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Vision Loss Among Delaware Nursing Home Residents

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Abstract

Objectives: To determine the prevalence of vision loss among Delaware nursing home residents for further data collection to expand the existing evidence about the vision loss among nursing home residents on a national level. **Methods:** This cross-sectional study involved the statistical analysis of comprehensive eye examination records of 1,856 nursing residents residing in 20 Delaware nursing homes from 2005 to 2011. Descriptive statistical analyses were conducted to identify age-specific prevalence rates of vision loss (moderate-to-severe vision impairment and blindness). **Results:** The mean age of nursing home residents was 82.54 years (range: 65–111 years), and 61.70% were over the age of 80 years. The majority of nursing home residents were female (64.10%) and White (76.30%). The overall prevalence rates of moderate-to-severe vision impairment and blindness were 47.40% and 16.20%, respectively. **Discussion:** The high prevalence of vision loss among Delaware Nursing home residents indicates a demand for further data collection for expanding the existing evidence about the vision loss among nursing home residents on a national level.

Keywords

vision loss, nursing home, aging population, preventive eye care, vision-threatening age-related eye diseases

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Introduction

The following introduction addresses the effects that aging has on our society, concentrating on the role of vision health among elderly nursing home residents that represent an especially vulnerable population.

Life expectancy has increased dramatically in recent decades. Concurrently, birth rates have decreased steadily in most countries (United Nations, 2016). Generally accepted definition of older adults is 65 years or older (Centers for Disease Control and Prevention [CDC], 2016). The impact of expanded life expectancy is an exponential growth in the number of individuals over 65 years in the United States where the number has reached 46 million and is expected to exceed 74 million by 2030 (National Prevention Health, and Public Health Council, 2016). Several methods have been proposed to measure and assess the quality-of-life measures. When elderly people are discussed, the most appropriate measure is quality-adjusted life years that consider the number of disability-free life years (World Health Organization, 2016a). A measure of the quality of life for elderly people, specifically institutionalized patients, provide an essential representation of their cognitive and physical function. Cognitive and physical functions are key components of this formula because they facilitate an active and engaging lifestyle and promote optimal physiological adaptation to changing environments. To achieve successful aging, our emphasis should be placed on the avoidance of disease and disability (Kim & Park, 2016).

Vision loss is one of the top 10 disabilities in the United States (CDC, 2016). The prevalence of vision loss is expected to increase twofold from 2010 to 2050 due to the aging of the U.S. population (CDC, 2016). Cataract, age-related macular degeneration, glaucoma, and diabetic retinopathy are widely recognized as the leading contributors to vision impairment and blindness. There are numerous treatment modalities currently available to prevent or delay vision loss due to age-related eye diseases (AREDs; Bourne et al., 2013; Gohdes et al.,

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2005; Hyman, 1987; Kini et al., 1978; Klein et al., 1991; Lee et al., 2015; Munoz et al., 2000; Pascolini & Mariotti, 2012; Stevens et al., 2013; Tielsch et al., 1990; World Health Organization, 2016b; X. Zhang et al., 2010).

Vision impairment, defined as correctable and uncorrectable blindness and low vision, is a crucial factor underlying health outcomes. It is considered most costly to human health, human capital, and the U.S. economy (Bourne et al., 2013). It is estimated that the total annual economic burden of vision loss is US$139 billion. Direct costs are US$66.8, and indirect costs are US$72.2 billion. Based on the prevalence of vision impairment and blindness, the cost of low vision alone is US$99 billion (US$15,900 annually per person). The average cost of a medical condition is US$3,432 per year. Among the medical diagnoses, blindness or low vision is the most costly condition at US$6,680 per year. The 65+ years age group incurs most of the costs. The cost of long-term care attributable to vision impairment and blindness for persons 65 years and older is US$20.2 billion (Prevent Blindness America, 2016). As the U.S. population ages, the social and economic burden of health care will increase dramatically. Increased health care costs drive the need for diverse public health strategies (Grover, 2017).

Our health care priorities must shift from infection and acute care to long-term disease care and the management of disabilities—thus creating a significant challenge for future health care systems and providers (Bourne et al., 2013). Regular access to eye care could lead to earlier recognition of AREDs when treatment is most effective and more cost-effective (Sloan et al., 2014; World Health Organization, 2016a, 2016b). The primary prevention of vision impairment is an essential goal of public health, and these services and treatments must be made affordable for the vulnerable populations (CDC, 2016; Grover, 2017; Sloan et al., 2014; World Health Organization, 2016b). This requires federal and state support in cooperation with public–private partnerships (Grover, 2017).

There are approximately 1.7 million licensed beds in 15,600 nursing homes in the United States and the vision care needs are exceptionally high for these residents. Eye care is not mandated in nursing homes in the United States (CDC, 2013–2014). Prior studies have found that the prevalence of vision loss is substantially higher in nursing home-populations than an age-matched control of ambulatory patients in the United States (Friedman et al., 2004; Monaco, 2009; Owsley et al., 2007; Tielsch et al., 1995; Voytas et al., 2004; West et al., 2003; Whitmore, 1989; Wingert et al., 1992). There are a number of barriers to adequate eye care in nursing homes in the United States: patient or family reticence, institutional resistance, and lack of community support. There is a conception among families and caregivers that vision care is of less value to these patients because of the complexities and co-morbidities that they suffer. A large portion of the visual ailments suffered by nursing home residents could be managed and treated if access was facilitated. Most nursing homes in the United States do not have a plan for eye care services for their residents, despite established clinical practice guidelines. The guidelines specify eye care, treatment, and management of endemic eye diseases suffered by nursing home residents (Monaco, 2009).

Vision impairment and blindness due to AREDs are associated with significant co-morbidities including compromised quality of life, mental health conditions, decreased physical activity, falls, and mortality (Carabellese et al., 1993; Christ et al., 2014; Crews et al., 2014; Dev et al., 2014; Evans et al., 2009; Fong et al., 2013; Gillespie et al., 2012; Hodge et al., 2007; Hong et al., 2013; Knudtson et al., 2006; Loprinzi et al., 2015; Marx et al., 1992; McCarty et al., 2001; Mitchell & Bradley, 2006; Noro & Aro, 1996; Salonen & Kivela, 2012; Willis et al., 2012; Yamada et al., 2016; T. G. E. Zhang, 2016; X. Y. Zhang et al., 2015; Zheng et al., 2015).

Vision impairment affects nursing home resident's social life and physical, psychological, and emotional well-being (Noro & Aro, 1996). Increased severity level of vision impairment was associated with poorer health-related quality of life (Carabellese et al., 1993; Crews et al., 2014).

Nursing home resident's activities of daily living are significantly dependent upon the presence of the highly prevalent vision-threatening AREDs such as cataract and age-related macular degeneration that cause central vision loss (Marx et al., 1992). The effect of vision impairment in physical activity is comparable to other serious medical ailments (Willis et al., 2012). In general, there is a higher prevalence of falls among older adults with severe vision impairment (Crews, 2016).

Vision correction plays a role in preventing falls, and single-vision glasses with distance correction significantly reduce falls related to outside activities (Gillespie et al., 2012; Zhang et al., 2015).

Moderate-to-severe vision impairment (MSVI) is also associated with a significantly increased risk of mortality (Christ et al., 2014; Fong et al., 2013; Hong et al., 2013; Knudtson et al., 2006; McCarty et al., 2001; Yamada et al., 2016; T. G. E. Zhang, 2016). It is well documented that access to adequate vision care is vital in maintaining the independent functional quality of life among older adults across care settings (Marx et al., 1992; Noro & Aro, 1996).

This study is one of the largest clinical eye care studies of nursing home residents and uses a unique database of full comprehensive eye exam records of 1,856 patients. These records, to the best of author's knowledge, provide the most current population-based assessment and quantification of endemic vision loss experienced by nursing home residents in the United States.

Method

Research Question

Is the prevalence of vision loss among elderly Delaware nursing home residents high, indicating a demand for further data collection for expanding the existing evidence about the vision loss among nursing home residents on a national level?

All patient data were initially de-identified, and the institutional review board at Salus University in Philadelphia approved the study for exemption of a project involving human subjects.

Setting

This cross-sectional study involved the statistical analysis of data from comprehensive eye examination records of 1,856 nursing home residents aged 65 to 111 years from 20 nursing homes in Delaware between the years 2005 and 2011. All data were received from an optometrist who provided the clinical data from these 20 skilled care facilities to be used for the research purposes of this study.

There were 48 nursing homes in northern Delaware in 2005. All nursing home facilities were contacted by the optometrist and offered the onsite comprehensive eye examination services, 20 elected to participate. The nursing homes in this study represented for-profit-, nonprofit-, or faith-based (Catholic) institutions. The size of the facilities varied from approximately 50 to 300 beds.

The following inclusion and exclusion criteria were established for the purposes of this study:

Inclusion criteria: Initial patient visits from 2005 to 2011 and patients aged 65 years and older.
Exclusion criteria: Repeated patient visits and patient records with missing data of the evaluated parameters (age, race, and visual acuity) and patients younger than 65 years.

Medical History

The patient history data recorded were obtained from medical records, thorough chart review, patient interviews, and nursing home staff interviews. Systemic diseases and previously diagnosed eye diseases were noted by review of the medical record.

Comprehensive Eye Examination

Comprehensive optometric eye examinations were performed on residents in 20 Delaware area nursing homes. All clinical assessments were done by the same optometrist (Doctor of Optometry) for providing the onsite comprehensive eye examinations to all nursing home residents that agreed to the eye exam. Medicare mandated guidelines of how patients were able to access for a comprehensive eye care exam were used: They were referred by the medical director of the facility, their primary care provider, self request, or the request of the responsible caregiver. All comprehensive eye examination data were recorded in an electronic health record format.

All eye exams were performed in an assigned exam room with the patient seated in a wheelchair, jerry or conventional chair, or at the bedside in the resident's room. Presenting distance visual acuity was measured with current eyeglasses or without if they were not used (permitting best initial visual acuity). Presenting near visual acuity was measured without the eyeglasses and/or with the current eyeglasses. For distance acuity measurement, a portable standard Snellen chart was placed at a 10-ft testing distance, and for near acuity, a standard near-point acuity card was used at a testing distance of 16″.

For residents who could not respond verbally, alternative methods of communication, like hand or head gestures or other verbal utterances, were used. The measured acuity was calculated for the adjusted test distance and recorded electronically in the eye exam record.

Ocular motility and integrity of the extraocular muscles were assessed with the cover test and motility testing with a penlight. Pupil functions were assessed with a penlight. Visual fields were assessed with confrontation visual field testing to detect gross visual field defects. Visual field loss was reported as central, peripheral, or quadrantanopia. Intraocular eye pressures were measured with the Reichert Tono-Pen. Anterior segment assessment was performed with a portable slit-lamp biomicroscope. Dilated posterior segment assessment was performed with a direct ophthalmoscope and binocular indirect ophthalmoscope using a 20-diopter condensing lens. Refraction was performed using the Welch Allyn Sure Sight Autorefractor in conjunction with trial frame and lenses. Supplemental tests included the Amsler grid, Ishihara color vision plates, Titmus Stereo Test, and fundus photography. Interventions were prescribed based on the individual patient assessment.

The intervention options included optical correction, in-house medical management or medical or surgical referral to a secondary provider, and follow-up care as needed.

Statistical Analyses

All statistical analyses were performed using SAS version 9.4 (The SAS Institute, Cary, NC). Descriptive statistics were used to examine age-specific prevalence rates of vision loss (MSVI and blindness).

Variables

Presenting aided or unaided (i.e., Rx not available) distance visual acuities were measured to quantify the age-specific prevalence of vision loss (MSVI and blindness)

Table 1. Data Categorization of Vision Loss.

Category heading	Data categories
Age (years)	65–69, 70–74, 75–79, ≥80
Normal vision to mild vision impairment	Is defined as presenting far visual acuity better than 6/12 (20/40) in the better-seeing eye.
Moderate-to-severe vision impairment (low vision)	Is defined as presenting far visual acuity worse than 6/12 (20/40) in the better-seeing eye (excluding the blindness).
Blindness	Is defined as presenting far visual acuity of 6/60 (20/200) or worse in the better-seeing eye.

among nursing home residents. National Eye Institute's (NEI, 2019) definition was used for defining vision loss. MSVI was defined as presenting far visual acuity worse than 6/12 (20/40) in the better-seeing eye (excluding the blindness). Blindness was defined as presenting far visual acuity of 6/60 (20/200) or worse in the better-seeing eye (Table 1).

Results

A total of 1,856 participants fulfilled the inclusion criteria of the study. Of these, visual acuity could be collected in 1,665 participants. The data could not be collected from 191 patients, mainly due to general health problems, such as cerebral stroke leading to insufficient responsiveness.

Demographics

The mean age of the nursing home residents was 82.54 years (range: 23–111 years). This report concentrates on elderly nursing home residents who were 65 years or older. The highest prevalence of nursing home residents was in the 80 years or older age group: 65 to 69 years 7.92%; age group: 70 to 74 years 10.77%; age group: 75 to 79 years 15.08%; and age group: ≥80 or older years 66.24%. The majority of nursing home residents were female (64.10%). The majority of nursing home residents were White (76.30%; Table 2).

Table 2. Percentage Distribution of Delaware Nursing Home Residents by Age, Gender, and Race.

Age (years) Prevalence rates	
65–69	7.92%
70–74	10.77%
75–79	15.08%
≥80	66.24%
Gender Prevalence rates	
Female	64.10%
Male	35.90%
Race Prevalence rates	
White	76.30%
Other	23.70%

Table 3. Age-Specific Prevalence Rates of Vision Loss by Age Among Delaware Nursing Home Residents.

Delaware nursing home residents	Moderate-to-severe vision impairment (%)	Blindness (%)
Age group (years)		
65–69	66.96	8.70
70–74	45.50	14.50
75–79	46.07	12.14
≥80	47.48	18.46

MSVI

The age-specific prevalence rates of MSVI among nursing home residents were 65 to 69 years 66.96%; 70 to 74 years 45.50%; 75 to 79 years 46.07%, and ≥80 years 47.48% (Table 3).

Blindness

The age-specific prevalence rates of blindness among nursing home residents were: 65 to 69 years 8.70%, 70 to 74 years 14.50%, 75 to 79 years 12.14%, and ≥80 years 18.46% (Table 3).

Discussion

We concentrated on elderly nursing home residents who were 65 years or older because the vast majority of nursing home residents are elderly patients, and the etiology of vision loss among younger and elderly patients are very different. Also, we used the NEI data for making national comparisons, and it does not include younger than 40 years old patients.

Our results suggest that there is a high prevalence of vision loss among elderly nursing home residents. The prevalence rates of vision impairment and blindness were substantially higher among Delaware nursing home residents compared to the United States elderly population of the same age (NEI, 2019). When people aged 80 years or older were compared, the age-specific prevalence rate of MSVI was 2.75 times higher among nursing home residents, and blindness was 2.20 times higher among nursing home residents (NEI, 2019 data: age-specific prevalence rates MSVI 17.26% and B 8.41%). NEI used best-corrected visual acuities in their analysis. We used presenting visual acuities because they offer a valid measurement of the existing status of the vision in a population. However, according to the latest U.S. population–based study, 33% of vision impairment was correctable with glasses (refractive correction; Munoz et al., 2000). Prior nursing home

studies found that correctable vision impairment varied from 3% to 37% and blindness from 0% to 20% (Grover, 2017; Sloan et al., 2014; Whitmore, 1989; Wiener & Tilly, 2002). These broad reported range differences suggest that other factors play a role in these previous outcomes. These factors might include study design, statistical analysis, and locations and types of nursing homes.

Nursing home residents typically suffer from multiple comorbidities that result in disability. Vision impairment may not cause severe subjective symptoms, especially in milder stages. This can be easily overlooked during the admission physical because of other life-threatening ailments requiring urgent attention take treatment priority. Eye care offers valuable information about the nursing home resident's ability to be engaged with activities of daily living, and it could play an important role in patient-centric multidisciplinary care for nursing home residents.

First, the sample nursing homes may not be representative of nursing homes in other areas. Second, while the population in this study closely represents the racial/ethnic composition of the average U.S. nursing home, Hispanic and Asian races were not well represented in the data.

We did not have information on the extent to which vision impairment and blindness might have been correctable solely by refractive correction. Additional research is needed to confirm these findings.

CDC (2016) recommends regular eye examinations for high-risk groups including diabetic patients, people with existing eye problems and people aged 65 years or older. According to our study findings, the vast majority of Delaware nursing home residents fulfilled at least two of these criteria. From a public health perspective, efforts should be made for maximizing ocular and systemic disease detection, eliminating avoidable vision loss, and providing the best possible eye care for people with eye diseases and vision loss.

Conclusion

Currently, most U.S. nursing home residents cannot easily access eye care. Desperately needed eye care services are not offered, and correctable vision loss is not managed systematically.

These study results are used to provide a means of awareness of the crucial need for the delivery of eye care in nursing homes. We hope that the results of this study may stimulate more research, on a national level, that further substantiates the critical need for eye care services in nursing homes in the United States.

We suggest that further clinical research is necessary to provide more data to expand our existing evidence of vision loss among nursing home residents in the United States. These data could be used to create evidence to guide action in the form of preventive eye care strategies for nursing home residents in the United States. Also, there are multiple access barriers for eye care to nursing home residents that should be considered based on future research if an action plan is created.

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