Falls and Vision

Vision and Ageing

• Neural processes slow down

But also………..

• Speed of older person moving through the environment

Visual Impairment

Increased prevalence of visual impairment with age

Source: Vision 2020
www.vision2020australia.org.au
Indigenous Information

• >40 years old, Aboriginal and Torres Strait Islander people have 6 x the rate of blindness of other Australians.

• 35% of Indigenous Australian adults report they have never had an eye examination.

AIHW 2011

For Aboriginal and Torres Strait Islander adults

• The most common cause of bilateral blindness was cataract (32%)
• The most common cause of low vision was uncorrected refractive error (54%)

• Other main causes are diabetic retinopathy, trachoma, optic atrophy, and trauma

AIHW 2011
Vision as a falls risk factor

- People with a vision impairment have:
  - twice as many falls
  - three times the risk of depression and
  - the risk of hip fractures increases eight fold.

Lord et al
**Balance**

**SENSORY**
- Vision
- Vestibular
- Somato-sensory

**CENTRAL INTEGRATION**
- Coordination
- Strength
- Range of motion
- Reaction time

**MOTOR**

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**Visual Acuity**

- Poor fine-detail vision

- Conflicting results from studies (Yes & No) for impact on falls
- ?linked to balance impairment for other reasons
- ?linked to age
**Edge Contrast Sensitivity**

- Detect edges under different contrast conditions
- Real world – detect ground level hazards
- May have greater effect on falls risk than poor visual acuity and reduced visual field size

**Depth perception (or Stereopsis)**

- Judge distances accurately
- Spatial relationships
- Important avoid obstacles and hazards
- One good eye and one bad may be more difficult than 2 moderately poor eyes!
Visual Fields

• Early studies – little association between falls and visual field loss

• But more recent studies have shown visual field loss is an important risk factors falls and fractures

Postural Sway linked with Vision Motion

• Any deficit or delay in the processing of transient or moving visual information may increase the risk of postural instability and falls.
Causes of Visual Impairment

- Refractive Error
- Eye Disease
  - Macular degeneration – greater risk of falls and 2x the rate of injurious falls
  - Cataracts
  - Glaucoma
  - Diabetic Retinopathy
  - Trachoma

Macular Degeneration

Source: Vision 2020
www.vision2020australia.org.au

Cataract

Source: Vision 2020
www.vision2020australia.org.au
Glasses

• Important to have glasses with appropriate prescriptions

• Inappropriate glasses can be a falls risk
  – Lead to inappropriate stepping and gait adaptations

• Multifocal glasses can add to this risk by impairing contrast sensitivity, depth perception, and ability to negotiate obstacles

Refractive correction ATSI

• ~21,000 Aboriginal and Torres Strait Islander adults - distance correction

• ~41,000 - near vision correction.

• Need a new pair of glasses about once every second year.

• One study - for 1 in 3 people with vision problems, it had been 3 years or more since their last consultation.
Vision and Obstacles

- Combination of visual input and postural control to respond to the presence of a hazard
- Multifocal glasses - ability to negotiate obstacles (lower lens blurs the field).
- Depth perception and head movements vital to negotiate obstacles (particularly in dual task)

Menant 2010

Interventions that work to prevent falls

Vision check

- Regular vision review
Cataract Surgery

- COCHRANE 2012: “First eye cataract surgery reduced the rate of falls in women but second eye cataract surgery did not.”

Second cataract surgery does improve visual disability and general health

Harwood 2005, Foss 2006

Provision of New Glasses

Provision of single lens glasses for outdoor use can decrease falls

BUT….. may be harmful for those who wore multifocal glasses and had low levels outdoor activity

Haran et al 2010

Provision of New Glasses

Sometimes providing new glasses can increase falls:

- People may need time to adapt to their new glasses, often with significantly altered prescriptions
- People may adopt more risk-taking activities (thus increasing the exposure to falls) after their vision improvement with new glasses.
Interventions that work to prevent falls

Home safety for visually impaired

- Home safety program (removal and modification of hazards, increased awareness to hazards, reduced exposure to risk) reduced falls in people with severe visual impairment

Interventions that may work to prevent falls – no evidence as yet:

- Clean Glasses
- Use of virtual reality technology

What does a person with visual impairment see?

(acknowledgements to the 2014 *New York Times* article - Bracing for the Falls of an Aging Nation, Katie Hafner)