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Vision Impairment Among Older Adults Residing in Assisted Living

Amanda F. Elliott, PhD, MSN¹, Gerald McGwin Jr, MS, PhD^{1,2,3}, and Cynthia Owsley, PhD, MPH¹

¹Department of Ophthalmology, School of Medicine, University of Alabama at Birmingham

²Department of Epidemiology, School of Public Health, University of Alabama at Birmingham

³Department of Surgery, School of Medicine, University of Alabama at Birmingham

Abstract

OBJECTIVE—To examine rates of visual impairment of older adults in assisted living facilities (ALFs).

METHODS—Vision screening events were held at 12 ALFs in Jefferson County, Alabama for residents 60 years of age. Visual acuity, cognitive status, and presence of eye conditions were assessed.

RESULTS—144 residents were screened. 67.8% failed distance screening, 70.9% failed near screening, and 89.3% failed contrast sensitivity screening. 40.4% of residents had cognitive impairment and 89% had a least one diagnosed eye condition. Visual acuities did not differ significantly between cognitive status groups or with greater numbers of eye conditions.

DISCUSSION—This study is the first to provide information about vision impairment in the assisted living population. Of those screened, 70% had visual acuity worse than 20/40 for distance or near vision, and 90% had impaired contrast sensitivity. Cognitive impairment accounted for a small percentage of the variance in near vision and contrast sensitivity.

Keywords

Visual impairment; assisted living facilities; older adults

INTRODUCTION

Assisted living serves as a middle ground between independent living and nursing home care for older adults who require some degree of help or monitoring with the activities of daily living, yet who do not require the close medical, behavioral, and moment-to-moment supervision of a nursing home (American Association of Retired Persons, 1999). Assisted living allows older adults to “age-in-place,” which is not only motivated by their own preferences and that of their families, but has been shown to enhance quality of life (Kelley-Gillespie & Farley, 2007). Not surprisingly, assisted living is rapidly growing in popularity in the United States. It has been estimated that approximately 975,000 persons currently live in 38,000 assisted living facilities nationwide, and the average age of an assisted living resident is 86.9 years (United States Department of Health and Human Services, 2007). By

Corresponding author: Amanda F. Elliott, Ph.D., Department of Ophthalmology, University of Alabama at Birmingham, 609 Callahan Eye Foundation Hospital, 1720 University Boulevard, Birmingham, AL 35294-0009; phone (205) 602-5985; fax (205) 325-8692; aelliott@health.usf.edu.

2030 the number of assisted living residents is expected to double in the U.S. (National Center for Assisted Living, 2001). Interestingly, while nursing homes have strict regulatory oversight by the federal government, assisted living facilities do not. Individual states, however, do have general regulations; for example, Alabama mandates individuals undergo a physical exam within 30 days prior to taking up residence in an assisted living facility and annually thereafter (there are no specific guidelines provided in the state mandates as to what this physical exam should entail) (Alabama State Board of Health, n.d.).

The relationship between vision impairment and cognitive impairment is complicated. The incidence of both conditions increases with age (Alzheimer's Association, 2012; Prevent Blindness America, 2008). Several studies have clearly documented that impaired visual acuity in older adults, specifically for near distances, increases the risk for incident or the worsening of cognitive impairment or performance (Lin et al., 2004; Reyes-Ortiz et al., 2005). However, others have found no relationship between cognitive impairment and vision, even after vision improving treatments (Hall, Mcwin, & Owsley, 2005; McGwin, Hall, Searcey, Modjarrad, & Owsley, 2005). Regardless, impaired cognition and vision have a strong relationship with deleterious impacts on older adults' performance of many everyday activities such as reading, mobility, and social interaction (Coleman, Yu, Keeler, & Mangione, 2006; Valbuena, Bandeen-Roche, Rubin, Munoz, & West, 1999). Thus it is important to examine the visual status among older adults, including assisted living residents.

To our knowledge, there have been no previously published studies examining the visual status of older adults residing in assisted living facilities. The vast majority of previous research regarding the visual functioning of older adults has examined either community dwelling older adults or nursing home residents (Horowitz, 1994; Owsley et al., 2007a; Tielsch, Javitt, Coleman, Katz, & Sommer, 1995; West et al., 2003; West et al., 1997). These studies found that residents of nursing homes have vision impairment rates that are 3 to 15 times higher than corresponding estimates for community dwelling older adults (Horowitz, 1994; Owsley et al., 2007a; Tielsch et al., 1995; West et al., 2003; West et al., 1997). Much of this impairment is due to correctable conditions such as refractive error (e.g., myopia, hyperopia, presbyopia) and cataract (Friedman et al., 2004; Tielsch et al., 1995). Having eye conditions such as cataract, glaucoma, age-related macular degeneration, and diabetic retinopathy also contributes to declines in visual acuity (Congdon, 2004). Even though federal guidelines mandate comprehensive health care (including eye care) for nursing home residents and Medicaid/Medicare covers eye care, over 50% of those residing in nursing homes are not receiving eye care (Owsley et al., 2007a). Given this situation in the nursing home where federal oversight does exist, it leads to the question as to whether vision impairment may even be more pervasive in assisted living communities where federal guidelines or regulations are absent. The purpose of this paper is to examine for the first time the rate of vision impairment in older persons residing in assisted living.

METHODS

Participants

Inclusion criteria consisted of adults (≥ 60 years) who resided in assisted living facilities or specialty-care assisted living facilities (e.g., dementia care) in Jefferson County, Alabama (Birmingham metropolitan area). All 38 state licensed assisted living facilities and specialty care assisted living facilities were initially invited to participate in a no-cost vision screening event through a recruitment letter sent to each facility's administrator. The letter described the vision screening program and inquired whether they might be interested in our organizing one for their facility. Follow-up phone calls from the project manager were made to the administrators one week following receipt of the letter in order to answer any

questions and to begin the process of setting up screening dates for facilities that were interested. An effort was made to contact each facility's administrator via telephone until they either accepted or declined participation. Twelve of the 38 facilities agreed to host an event; reasons for facility non-participation included: facility could not be reached despite multiple attempts to contact or verbally expressed they were not interested (N= 22), could not get administrative approval (N=2), facility had existing eye care service for residents (N=1), and facility could not find a time to host the screening event (N=1). The Project Manager then met with each facility's administrator and/or activity director and worked out the details on what room/building within the facility would be used for the screening.

Procedures

Once a facility agreed to participate, a date for the vision screening event was selected. Approximately 2 weeks in advance to the screenings, a packet was sent to the facility that included letters for each resident detailing the no-cost vision screening event (e.g., when and where it would be held) as well as flyers for the facility to post in several locations announcing the vision screening fair's date, time, and room location. The vision screening event was set up as first come first served although residents were provided with the Program Manager's telephone number in advance so they could make an appointment if they preferred.

On the day of the vision screening fair, the Program Manager and two assistants arrived early morning to set up the vision screening equipment, a "check-in desk," and a place for interviewing participants for background information. The screening began by 9am and continued to late afternoon. In the event that not all residents interested in screenings could be accommodated in a single day, we made arrangements to return for a second day of screenings so no one would be turned away because of time constraints.

Before beginning the study protocol, informed consent was obtained from each resident. In the case of the specialty care assisted living facilities (N= 2 facilities), letters regarding the vision screening event and copies of the informed consent form were sent to each resident's legal guardian to be returned to the study coordinator completed in advance of the screening if they chose to have their loved one participate (N= 11 enrolled participants, 7.6% of total). The protocol was approved by the Institutional Review Board of the University of Alabama at Birmingham.

The study utilized a cross-sectional design. All protocol measurements were carried out by trained staff. The following visual function screening tests were administered according to standard procedures for each test. Each eye was assessed separately with the participant viewing with whatever habitual correction they would normally use (if they used any) for each specific vision measurement. Distance letter visual acuity was measured by the ETDRS charts and accompanying light box (Ferris, Kasso, Bresnick, & Bailey, 1982). Letter visual acuity for near vision was assessed by the Lighthouse Near Visual Acuity card (Owsley et al., 2007a). The Mars Letter Contrast Sensitivity Test was used to assess contrast sensitivity (Arditi, 2005). Participants were also asked to report demographic information (birth date, sex, race/ethnicity, educational level, marital status), whether they resided alone or with someone else, and the length of time they had been residing in assisted living. A questionnaire was administered to obtain information about the presence of chronic medical conditions. General mental status was assessed by the Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975). Ocular comorbidities were abstracted from participants' medical records after a signed medical release was sent to their eye care provider. Screen "failure" for distance and near acuity was defined as acuity worse than 20/40 in at least one eye. This definition was used in order to identify visual impairment in any eye in order to provide participants with a meaningful status report of their vision after

the screening. Screen failure for contrast sensitivity was defined as scores worse than 1.50 in at least one eye, a commonly used cutoff value used to identify impaired contrast sensitivity (Owsley, McGwin, Searcey, 2012). All residents were provided with a report containing their vision screening results and those participants who failed any of the vision screening tests according to the above criteria were given a short letter encouraging them to seek a comprehensive eye examination by an ophthalmologist or optometrist, if they were not already routinely receiving care. If they preferred, we sent the letter directly to their eye care specialist. If the participant did not have an eye care provider, we provided information on eye care providers in their community and offered help in making an appointment.

Statistical Analysis

Descriptive statistics (e.g., means, proportions) were calculated to determine the visual status of the sample. The definition of impairment for distance acuity, near acuity, and contrast sensitivity was identical to the definition of screen failure for these tests as described above. Chi-square tests were used to test for significant differences between those with and without cognitive impairment and also for those with 0–1 or 2 and more eye conditions. Multiple regression analysis was used to test for the effects of cognitive impairment and number of eye conditions on visual status.

RESULTS

A total of 152 persons attended the vision screening events. Of these, 8 were ineligible for the present study due to an age of < 60 years; therefore a total of 144 persons participated in the present study. Eleven of these participants were from SCALFs (7.6% of total). The overall participation rate in the study across all facilities was 29.7%, with rates ranging across individual facilities from 12.3% to 67.1%. Characteristics of assisted living residents who participated in the study are summarized in Table 1. Over 70% of residents were in their 80s and 90s and were predominantly women (over 80%). Nearly all participants were white (97.9%), and 91% were widowed, separated, divorced, or single, with the largest group being widowed. Slightly less than half (44.5%) had greater than a high school education, while 58.6% were considered cognitively intact according to their MMSE score (i.e., a score > 23).

The visual function of participants is summarized in Table 2. With regard to visual function in the better seeing eye, 61.4% of residents had 20/40 or better acuity for distance vision, 49.6% of residents had 20/40 or better acuity for near vision, and 33.9% of residents had 1.50 contrast sensitivity. With regard to the worse seeing eye, the majority of acuities fell between 20/40 and 20/200 (48.5% for distance and 47.4% for near). The majority (64.8%) of residents' contrast sensitivity scores fell between 0.90 but <1.50. Residents of SCALFs did not differ significantly from ALF residents on any demographic or vision measure, with the exception of the MMSE ($\bar{x}$ = 16.7 vs 24.3, p = 0.00), which would be expected.

The pass-versus-fail vision screening results are presented in Table 3. Almost 70% of participants failed the visual acuity test for distance meaning that they had at least one eye that had visual acuity worse than 20/40. Also, 70% failed the near visual acuity test. Nearly 90% of residents failed the contrast sensitivity test (scores < 1.5).

Visual acuities for residents by cognitive status group and number of eye conditions are presented in Table 4. Chi-square analyses (results not shown) were conducted to detect any between group differences. There were no statistically significant differences on any vision test between cognitive status or number of eye condition groups. Because visual acuity tended to be worse in those with cognitive impairment and also in the 2+ eye conditions group, multiple regression analyses were conducted to determine the strength of these

variables in predicting visual status. Results indicated that cognitive status significantly contributed to the prediction of visual status for near vision in the better eye ($R^2 = 0.06$, $p = 0.004$) and contrast sensitivity in the better eye ($R^2 = 0.07$, $p = 0.004$), however cognitive status explained little of the variability in this relationship.

DISCUSSION

To our knowledge there are no previous studies reporting the rate of visual impairment of older adults residing in assisted living facilities. Thus, this study is the first of its kind to provide information for understanding the scope of vision impairment problems in this population. The demographics of the assisted living residents who participated in this study are similar to the demographics of assisted living residents found by the 2009 Assisted Living Facility Survey with regards to age, sex, and marital status (no race or education levels were available from the 2009 survey) (American Association of Homes and Services for the Aging, American Seniors Housing Association, Assisted Living Federation of American, National Center for Assisted Living, & National Investment Center for the Seniors Housing & Care Industry, 2009).

The vision screening program identified 70% of assisted living facility residents screened as having vision impairment for either distance or near visual acuity, and 90% for contrast sensitivity. Vision impairment rates among nursing home residents range from 29% to 62% (Mitchell, Hayes, & Wang, 1997; Tielsch et al., 1995). Variations in estimates can often be attributed to varying definitions of vision impairment employed between studies. Previous research has documented that the rate of vision impairment among nursing residents is greatly accentuated (3–15 higher) as compared to older adults living independently in the community (Horowitz, 1994; Owsley et al., 2007a; Tielsch et al., 1995; West et al., 2003; West et al., 1997). The present study found vision impairment rates to be high among the assisted living residents we screened. It should be noted that our definition of vision impairment in the current study for distance and near visual acuity being worse than 20/40 in either eye was intended to be more inclusive of identifying any visual impairment as no previous studies had explored visual status in this population. Other common ways to define visual impairment include best corrected binocular vision worse than 20/40 or just in the better eye worse than 20/40 (Congdon et al., 2004; Owsley et al., 2007a). Binocular vision was not assessed in the current study, but if we were to define visual impairment as worse than 20/40 in the better eye (and <1.50 for contrast sensitivity), we find visual impairments in distance vision for 38.6% of residents, in near vision for 50.4% of residents, and in contrast sensitivity for 66.1% of residents. These are similar to rates mentioned above for nursing home residents.

It has been estimated that approximately one-third of vision impairment among nursing home residents is reversible with currently available treatments such as correction of refractive error and cataract surgery (Friedman et al., 2004; Tielsch et al., 1995). Furthermore, Medicaid would cover all or nearly all the costs of these treatments, and Medicare would cover cataract surgery and some or all of the glasses cost following cataract surgery. Recently, we (Owsley et al., 2007a) and others (Teresi et al., 2005) have demonstrated that improving vision through the correction of refractive error in nursing home residents improved their quality of life and decreased depressive symptoms. Cataract surgery also had dramatic quality of life benefits (Owsley et al., 2007b). These findings underscore the importance of providing routine eye care among nursing home residents, and we suggest that the same may apply to assisted living residents as well. This is especially true given that 66% of participants reported a positive history for cataract and nearly a quarter reported having age-related macular degeneration. Research on the assisted living population confirming the link between interventions to improve vision and improved

quality of life could influence the development of eye care guidelines for this increasingly popular type of residential living for the elderly. Although the relationship between cognitive status and visual acuity was weak, we should consider that these findings could serve as a segue to an intervention study evaluating the impact of treating refractive error in reducing incident cognitive impairment, a major reason why assisted living residents transition to nursing home placement (Phillips et al., 2003). It is conceivable that eye care utilization and the treatment of reversible vision impairment could slow the rates of conversion to nursing home care that are precipitated by cognitive impairment.

A strength of this study is that it comprises a first look at vision impairment rates in those older adults residing in assisted living communities. Valid and reliable tools for measuring visual acuity and contrast sensitivity were employed. A limitation is that we had a relatively low overall participation rate and variable rates at each facility creating the potential for bias in our vision impairment estimates, which are likely overestimates. Participation rates were generally better at smaller assisted living facilities where perhaps the screening event was more recognizable through pre-event advertisements and also on the day of the event by having it located in a central room that residents were likely to walk by during the day. Participation rates for future studies could be strengthened by strategies such as following mailed announcements with verbal announcements and visiting each facility in advance of the date of the vision screening fair to meet residents and answer questions. Yet acknowledging this participation bias, our vision screening program did reveal a subpopulation of assisted living residents who had high rates of visual impairment. The creation of eye care guidelines or policies for older adults living in assisted living communities could have a positive eye health benefit for this population in that it might facilitate eye care for those who do not seek it on their own. Additionally, further work will need to develop ways to enhance participation and better understand the reasons for non-participation in this population.

An important outcome of evaluating vision screening programs among those “positive” for vision impairment is determining who actively seeks dilated comprehensive eye care and what are the outcomes of this medical intervention. Further analyses related to eye care utilization in this sample will be discussed elsewhere. The American Academy of Ophthalmology (2009) recommends that adults 65 years of age and older have an eye examination every 1 to 2 years, even in the absence of symptoms. In addition to future research determining what proportion seek follow-up eye care after a screening, future work should strive to achieve a better understanding about the factors that impact eye care utilization among older adults including those residing in assisted living.

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Table 1**Demographic and Medical Characteristics of Assisted Living Participants**

Characteristic	No. (%)
Age, y	
60–69	7 (4.86)
70–79	21 (14.58)
80–89	77 (53.47)
90+	39 (27.08)
Sex	
Male	26 (18.06)
Female	118 (81.94)
Race/Ethnicity	
White, non-Hispanic	141 (97.92)
Black, non-Hispanic	2 (1.39)
Native American	1 (0.69)
Education	
<12	21 (15.33)
High school graduate	55 (40.15)
Some college	29 (21.17)
College graduate	21 (15.33)
Graduate or professional degree	11 (8.03)
Marital status	
Married	13(9.03)
Single	10 (6.94)
Divorced	13(9.03)
Widowed	108 (75.00)
Social support	
Live alone	125 (86.81)
Live with a family member/friend	19 (13.19)
No. of medical conditions, mean (SD)	4.8 (s.d. 2.58)
MMSE score ^a	
27–30	52 (36.88)
24–26	32 (22.69)
20–23	29 (20.59)
16–19	19 (13.94)
13–15	4 (2.84)
10–12	3 (2.13)
<10	2 (1.42)
Eye Diseases	
Cataract	94 (66.20)
Diabetic retinopathy	1 (0.71)
Glaucoma	14 (10.00)

Characteristic	No. (%)
Age-related macular degeneration	31 (23.13)

^aMini Mental State Exam, normal range 24–30, 23 indicates cognitive impairment

Table 2**Visual Function Characteristics of Assisted Living Participants**

Characteristic	Better Eye	Worse Eye
Distance visual acuity, No. (%)		
20/40 or better	81 (61.36)	40 (29.85)
Worse than 20/40 but better than 20/200	45 (34.09)	65 (48.51)
20/200 or worse	6 (4.55)	29 (21.64)
Distance visual acuity, logMAR, mean (SD)	0.32 (0.30)	0.58 (0.40)
Near visual acuity, No. (%)		
20/40 or better	67 (49.63)	39 (28.89)
Worse than 20/40 but better than 20/200	61 (45.19)	64 (47.41)
20/200 or worse	7 (5.19)	32 (23.70)
Near visual acuity, logMAR, mean (SD)	0.38 (0.29)	0.63 (0.43)
Contrast sensitivity, No. (%)		
1.80	*	*
1.50 but <1.80	41 (33.88)	13 (10.74)
1.20 but <1.50	55 (45.45)	47 (38.84)
0.90 but <1.20	18 (14.88)	29 (23.97)
0.60 but <0.90	4 (3.31)	13 (10.74)
0.30 but <0.60	2 (1.65)	4 (3.31)
<0.30	1 (0.83)	15 (12.40)
Contrast sensitivity, log sensitivity, mean (SD)	1.34 (0.28)	1.05 (0.47)

Table 3

Visual Acuity Screening Results for Distance and Near Vision and Contrast Sensitivity

Vision Measure	Number (% of total)
Distance Visual Acuity	
Passed screening test	46 (32.2)
Failed screening test	97 (67.8)
Near Visual Acuity	
Passed screening test	41 (29.1)
Failed screening test	100 (70.9)
Contrast Sensitivity	
Passed screening test	13 (10.7)
Failed screening test	108 (89.3)

Table 4
Vision Screening Results for Distance and Near Vision and Contrast Sensitivity by MMSE Score and Number of Eye Conditions

Characteristic	MMSE ^a				# Eye Conditions			
	>23 (N=84)		23 (N=57)		0-1 (N=132)		2+ (N=12)	
	Better Eye	Worse Eye	Better Eye	Worse Eye	Better Eye	Worse Eye	Better Eye	Worse Eye
Distance visual acuity, No. (%)								
20/40 or better	52 (65.82)	27 (34.18)	28 (53.85)	12 (22.22)	76 (62.81)	36 (29.27)	5 (45.45)	4 (36.36)
Worse than 20/40 but better than 20/200	23 (29.11)	34 (43.04)	22 (42.31)	31 (57.41)	39 (32.23)	60 (48.78)	6 (54.55)	5 (45.45)
20/200 or worse	4 (5.06)	18 (22.78)	2 (3.85)	11 (20.37)	6 (4.96)	27 (21.95)	---	2 (18.18)
Distance visual acuity, logMAR, mean (SD)	0.32 (0.32)	0.57 (0.41)	0.33 (0.28)	0.60 (0.39)	0.31 (0.30)	0.58 (0.40)	0.39 (0.30)	0.59 (0.41)
Near visual acuity, No. (%)								
20/40 or better	45 (55.56)	27 (33.33)	21 (39.62)	11 (20.75)	63 (51.22)	36 (29.27)	4 (33.33)	3 (25.00)
Worse than 20/40 but better than 20/200	33 (40.74)	34 (41.98)	28 (52.83)	30 (56.60)	54 (43.9)	58 (47.15)	7 (58.33)	6 (50.00)
20/200 or worse	3 (3.70)	20 (24.69)	4 (7.55)	12 (22.64)	6 (4.88)	29 (23.58)	1 (8.33)	3 (25.00)
Near visual acuity, logMAR, mean (SD)	0.36 (0.27)	0.62 (0.44)	0.43 (0.30)	0.66 (0.42)	0.37 (0.28)	0.63 (0.43)	0.53 (0.32)	0.69 (0.43)
Contrast sensitivity, No. (%)								
1.80	---	---	---	---	---	---	---	---
1.50 but <1.80	29 (39.73)	9 (12.33)	12 (25.53)	4 (8.51)	39 (35.14)	13 (11.71)	2 (20.00)	---
1.20 but <1.50	33 (45.21)	28 (38.36)	21 (44.68)	18 (38.30)	50 (45.05)	45 (40.54)	5 (50.00)	2 (20.00)
0.90 but <1.20	8 (10.96)	16 (21.92)	10 (21.28)	13 (27.66)	16 (14.41)	24 (21.62)	2 (20.00)	5 (50.00)
0.60 but <0.90	2 (2.74)	9 (12.33)	2 (4.26)	4 (8.51)	3 (2.70)	11 (9.91)	1 (10.00)	2 (20.00)
0.30 but <0.60	1 (1.37)	2 (2.74)	1 (2.13)	2 (4.26)	2 (1.80)	4 (3.60)	---	---
<0.30	---	9 (12.33)	1 (2.13)	6 (12.77)	1 (0.90)	14 (12.61)	---	1 (10.00)
Contrast sensitivity, log sensitivity, mean (SD)	1.39 (0.24)	1.06 (0.48)	1.26 (0.33)	1.02 (0.47)	1.35 (0.28)	1.05 (0.48)	1.22 (0.24)	0.97 (0.40)

^aMini Mental State Exam, normal range 24-30, 23 indicates cognitive impairment

Table 5
Summary of Multiple Regression Analyses for Variables Predicting Visual Acuity and Contrast Sensitivity

Predictor Variable	Distance VA			Near VA			Contrast Sensitivity		
	Better Eye beta	Worse Eye beta	p	Better Eye beta	Worse Eye beta	p	Better Eye beta	Worse Eye beta	p
MMSE#Score	-0.01	0.32	0.15	-0.03	0.004	0.08	-0.05	-0.03	0.20
# Eye Conditions	0.07	0.08	0.43	0.10	0.21	0.38	0.07	0.12	0.56
R ²	0.03	0.02		0.06	0.02		0.07	0.01	
Adjusted R ²	0.01	0.00		0.05	0.01		0.05	0.00	
F(df)	1.69 (2, 128)	1.13 (2, 130)		4.39 (2, 131)	1.66 (2, 131)		4.26 (2, 117)	0.85 (2, 117)	

^aMini Mental State Exam, normal range 24–30, 23 indicates cognitive impairment