity. Data are presented as percentages

All ages	Visual impairment (VA <6/12)	Blindness (VA <6/60)
Total	1.30	2.60
Men	2.60	5.30
Women	0	0

Patients performed well on the NEI-VFQ 25, indicating a high degree of visual functioning with minimal visual disability. Highest ratings were seen in domains of social functioning and dependency, suggesting that patient's visual functioning was not limiting their independence and overall quality of life. Our results were comparable to the BMES in their subgroup of patients aged 70 years and older (Chia *et al*. 2006).

The strength of this study lies in it being the first attempt to assess the level of eye care in Australian General Practice and provides a unique insight into the current level of engagement of GPs in managing AgED, community eye care service provision and vision-related QoL. The limitations include, due to resources and time available: the limited number of practices included, which may not be representative of all South Australian practices; a limited response rate with marked variability between clinics; and the reliance on patient self-report, which inevitably is prone to selection and recall bias.

Studies have shown that response rates to questionnaire surveys of the general population rarely exceed 50% (Nakash *et al*. 2006). The low overall response rate of 38.2% in this study may be attributed to patients with poor vision being unable to read and complete the postal questionnaire. Higher participation rates were observed among those from higher socioeconomic areas in Adelaide, potentially favouring those with a higher degree of health literacy (Australian Bureau of Statistics 2008). There was marked variability in response rates between practices, ranging from 22.6 to 67.4%. Similarly, Potiriadis *et al*. (2008) found that patient survey response rates varied by general practice from 26.2 to 55.0%. This variability may be related to the level of engagement and continuity of patient care in a particular practice.

Given the limited recording of visual acuity in general practice records, the prevalence of blindness (2.6%) and visual impairment (1.3%) detected in this study may not accurately represent population frequencies. Casson *et al*. (1996) performed a population-based prevalence study of 1466 Adelaide metropolitan residents aged 70 years and older and found that 9.3% of the sampled population were visually impaired and

1.2% were blind. This correlates with pooled data from the BMES ($n = 3654$) and MVIP ($n = 4744$) that estimated 9.4% of Australians aged 55 years or older have visual impairment and 1.2% were blind (Australian Institute of Health and Welfare 2005). The BMES and MVIP recruited all eligible residents in randomly selected clusters by door-to-door household census (Taylor *et al*. 2005). Casson *et al*. (1996) undertook objective visual acuity testing in the participants' homes. This is in contrast to self-selection and self-report by return of postal questionnaires in our study. Recruitment methods, objective eye testing and considerably larger sample sizes in these population-based studies may therefore account for such discrepancy in contrast to our results.

Self-report studies, as opposed to population-based studies, cannot detect conditions that are undiagnosed or of which the respondent is not aware (Australian Institute of Health and Welfare 2005). Based on UK data, 12–50% of people are estimated to have undetected reduced vision (Evans and Rowlands 2004; Iliffe *et al*. 2013). It is also known that nursing home residents are 3.3-fold more likely to have visual impairment (Evans and Rowlands 2004); none of whom were included in this study. Therefore, the results may underestimate the true extent of AgED and visual disability, compared with objective eye testing (Iliffe *et al*. 2013).

Conclusion

Our results demonstrate that there is a disparity between GPs' documentation of eye health and a patient's self-report, unless the patient presents for a 'Fitness to Drive' medical assessment. Despite this, most of the patients actively engaged in timely eye checks with an optometrist or ophthalmologist and there was no reduction in their overall visual function and vision-related QoL. There was a significant discrepancy in the prevalence rates of AgED, visual impairment and blindness in this study compared with Australian population-based surveys. There is a role for GPs to be more active in verifying a patients visual history, and for improved communications between health practitioners to better facilitate multi-disciplinary management of AgED and visual disability in the community.

Conflict of interests None declared.

Supplementary material

The Eye Health Survey is available as Supplementary materi al to this paper from the journal online.

Acknowledgements

This study was funded by the Department of Health, in collaboration with the Adelaide to Outback General Practice training provider. We would like to thank the participating general practices and affiliated patients involved in the study.

References

Access Economics Pty Ltd (2010) Clear focus: the economic impact of vision loss in Australia in 2009. Commissioned by Vision 2020 Australia, Access Economics Pty Ltd, Melbourne.

Australian Bureau of Statistics (2008) Adelaide's advantaged and disadvantaged suburbs. (Commonwealth of Australia: Canberra) Available at http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1345.4Feature%20Article1Sep%202008 [Verified 23 December 2015]

Australian Health Ministers' Conference (2005) 'National Framework for Action to Promote Eye Health and Prevent Avoidable Blindness and Vision Loss.' (Commonwealth of Australia: Canberra)

Australian Institute of Health and Welfare (2005) 'Vision Problems among Older Australians. Bulletin Number 27.' (Commonwealth of Australian: Canberra)

Australian Institute of Health and Welfare (2009) 'A Guide to Australian Eye Health Data', 2nd edn. (Commonwealth of Australia: Canberra)

Casson R, Giles L, Newland HS (1996) Prevalence of blindness and visual impairment in an elderly urban population. *Australian and New Zealand Journal of Ophthalmology* **24**(3), 239–243. doi:10.1111/j.1442-9071.1996.tb01586.x

Chia E-M, Mitchell P, Ojaimi E, Rochtchina E, Wang JJ (2006) Assessment of vision-related quality of life in an older population subsample: The Blue Mountains Eye Study. *Ophthalmic Epidemiology* **13**, 371–377. doi:10.1080/09286580600864794

Clemons TE, Chew EY, Bressler SB, McBee W, Age-Related Eye Disease Study Research Group (2003) National eye institute visual function questionnaire in the age-related eye disease study (AREDS). *Archives of Ophthalmology* **121**, 211–217. doi:10.1001/archopht.121.2.211

Evans B, Rowlands G (2004) Correctable visual impairment in older people: a major unmet need. *Ophthalmic and Physiological Optics* **24**, 161–180. doi:10.1111/j.1475-1313.2004.00197.x

Iliffe S, Smeeth L (2006) Community screening for visual impairment in the elderly. *Cochrane Database of Systematic Reviews* (3), CD001054. doi:10.1002/14651858.CD001054.pub2

Iliffe S, Kharicha K, Harari D, Swift C, Gillmann G, Stuck AE (2013) Health risk appraisal in older people 6: factors associated with self-reported poor vision and uptake of eye tests in older people. *BMC Family Practice* **14**, 130. doi:10.1186/1471-2296-14-130

Jamous KF, Jalbert I, Kalloniatis M, Boon MY (2014) Australian general medical practitioner referral pathways for people with different ocular conditions. *Clinical & Experimental Optometry* **97**(2), 152–159. doi:10.1111/cxo.12102

Mangione CM, Lee PP, Gutierrez PR, Spritzer K, Berry S, Hays RD, National Eye Institute Visual Function Questionnaire Field Test Investigators (2001) Development of the 25-Item National Eye Institute Visual Function Questionnaire. *Archives of Ophthalmology* **119**, 1050–1058. doi:10.1001/archopht.119.7.1050

Nakash RA, Hutton JL, Jørstad-Stein EC, Gates S, Lamb SE (2006) Maximising response to postal questionnaires – a systematic review of randomised trials in health research. *BMC Medical Research Methodology* **6**(1), 5. doi:10.1186/1471-2288-6-5

Potiriadis M, Chondros P, Gilchrist G, Hegarty K, Blashki G, Gunn JM (2008) How do Australian patients rate their general practitioner? A descriptive study using the General Practice Assessment Questionnaire. *The Medical Journal of Australia* **189**, 215–219.

Royal Australian College of General Practitioners (2012) 'Guidelines for Preventative Activities in General Practice', 8th edn. (RACGP: Melbourne)

Taylor HR, Keeffe JE, Vu HTV, Wang JJ, Rochtchina E, Mitchell P, Pezzullo ML (2005) Vision loss in Australia. *The Medical Journal of Australia* **182**(11), 565–568.

Vision 2020 (2013) Progressing eye health and vision care in Australia: policy and funding proposal 2013. Vision 2020, Melbourne, Australia.

Vision 2020 (2014) Strategic plan 2014–17. Vision 2020, Melbourne, Australia.

Wang J, Mitchell P, Smith W (1999) Use of eye care services by older Australians: the Blue Mountains Eye Study. *Australian and New Zealand Journal of Ophthalmology* **27**(5), 294–300. doi:10.1046/j.1440-1606.1999.00227.x

World Health Organization (2013) 'Universal Eye Health: a Global Action Plan 2014–2019.' (WHO: Spain)