Visual Impairment, Falls Management: the evidence
Objectives

- Prevalence
- Anatomy
- Cataracts
- Glaucoma
- Diabetic Retinopathy
- Macular Deg
- Trachoma
- Round up of evidence
- What can we do as health professionals
- Experience vision impairment
- [http://www.youtube.com/watch?v=v9CawJSUy2c](http://www.youtube.com/watch?v=v9CawJSUy2c)
Definition of Visual Impairment

- Vision loss that constitutes a significant limitation of visual capability resulting from disease, trauma or a congenital or degenerative condition that cannot be corrected by conventional means such as refractive correction or medication

- 4 Levels

  - Normal
  - Moderate Imp
  - Severe Imp
  - Blindness

Low Vision
Sight is the sense that most people fear to lose.
Australia\textsuperscript{2}

- 575,000 aged 40 and over vision impaired (\(\uparrow39\%\) by 2020)
- 66,500 are blind (\(\uparrow55\%\) by 2020)
- Eye care cost will double
- 75 per cent of vision loss is preventable or treatable.
- The total cost of vision disorders in Australia is estimated to be $9.85 billion in 2004\textsuperscript{3}
Five conditions responsible for 80 per cent of vision impairment in Australia²:
Aboriginal Vision Impairment

- Blindness rates in Indigenous adults are six times higher
- Vision impairment nearly three times
- 94% of vision loss among Aboriginal and Torres Strait Islander people is preventable or treatable
- 35% of adults have never had an eye exam.
- 33.4% have long term eye/sight problem
Vision Loss Indigenous

- Refractive Error: 39%
- Diabetic ED: 36%
- Cataract: 3.1%
Trachoma

- Australia is the only developed country in the world where trachoma is endemic.
- Despite falling rates in this country, it still affects 60% of outback Indigenous communities.
Western Australia

- 30% Aboriginals have long term eye/sight problem
- > 40,000 have a vision impairment
Vision and Falls\textsuperscript{2}

- Suffer twice as many falls, often leading to hospitalisation
- Lose confidence in their ability to manage everyday life
- 3x the risk of depression
- Admitted to nursing homes up to 3 years earlier than those without vision impairment.
- Hip # - 33% visually impaired
- 58% \(\downarrow\) distance visual acuity
Vision and Falls

- One of 4 sensory mechanisms that detect balance disruption
Anatomy of the Eye

Cones and Rods

Vitreous Body
Macula
Blood Vessels
Optic Nerve
Sclera
Choroid
Retina
Suspensory Ligament of Lens
Lens
Anterior Chamber
Iris
Cornea
Pupil (the opening in the Iris)
Posterior Chamber
Ciliary Body and Muscle

Cones and Rods
Cataract

- Cataract is the clouding of the lens
- Limits the amount and clarity of light
- By the age of 80 almost all of us will have some degree of cataract formation.
Cataract Symptoms

- Hazy vision
- Problems with glare
- Difficult to see stair edges, kerbs
- Streaks of light come from light sources
- Print is faded lacking in contrast
- Colours fade or change e.g. blue to green, white to beige, yellow to white
Treatment

- Strong glasses, magnifiers
- Surgery, - cloudy lens removed and replace with intraocular lens implant
- Day procedure
- After surgery 85% of people have vision good enough to drive
Glaucoma

- Eye drainage canals become clogged and pressure builds up.
- This slowly progressively damages the optic nerve and retina.
Optic Nerve Damage in Glaucoma

Healthy Optic Nerve

Damaged Optic Nerve due to intraocular pressure
Glaucoma Symptoms

- Painless, blurred vision
- Loss of peripheral vision
- Difficulty adjusting to low light
Glaucoma

Diagnosis

- Early detection important
- Routine examinations major factor in detection
- Should have regular eye tests from age 40
Treatment is to control eye pressure

- Eye drops – pilocarpine, propine, timolol, xalatan
- Laser treatment (dependant on type of glaucoma)
- Surgery - to create a channel to bypass the filter mechanism of the eye.
“You should have come in sooner.”
Macular Degeneration

- Most common cause of vision loss in people over 60
- Affects central vision
- Peripheral vision remains intact
What is the Macula?

- The finest blood supply in the body
- Central area of retina
- Macula controls central vision, colour and daylight vision
Images of Macular Degeneration

Normal Macula

Macular Degeneration
Symptoms – dry macular degeneration
• Blurred distorted central vision
• More light needed for reading
• Colour vision reduces
• Objects fade and disappear
• Difficult to recognise faces

Symptoms – wet macular degeneration
• Objects wavy, distorted
• Sudden rapid decrease in central vision
• Blind spots appear

Diagnosis
Regular eye tests as drusen can be seen before symptoms develop
Late stage Wet Macular Degeneration
Late stage  Dry Macular Degeneration
Diabetic Retinopathy

- The leakage of fluid or blood into the retina
- By abnormally varying levels of blood sugar
- Blurred and hazy vision
- 90% chance of developing eye disease if diabetes is not kept in strict control
- Treatment is laser to seal off leaking vessels and destroy abnormal ones
Normal Retina

Diabetic Retinopathy
Diabetic Retinopathy
Effects of Vision Loss

- Sight is the sense that people most fear losing
- Considerable financial, social costs,
- Can shorten life,
- Restrict social communication
- Restrict social participation, independence,
- Reduces confidence in new environments (FOF)
- Impair physical and mental health
- Need more light to see detail and colour
- People with visual impairment have higher use of social services and higher admission rate to nursing homes
How it contributes to a risk of falling.

- Unable to process light properly
- Impaired vision means lack of balance
- Unable to see stairs, steps, curbs, objects in the way, depth perception
- Unreliable visual information
- Difficult to exercise and keep strong
- Loss of confidence, increase in fear
- Decreasing socialisation
- Uncertainty in movement
Adults with AMD significant association with falls and injuries. Reduced contrast sensitivity was significant association with both falls and injuries while reduced visual acuity only associated with increased falls.8

There is evidence that health inequalities exist and that older people from low socio-economic groups are less likely to avail themselves of primary care ophthalmic services. Severe visual problems are therefore more likely to remain unrecognised and untreated.3

Visual impairment is strongly associated with falls and hip fractures.2,3,4
Providing single lens distance glasses to regular users of multifocal glasses reduce falls by around 40% in older people who regularly took part in outside activities BUT – In frailer people, who spent more time inside, no significant difference was seen in falls inside and a significant increase was seen in falls outside. Need to careful consideration of the person’s mobility is important when discussing interventions with them.
Assessment

- Comprehensive vision and eye assessment with appropriate treatment does not reduce and may even increase the risk of falls and fractures. (Community Sydney)\textsuperscript{10}
- All older people undergoing a falls assessment should be screened for visual impairment\textsuperscript{3}
- Intervention group received comprehensive vision and eye examinations, falls occurred more frequently in this group. There may need to be considerable period of time to adjust to new eyeglasses and increased risk of falling during this time. Or improving vision might lead to changes in behaviour that increase exposure to fall-prone situations \textsuperscript{11}. 

Home modification/exercise programmes

- Home Safety program delivered by OT that has an additional strategy other than modification of home or equipment – reduced falls in VI\(^{12}\)

- Decrease in visual acuity as a result of a half mile walk test in 91 elderly people M age = 69yr\(^{13}\)

- A Cochrane Review on the effects of vision rehabilitation suggested that the use of low vision aids and also training in how to cope with their own environment led to improved quality of life, mood, self efficacy, well-being.

- The Otago exercise programme with vitamin D supplementation was not effective in reducing falls or injuries possibly due to low levels of adherence. Trial registration number ISRCTN15342873.\(^{14}\)
Patients with Central Vision Loss adopt a cautious gait strategy during tasks that present high risk of falling such as obstacle crossing. Differences are minimal in low risk conditions though. Reduced vision may weaken the vestibulo-ocular reflex contribution to balance. Impaired contrast sensitivity associated with postural instability, slower walking velocity, increased step width, reduced stride length. A study suggests that contrast sensitivity and visual field in patients with ARMD can lead to balance and mobility problems.
Compared obstacle course performance of a group that trained in visually driven body movements and agility drills, to a group that trained only in agility drills. Obstacle course performance results revealed that visual training had the greatest improvement on obstacle course performance (22%) following a 12 week training program. These results suggest that visual training may be an important consideration for fall prevention programs\textsuperscript{18}. 

Balance/Gait
WA study - Risk of Injurious fall requiring hospitalisation between 1\textsuperscript{st} and 2\textsuperscript{nd} eye cataract surgery doubled between 1\textsuperscript{st} and 2\textsuperscript{nd} eye cataract surgery compared the 2 years prior to 1\textsuperscript{st} surgery. 345 increase in injurious falls req hospitalisation AFTER 2\textsuperscript{nd} eye cataract surgery. Need for appropriate management at all points\textsuperscript{19}

Recent study (in WA)showed that first eye cataract surgery was associated with more hospital admissions from injuries due to a fall in the year after cataract surgery than in the year before \textsuperscript{21}. 
Systematic review on vision improvement and reduction in falls after expedited cataract surgery concluded that accumulating evidence indicates that expedited cataract surgery is effective in significantly enhancing vision but is inconclusive in preventing falls.\(^{22}\)

Removal of cataracts has been shown to decrease risk of a further fall. RCT involving 306 women aged over 70, showed that expedited cataract surgery (approx 4 weeks after diagnosis vs routine 12 months wait), showed a 40% reduction in risk of recurrent falls.\(^{23}\)
Glaucoma

- Older Asian population: having glaucoma increased risk of falling by four fold (3266 participants)\(^{24}\)
- Older adults with glaucoma have a significant postural sway thus reducing postural stability increasing risk of fall\(^{25}\)
- Bilateral VF loss from glaucoma assoc with greater FOF with an impact that exceeds numerous other risk factors. Screening and intervention required\(^{26}\).
Cost

- VI and B cause considerable economic burden for affected persons, their caregivers, and society at large, with increases with the degree of visual impairment. This review provides an insight into the distribution of costs and economic impact of VI & B (e.g., time spent by carers for people with vision 5.8 h/week up to 94 hours/week for people with ↓vision).
Depression

- **32.5%** of participants with VI had depressive disorder (twice the usual rate in the elderly) Depression strongly associated with both vision-specific and general disability scores \(^2\)\(^8\)
- **13.5%** of visually impaired had a score of 6 or more on the Geriatric Depression Scale (compared to 4.6% with good vision)\(^2\)\(^9\)
What can we do to help?

- Ensure lighting is adequate
- Reduce clutter around the bed
- Ensure patients have their spectacles & clean
- Use impaired vision signage
- Encourage patients to have regular eye tests
- Educate
- Encourage exercises to keep strong
- Encourage compliance with meds
- Ask patients – often not in history
Develop a pathway for vision assessment

Consider exercise?
GAD routine for severely VI patients?
Measure postural sway on those patients with Glaucoma – identify
What is an appropriate intervention to reduce the risk of falling post 1st cataract surgery?

Other ideas??????????
As this person is vision impaired please make your presence known by speaking

Please offer patients a choice of using a sign above their bed to indicate that they have a special need.

It is not mandatory for a sign to be used, unless one has been requested by the patient/carer family.

Please make an alternative sign for the patient if those offered are not acceptable.
Resources

- Vision Australia
- World Health Organization
- The Fred Hollows Foundation
- Australian Indigenous HealthInfoNet
- Independent Living Centres Australia
Thank You


5. 47270DO003_20122013 Australian Aboriginal and Torres Strait Islander Health Survey: First Results, 2012–13 — Australia Released at 11:30 am (Canberra time) 27 Nov 2013 


13. DeOliveira Fiho CW, Dias RG, Taveares GM, Santos GM, Mazo GZ. A half mile walk decreases visual acuity in active older people. 2010 Jun: 110 (3 Pt 2) : 1013-4


References


VISUAL IMPAIRMENT
INCREASED FALLS AND FRACTURE RISK

The Importance of Vision in Preventing Falls
There is a major problem of preventable or treatable visual impairment in Britain's older population. Visual impairment is defined as existing when the level of vision is below that which the individual requires for his or her everyday tasks.

A North London Study of 1547 people showed that 30% of the sample population aged 65 years and older were visually impaired in both eyes. Visual acuity of less than *6/12 or 20/40 is a common cut-off point used to define visual impairment.

More than 72% of this bilateral visual impairment could potentially be improved by surgery or spectacles.
Visual impairment is caused by a variety of conditions that *may or may not* coexist with refractive error.

Refractive error (ametropia) is where light entering the eye cannot be focussed - this can be resolved by the provision of spectacles.

One UK study found that 17% of visual impairment in the over 65s was solely related to uncorrected refractive error.

Another that over 30% of visual impairment in the over 75s was due to refractive error.

Refractive error can be resolved with spectacles.
Common conditions that cause visual impairment

1) Cataract
   - Lens has hardened and become cloudy

2) Diabetic Retinopathy
   - Burst blood vessels on retina cause blurred vision

3) Glaucoma
   - Optic nerve damaged by increased fluid pressure in the eye

4) Age-related macular degeneration (AMD)
   - Blank patch in centre of vision from damage to macula

Significant reduction of visual impairment may be attained with the application of current knowledge in refractive errors, diabetes mellitus, cataract and glaucoma

5) Visual field loss
   - Reduction in field of view of the outside world
Visual impairment is strongly associated with falls and hip fractures.

The rate of falls in older people with visual impairment is 1.7 times higher than other older people of the same age, with hip fractures 1.3-1.9 times higher.

Early cataract removal reduced falls by 34%.

A home safety assessment, modification and coping strategy programme delivered by an occupational therapist reduced falls by 41%.

- Poor contrast sensitivity and decreased depth perception appear to have strong associations with falls risk.
- Wearing incorrect prescription glasses, or not wearing glasses at all, when sight is failing can increase risk.
- There is also an association of increased risk with the wearing of bi-focals or multi-focal lenses.
Problems in take up and provision of services to improve visual impairment

Since April 1999 people living in the UK aged 60 and over have been eligible for a regular free NHS eye examination.

**Awareness**

It is important that older people and health care professionals are aware of what is available.

**Reluctance**

Older patients who become aware of visual difficulties may be reluctant to attend for a routine eye examination.

"I can’t afford it"

"I’m scared of bad news"

"It’s just part of growing old"

"I don’t like being examined"