Vision in Aging: A Focus on Falls and the Driving Debate

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The Low Down on Falls in Older Adults and the Optometrist’s Role

Outline
• Definitions
• Epidemiology
• Causes of Falls
  ▫ Why more in older adults
  ▫ Risk factors
  ▫ Visual risk factors
  ▫ Falls and spectacle wear
• Intervention studies
• Falls prevention programmes
• Falls management – the Optometrist’s role

Falls
“Unintentionally coming to rest at on the ground, floor, or other lower level other than as a consequence of sustaining a violent blow, loosing consciousness, sudden paralysis as in a stroke or seizure”

The extent of the problem
• 30% of those 65 and older fall at least once per year
  ▫ 60% of nursing home residents
• Consequences of falls
  ▫ Psychological
  ▫ Physical
• Minor falls – snowball effect → fear of falling → less activity → deconditioning → more prone to falls
• A senior who has a fall is 3x more likely than others to fall again
• Cause of premature nursing home placement
  ▫ “anyone who has fallen in the last year is one fall away from nursing home placement”

The personal cost
- Minor fall
  - Fear of another fall
    - Go out less, walk more slowly
    - Reduced quality of life
    - Depression and less active
    - More at risk of another fall
- Major (injurious) fall
  - Hip fracture
    - Hospitalised
    - Loses more strength and function
    - At risk for another fall or of pneumonia, thrombophlebitis
    - Best outcome – moved to a nursing home
    - Worst outcome - death
• Falls are the leading cause of injury in 65+
  ▫ Head trauma
  ▫ Hip fractures

• 35% of fallers between the ages of 65 and 70 years experience severe injuries
  ▫ 76% in the 80+ age group

• Increased mortality
  ▫ 20% of those who fall and fracture a hip will die in 12 months
  ▫ 84% of accidental deaths in elderly due to falls

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**Health Care Cost of Falls**

**Hospital Admissions**

• Over 50% of all trauma admissions in Ontario are caused by falls (in comparison, motor vehicle accidents account for only 13%)
• In patients over 65, over 80% of trauma admissions are caused by falls.

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Cost in $

• In 2000, falls in older adults cost US health care over $30 billion in 2010 dollars (CDC)
• In 2009, emerg. depts. treated 2.4 million non-fatal fall injuries in older adults (CDC)
• One fall costs Medicare $9,000-13,500.
• In one Ontario acute-care hospital, the cost of a serious fall in the hospital is $30,000 (Zecevic et al. 2012)

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**Why are falls more common in the elderly?**

• Balance is maintained by input from proprioreceptor, vestibular and visual systems
• Less input from vestibular and proprioceptive systems with age
  ⇒ Older adults rely more on vision
  ▫ In women this increased reliance may happen as early as 50 years
  ▫ When vision disrupted → more sway
• Video and demonstration

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• Once balance is lost
  ▫ Changes in strategies to avoid a fall
    ▫ Slower reaction time
    ▫ Less physical strength
    ▫ Elderly shift from hip strategy, to step strategy to loss of ability to prevent.

• More injurious
  ▫ Osteoporosis → more likely to sustain fracture
Cause of falls is multifactorial - Risk factors for falls

Interaction of the person with the environment

Biological and medical
- Age, female sex
- Muscle weakness and reduced physical fitness (4x)
- Physical disability
- Balance (postural instability), gait or mobility problems
- Slower balancing reactions
- Chronic medical conditions (history of stroke (especially hemiparesis), Parkinson’s, arthritis, heart disease, neurological conditions, arthritis, hypotension, COPD)
- Vision changes
  - Hearing loss
  - Vertigo
  - Loss of sensation in feet and limbs (peripheral neuropathy)
  - Acute infection (immobility → weakness, bone density)
  - Impaired cognition (delirium and dementia)
  - Depression
  - Pain
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Behavioural
- History of previous falls
- Risk taking behaviour (climbing, sports, rushing, not attending, not using walker etc)
- Medications (sedatives, psychotropic, antidepressants, diuretics, antihypertensives)
- Anticoagulants may ↑ risk of damage
- Polypharmacy
- Poor footwear, clothing, bags
- Fear of falls

Environmental
- Poor lighting
- Slippery or uneven surfaces
- Loose carpets
- Stairs (steep, narrow, irregular, unmarked edges)
- Floors (glary, patterned)
- Poor accessibility (switches, cupboards)
- Clutter and obstacles
- Long distance to washroom

Socio-economic
- Income
- Education
- Housing
- Social connectedness

Rate of falls increase from 27% for those with 0 or 1 risk factor to 78% for those with 4 or more factors

Home is the most common place for falls (47%)
- And 26% on the stairs (44% slip, trip and stumble on any surface)

What aspects of vision are associated with falls/balance/hip fractures?

- VA
  - poor VA increases risk of falls by 1.5-2.0
  - Also associated with poor balance and hip fractures
  - Intercocular differences may be more significant than moderate monocular loss
- CS
  - General agreement that CS is a factor for falls and increased sway
- Stereopsis
  - Implications of monovision
  - Poor BV linked to poor balance

Visual fields
- Binocular field loss associated with increased sway
- Field loss in the inferior region in glaucoma → more falls and more injurious falls (Black et al CNS 2013)
- More field loss = more fear of falling

Visual impairment

• Other possible risk factors
  ▫ Visual attention
    • Not definitely related to falls yet, but related to mobility, balance, walking tests
  ▫ Visuospatial vision
  ▫ Eye movements
  ▫ Light/dark adaptation
  ▫ Glare sensitivity


• Ocular disease
  ▫ Cataract increases risk of falls
    • PSC
    • Studies don’t agree with regard to other types of cataract
  ▫ Glaucoma
    • Earlier studies disagree
    • Best study to date – Black et al (2011)
    • topical beta-blocker not associated

• Falls and spectacle wear
  ▫ ARM – not specifically linked (although secondary association, because of VA loss)
  ▫ Diabetes – polyneuropathy is associated, but not DR itself

• Falls and vision intervention
  ▫ First eye cataract surgery reduced falls by 34% and fractures by 67% (Harwood et al, 2005)
  ▫ Brannan et al (2003) found it reduced falls by 69%
  ▫ 2nd eye cataract surgery had no effect (Foss et al 2006)

Falling fails and fractures more frequent in the intervention than in the control group in first 6 months, but no diff in 2nd 6 months
  • only 44% of the intervention group actually received any therapy and only 30% received new glasses
  • 72% of the control group visited their optometrist or ophthalmologist

Results explained by
- changes in behaviour, adaptation time to specs, less reporting of falls in control group
- Slight trend that greater changes → more falls risk
Discussion: “It is not possible to reach any firm conclusions from the present study. A serious flaw in the design was the failure to provide any form of intervention to the control group”
Abstract: “Falls occurred more frequently in the group randomized to receive the vision intervention (65% fell at least once; 758 falls in total) than in the control group (50% fell at least once; 516 falls in total).”

The difficulties of conducting vision intervention for falls

- Elliott and Chapman (2010), Chapman et al (2011); It’s the magnification differences that cause the miss-stepping.

- Haran et al (2010); RCT of SV specs for outdoor wear.
  - No overall effect
  - But sub-analysis – falls were reduced in those who regularly exercised outside.
  - Note – they also prescribed tints!
  - But a sig increase in falls in those who did little outside activity

- Vision intervention as part of a multiple-component intervention
  - Whitehorse trial (Day et al, 2002, Fitzharris et al 2010); “vision intervention” seems to help in combination with exercise and home hazard management.

Falls prevention programmes
- Reduce the risk factors
  - Falls evaluation (assessment) for older adults who
  - Present for medical attention for one or more falls
  - Report recurrent falls in the last year
  - Demonstrate abnormalities of gait or balance

- Falls assessment
  - Case history
  - Examination of
    - Vision and hearing
    - Gait and balance
    - Neurological exam
    - Lower extremity function
    - Cardiovascular
    - Review of meds

Public Health Agency of Canada, Report on Senior’s Fall, 2005

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### Interventions
- Exercise (Tai Chi and Wii fit)
- Treatment of contributing health conditions
- Modification of meds
- Home modifications
  - Especially for those with VI
- Vision and hearing assessment
  - Seniors often underestimate loss of VA
  - Assistive and protective devices
  - Education and behaviour modification

### The optometrist's role

#### Prevention of falls
- **Optometrist role**
  - Be aware of those at risk
  - Ask patients about falls
    - Have you fallen in the last 6 months, 3 months, 1 month?
    - How many times?
    - Worried about falling?
    - Difficulty with mobility? Glare? adapting to lighting changes?
    - When using which glasses?

#### Observe patient
- Walking,
- State and fitting of spectacles
- vision assessment
  - CS
  - Stereoacuity
  - BV

#### Prescribing considerations re falls
- Don’t give large power changes (≥0.75D)?
- Don’t give new PALS or bifocals to the elderly, especially those at risk of falls
- Those adapted to PALS – give soft design or short corridor
- Or SV for outside house, multifocal inside
  - 40% reduction in falls with additional pair of SV for outside
  - But for chair bound - no difference
- Or take out of PALS/bifocals altogether
- Take out of monovision, if at risk of falls
- Frame that doesn’t impede peripheral vision

#### More careful counseling regarding adaptation
- Adapt to new glasses in house
- Re-educate about bifocals/PALS
  - Emphasis looking over bif. or PAL for stairs
- Educate about removing readers when walking
- Tint for light adaptation/glare reduction
• Tints to reduce glare

• Management of disease
  ▶ Refer for cat. surgery, especially first eye surgery
  ▶ Screen/manage glaucoma, diabetes
  ▶ Remember that falls linked to
    ▶ peripheral neuropathy in diabetes - counseling

• Home is the most common place for falls
  ▶ And 26% on the stairs (44% slip, strip and stumble on any surface)

  Therefore, discuss environmental modifications
  ▶ Ensure that a family member there

• Increase contrast

  • AFB Vision Aware
    Resources for Independent Living with Vision Loss

  • Reduce busy patterns and clutter

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Lighting
  ▶ At night, hallways and stairs
  ▶ Good, even illumination with some task lighting
• Handrails

• Throw away old throw rugs

- Education and awareness
- Mohammed’s story
- One finger contact

- Future interventions
  - Training for visual attention
- Communicate with family doctor

- Referrals to OT, O&M, Audiologist, home nurse, community care programmes

- Consulting

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