

## Visual Deficits and their Relationship to Falls/Fractures

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Research indicates that vision decline is directly associated with the aging process (Houde & Huff, 2003). Uncorrected vision decline has been found to be related to falls and fractures in the elderly. Further, when treatment is conducted, the incidence of falls and related injuries are decreased. This article will discuss the serious consequences of vision decline in older adults and the outcomes when the vision impairment is treated.

Correctable and treatable deficits which contribute to vision decline in aging include refractive errors, cataracts, macular degeneration, glaucoma and diabetic retinopathy (Stuen & Faye, 2003). Falls are a major source of death and injury in the elderly, with hip fractures being the most common, the most devastating and the most costly for the health care system to treat (Kannus & Khan, 2001). Fall related hip fractures in the elderly are higher in persons with visual impairment (American Geriatric Society, British Geriatrics Society & American Academy of Orthopaedic Surgeons Panel Falls, Prevention, 2001; Brannan *et al.*, 2003). Many studies have shown that poor vision is an independent risk factor for falls (Harwood, 2001). Research has shown that older people, who have vision impairment with a visual acuity less than that required for driving, double their risk for falls and hip fractures and are twice as likely to be admitted to nursing homes (Carnicelli, 2001). Simple refractory alterations and cataract surgery are two corrective interventions which impact positively on adverse events such as falls and fractures in this population group (Harwood *et al.*, 2005; Marx *et al.*, 1995).

### Population Aging

In Canada, the current population over the age of 65 is 13% and is projected to increase to over 23% by the year 2030 (Statistics Canada, 2001). The old-old, those persons over the age of 80 is expected to soar to 43% over the next decade to 1.3 million people largely due to increased life expectancy.

It is estimated that there will be an increase of more than 30% in health care expenditures by the year 2030, purely as a result of population aging (Hogan & Hogan, 2002). This will impact on the health care system as it stretches to meet the unique needs of an aging population. Aging changes related to vision and their impact on falls and fractures in this population group will place substantial pressure on the health care system (Hogan & Hogan, 2002).

### The Relationship between Visual Impairment and Health

Residents admitted to acute care centres due to falls and fractures have an alarming rate of correctable visual deficits (American Geriatrics Society, British Geriatrics Society, & American Academy of Orthopaedic Surgeons Panel on Falls Prevention, 2001, Brannan *et al.*, 2003). Almost half of the residents admitted to acute care centres from the community due to falls and fractures cannot go home due to the inability to be rehabilitated to their pre-fracture state. The hospital admission assessment does not include vision screening. Nor, does vision assessment normally take place during the hospitalization. Therefore, the role of vision in the older adults' fall or fracture is not considered or explored. These residents are often discharged to the personal care home (PCH) setting (Tibbitts, 1996).

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Studies indicate that the rates of eye disease and visual impairment among PCH residents is 3.3 times greater than any other segment of the population, including non-institutional-

ized persons in the same age group (Morer, 1994). Vision deficits in the PCH resident include cataracts, glaucoma, macular degeneration, diabetic retinopathy and refractive errors, which directly relate to aging (Horowitz, 1997). These vision deficits in the PCH resident have been linked to falls, fractures, disruptive behaviors and depression (Carnicelli, 2001; Horowitz, 1997; Houde & Huff, 2003).

Vision deficits are a major risk factor for falls in the elderly. In one study of elderly PCH residents, 19.3% of the falls required treatment for head injuries. Head injuries in the elderly are much more likely to give rise to intracranial bleeding or a cerebral contusion. The great majority of head injuries in the elderly would conventionally be regarded as minor in severity in younger patients who have excellent recovery. Unfortunately, elderly patients virtually never return to their pre-accident status.

Fall-related hip fractures are higher in patients with visual impairment (American Geriatrics Society, British Geriatrics Society, & American Academy of Orthopaedic Surgeons Panel on Falls Prevention, 2001; Brannan *et al.*, 2003). Vision plays an important role in the stabilization of posture by providing the nervous system with continually updated information regarding the position and movements of body segments in relation to each other and the environment. In a study conducted by Lord and Metz (2000), body sway increased by 20-70% when subjects closed their eyes while standing still. Greater sway was observed in the older participants. This study confirmed the importance of vision in the stabilization of posture in older people

Elderly women sustain 80% of all hip fractures from falls and, of all fall related fractures, hip fractures cause the greatest number of deaths and lead to the most severe health problems and reduced quality of life (Plouffe, 2003; Wolinsky, Fitzgerald, & Stump, 1997). Elderly persons admitted to acute care centres with fractured hips become more dependent on the health care system and 40% are admitted to long term care (LTC) facilities due to this dependency (Tibbitts, 1996). A major cause of hospitalization, disability and morbidity among seniors is unintentional injuries, usually resulting from falls (Plouffe, 2003).

## Economic Consequences of Uncorrected Visual Impairment

Vision impairment has been identified as one of the four leading causes of lost independence among older people. As discussed, there is a three-way link among the factors of aging, visual deficits and falls/fractures. Administrators, physicians, nurses, residents and families are not informed of the

effects caused by visual deficits in the elderly population. In Manitoba alone, of the \$819 million per year spent on unintentional injuries, 41% or \$335 million is related to falls; \$256 million per year is spent on direct costs of falls, with \$164 million of that devoted to treating falls among the elderly. It is estimated that about 40% of falls leading to hospitalization are the result of hip fractures, and that the number of hip fractures in Canada will increase dramatically from 23,375 in 1993 to over 88,000 cases by the year 2041 as the population ages (Papadimitropoulos, Coyte, Josse, & Greenwood, 1997). Injuries are often predictable and preventable. Through effective prevention strategies, lives, injuries and dollars can be saved. Falls among the elderly can be prevented by recognizing and targeting known risk factors through prevention programs (Smartrisk, 2003).

The National Advisory Council on Aging (1995) states that health care is determined by assessing how much benefit is gained by a service in terms of life extension and or improvement in quality of life. Vision care has not been viewed as a medically necessary service as it is not considered life threatening to lose one's eyesight. Research indicates that falls and fractures from falls are directly related to visual deficits in the elderly. Elderly persons admitted to acute care centres with fractured hips become more dependent on the health care system and 40% are admitted to LTC facilities due to this dependency (Tibbitts, 1996). A major cause of hospitalization, disability and morbidity among seniors is unintentional injuries, usually resulting from falls (Plouffe, 2003).

A report by the Manitoba Centre for Health Policy entitled *The Health and Health Care Use of Manitoba Seniors: Have They Changed over time?* (Menec, MacWilliam, Soodeen, & Mitchell, 2002) illustrates that hospitalization for hip fractures is considered an indicator of the health of a population. Unlike other hospitalizations, hip fractures show little variation across geographic regions and therefore reflect professional consensus on the need for hospitalization, rather than availability of beds or differences in physician practice patterns. Such hospitalizations are demand driven. The most common cause of injuries requiring hospitalization among seniors is falls. In 1999, it was found that 57% of falls leading to hospitalization involved fractures in Manitoba.

The trend of hip fractures in the elderly population can be interpreted as changes in the need for health care. Past trends for the older adult have not been significant until now with the impact of an aging population. An aging population is a trend which is timely. The cost effectiveness of vision care services to the older adult will need to be investigated. Currently a vision examination costs between \$50-\$70, cataract surgery costs \$1200, with surgery for a hip fracture costing \$38,000 or

more (Jacobs, Shanahan, Roos, & Farnsworth, 1999). Vision care for the older adult is efficient as demonstrated through a number of studies illustrating the positive impact of cataract surgery on quality of life and falls and fractures (Harwood *et al.*, 2005)

## Social Consequences of Uncorrected Vision Disorders

Older persons are considered to be under-served, disadvantaged and oppressed (Carlton-LaNey, 1997). Physicians and health professionals frequently dismiss the physical and medical complaints of the elderly which directly relate to age associated declines, specifically vision decline. A number of factors may account for the lack of vision screening conducted by professionals or considered by older adults. Some older adults think their failing eyesight is normal and that nothing can be done to help (Sullivan, 1983). In the general population, people are expected to self identify visual deficits and seek care independently. Elderly individuals often do not recognize their own visual decline and therefore do not seek care for correctable problems. Some elderly accept low vision as an inevitable consequence of aging and choose not to see optometrists or ophthalmologists. Others want to seek vision care but, due to social and financial situations, cannot (Evans & Rowlands, 2004). Many elderly are not aware of vision services that are available to them through government programs. An Australian study by Taylor *et al.* (as cited in Evans & Rowlands, 2004) discovered that half the persons in the study were covered under the Australian National health insurance program, but were unaware of it prior to the study.

### Reasons for Uncorrected Vision Disorders

- older adults do not recognize their visual decline
- financially unable to afford treatment
- unable to obtain transportation
- lack of knowledge of treatments available
- lack of knowledge of visual deficits and aging
- unaware of health insurance coverage and its benefits
- lack of accessibility to vision care services in a PCH

## The Positive Outcomes of Vision Assessment and Treatment

In a screening and treatment program in Australia, residents who were assessed and treated for cataracts with surgery

presented a significant improvement in both visual acuity and depression when assessed at 4 months post surgery. This improvement was maintained at the one year post-surgery reassessment (Marx *et al.*, 1995). PCH residents benefit from cataract extraction and lens implantation showing both improvement in visual acuity and reduction in depression (Keller, Hejkal, & Potter, 2001). Cataract extraction has been linked to a decrease in the number of falls of elderly who reside in the PCH setting due to improvement in visual acuity. Evans and Rowlands (2004) in the United Kingdom, reviewed numerous vision screening studies which determined the prevalence of correctable visual impairment in older people in the UK. They successfully uncovered a startling finding. They found that in developed countries, between 7-34% of older people have visual impairment that can be simply treated with appropriate lenses. They concluded that annual vision screening of the elderly could be incorporated into the physician's annual health checkups.

### Positive Outcomes of Vision Services for Older Adults

- increased visual acuity
- decreased depression
- decreased frequency of falls
- increased independence
- increased self-confidence
- increased socialization
- decreased rates of hospital admission and PCH admission

Research indicates that there is a decrease in falls and fractures when appropriate vision care services are provided to residents who reside in the PCH setting (Carnicelli, 2001). A discussion paper presented at the Commission of the Future of Health Care in Canada indicated that elderly Canadians have limited access to services (Hogan & Hogan, 2002). Overall this leads to an underuse of the health care system and a 'false' perception of cost-saving. However, the inadequate accessibility and availability of services to the elderly results in a needless decline in health for the individual. Increasing accessibility and availability of services would most likely increase health care utilization and costs in the short term but may reduce health care costs in the long term due to delayed or preventable institutionalization (hospital admissions, emergency room visits, hospital length of stay and personal care home admission). Less expensive forms of health care services would be used and would be used less frequently. In an Ontario government statement to the legislature regarding long term care policy, a stipulation that seniors have a right to

fair and equitable access to appropriate services was brought forward (Nahmiash & Reis, 1991).

## Interventions

Treating and correcting visual deficits has proven to have a positive impact on falls and fractures (Carnicelli, 2001). The occurrence of fractures and depression decreases and there is an improvement in cognitive impairment when vision is recognized as a major risk factor for falls and is properly assessed and treated in the elderly (Tinetti, 2003). Faulty vision is a modifiable risk factor of falls and related injuries (Alexander, Rivara, & Wolf, 1992). The elderly in the PCH setting are at a high risk for falls and are at risk of having their eye problems overlooked (Stanforth, 2003). A decrease in falls and fractures directly impacts the health care budget by decreasing transfers to acute care facilities, admissions, surgical procedures, and rehabilitative services, and, in turn, admission to a PCH facilities (Lord, 2003).

Interventions aimed at reducing the number of falls of elderly persons have shown promising results (Kannus *et al.*, 1999). Simple targeted interventions in the PCH population for vision impairments can impact on the impairment itself and have broader impacts on functional status leading to a decrease in falls and fractures (West *et al.*, 2003). The Canadian Task Force on the Periodic Health Examination states that there is fair evidence to include in the periodic health examination, visual acuity testing with a Snellen sight chart for adults aged 65 years or older (U.S. Department of Health and Human Services, n.d.). Acuity can be improved for most patients with refractive errors (Foran *et al.*, 2003; Jack *et al.*, 1995; Liou *et al.*, 1999; Reidy *et al.*, 1998; Taylor *et al.*, 1997). Some cases of age related macular degeneration can benefit from PDT (Fletcher, Donoghue, & Owen, 2001). Glaucoma (Reidy *et al.*, 1998) and diabetic retinopathy (Prasad, Kamath, Jones, Clearkin, & Phillips, 2001; Rhatigan *et al.*, 1999) can both be treated if diagnosed early. Primary care optometric services are widely available in the community. Eye care services are widely advertised, although the emphasis on products rather than care may be counterproductive (Evans & Rowlands, 2004). However, optometric services within the personal care home setting are rare and as illustrated in this article are needed.

## Conclusion

Treatable and correctable visual deficits for residents who reside in the PCH setting include cataracts, macular degeneration, glaucoma, diabetic retinopathy and refractive errors. These deficits will remain linked to falls, fractures, as well as the reason for PCH placement, if interventions are not implemented for this population group (Carnicelli, 2001)

*References will be available upon request.*

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