

Geriatric Giants Lecture Series

FALLS

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DEFINITION OF FALL

“Unintentionally coming to rest on the ground, floor or other lower level with or without an injury”¹

FALLS ARE NOT PART OF NORMAL AGING!!

Multiple falls are a marker for other underlying factors, including chronic disease, functional disability and physiologic changes that put older people at risk for adverse health outcomes.

STATS

In Alberta (2006), fall-related injuries in older adults resulted in:²

- 6915 hospital admissions (19 fall-related hospital admissions daily)
- 18,623 ED visits (2 per hour)
- 53% of fall-related deaths involved males over the age of 65; females accounted for 70% of fall-related hospital admissions

30% of those older persons living in the community will sustain a fall and 40 - 50% of those living in institutions.^{3,4} The incidence increases with age; 50% of women and 30% of men aged 85+ fall annually. 50% who fall, do so repeatedly.⁴

SEQUELAE OF FALLS

A variety of issues can arise as a result of falls:

- Death within one year from complications of hip # occurs in some 14 - 36% of those living in the community.⁵ Rate of death after an injurious fall increases with age and is higher in men than women
- Long lies, which is a sign of physical frailty, puts older adults at risk for dehydration, pressure sores, pneumonia, rhabdomyolysis and ultimately hospitalization and possibly death.
- Fear of falling⁶ is characterised by exaggerated fear of falls, leading to restriction of walking and poor cooperation with rehab efforts. Fear of falling is related to decreased mobility, poor life satisfaction and depressed mood.
- Institutionalization secondary to falls or injuries from a fall are common as illustrated by Tinetti's study⁷ which examined 1103 community dwelling seniors > 71 years of age prospectively for three years. The primary outcome studied was the number of days from the initial assessment to admission to a LTC facility. 12% (N=133) had long term care admissions. With adjustments for other risk factors, the adjusted relative risk of admission was 3.1 if during the previous 3 months they had 1 fall without serious injury. The risk was 5.5 for two or more noninjurious falls and it increased to 10.2 if they had > 1 fall with serious injury. 40% of all Canadian NH admissions are the result of falls.⁸
- Decline in function following a fall-related hip fracture can result in 25-75% of older adults who do not recover their pre-fracture level in ambulation or with activities of daily living.^{9,22}
- About 30-40% of injuries sustained are to the hip, thigh, knee, and result in a fracture or sprain; falls cause more than 90% of all hip fractures in older persons. Falls are the second leading cause of both head and spinal cord injuries (35% and 37%, respectively; *CIHI data 2004*)
- Average LOS is consistently longer for those 65+ who have fallen and sustained an injury
- Estimated annual direct cost of falls is \$1.0 Billion in Canada (*Smartrisk 2004*). In Alberta, yearly hospital costs for falls in 2003 totalled ~ \$88 Million and is projected to reach \$250 M by 2033 if unchecked; these costs do not include ED costs, payments to MD's, PT, home care costs, med costs or costs to the individual or their family (*Schopflicher. On Solid Ground: 2006*)

RISK FACTORS FOR FALLS

Falls cannot be attributed to a single cause in the majority of cases. Falls, rather, are due to a complex interplay of factors intrinsic to the patient (age-related changes, disease states, drugs) and extrinsic (environmental and activity related). These can be further divided into 4 major categories: biological / medical risk factors, behavioural, environmental, and social / economic.

a) Biological / Medical risk factors^{1,10}

- age → the older an individual the greater the risk of falling and injury
- gender → females tend to fall more than men with greater injury
- chronic illness → certain conditions predispose to falls such as Parkinson's disease, osteoarthritis, recent CVA, incontinence, hypertension, dizziness, cognitive impairment (1.8 fold risk of falls), cataracts, prior history of falls and osteoporosis.
- acute illness → look for causes of delirium
- physical disability → gait and/or balance disorders (3 fold risk of falls), decreased sensation in the lower extremities, decreased hearing and vision, feet problems, muscle weakness (4 fold risk of falls)
- Medications

b) Behavioural risk factors

- risk taking, inattention, alcohol intake, inappropriate footwear and clothing, heavy handbags, poor diet, dehydration, lack of exercise, fear of falling

c) Environmental risk factors

Common environmental factors implicated in falls:

- poor / inadequate lighting, changes in floor surfaces or slippery surfaces, unsafe stairs with no rails, inappropriate chair heights, clutter, throw rugs, poor sidewalk / pavement conditions, pets

d) Social / Economic risk factors

- lower income, decreased education (illiteracy), inadequate housing, lack of support networks, language barriers, lack of transportation, decreased access to appropriate health / social services can all contribute to higher fall risk

The likelihood of falling increases with the number of intrinsic risk factors present. In one community-based prospective study by Tinetti, 8% of persons with no risk factors fell, whereas 78% of those with four or more risk factors fell the next year.¹¹

MULTIFACTORIAL APPROACH TO PATIENTS WITH FALLS

All older persons should be asked once a year about a history of falls and if they have any gait and balance problems.^{5,10,21} Those at high risk of falling include those with > than 2 falls in the past year, those with 1 fall associated with an injury and/or those with gait and balance issues. These are the individuals, multi-factorial assessments and interventions are targeted for. If there is no history of falls or problems with mobility with the annual screen, the individual is still encouraged to stay physically active, and should have osteoporosis and home hazards evaluated.

After a fall, evaluate for physical injury and/or acute medical problems**1) History**

Obtain circumstances of the fall – when did the falls start and what is the frequency

S (symptoms associated with the fall; rule out syncope)

P (previous falls; change in premorbid functional status)

L (location)

A (activity preceding fall)

T (toxins/ alcohol, trauma)

Review risk for osteoporosis!

2) Physical

Postural BP, temperature, heart rate, oximetry

Cardiovascular (murmurs, rhythm, hydration status)

Musculoskeletal (strength – knee/ hip extensors, hip abductors, plantar flexors, joint stability and ROM, pain, feet/nails, footwear)

Neurological (focal signs, cerebellar, sensory)

Visual acuity testing
Cognitive assessment (sMMSE, MoCA, CAM)

3) Performance-oriented evaluation of gait and balance

a) Tinetti's performance-oriented assessment¹²

Requires no equipment and little experience to master
Incorporates gait and balance subscales
Score < 20/28 predictive of recurrent falling

b) Timed "Up and Go" Test^{13,14}

Measures in seconds the time taken to stand from a chair, walk 10 feet (3 meters), turn, and return to the chair.

Older adults can complete the task in 10 seconds

If it takes > 13.5 seconds to complete the TUG, the individual is at high risk for falls

d) Sharpened Romberg test

Tandem, semi-tandem, feet together

4) Determine ADL status

Assistance required for basic and/or instrumental activities of daily living indicates increased risk of falls²¹

5) Selective diagnostic testing

MULTI-FACTORIAL FALL INTERVENTION^{10,15,16,17,21,23}

Multi-factorial assessments and interventions do reduce the rate of falls (RaR 0.75; 95% CI 0.65-0.86) but not risk of falling.¹⁵ The effectiveness of these multi-factorial evaluations are based on identifying and treating the individual's modifiable risk factors.

Medications need to be reviewed at least annually. Those older adults with > 4 medications have a higher risk of falling.¹⁸ High risk medications include those that affect balance, cognition, vision or alertness such as psychoactive meds, antihypertensives, anticholinergics, opioids, muscle relaxants, and anticonvulsants. Gillespie et al in the Cochrane systematic review validated that gradual withdrawal of psychotropic medications reduces the rate of falls (RaR 0.34, 95% CI 0.16-0.73).¹⁵

The effectiveness of vitamin D₃ (cholecalciferol) in preventing older persons from falling was analyzed by a meta-analysis performed by Bischoff-Ferrari.¹⁹ It concluded that Vitamin D did reduce the risk of falling among ambulatory or institutionalized older people with stable health by 22% (corrected OR 0.78; [CI] 0.64-0.92). The NNT was 15. The Cochrane review¹⁵ did not demonstrate that vitamin D reduced falls but it was suggested that it could be effective in those with low vitamin D levels, such as those who are housebound or institutionalized and exposed less to sunshine. The Vitamin D recommended dosage is 800-1000 IU per day, as confirmed with a second meta-analysis by Bischoff-Ferrari in BMJ 2009; 339; b3692.²³ It continues to be prudent to assess risk for osteoporosis in the older age group at risk of falls.

Even though exercise programs are effective intervention strategies for falls, there needs to be clarification of the frequency, intensity, duration, type of exercise that should be prescribed with different patient populations. The types of exercise generally include balance training, strength building, flexibility or endurance. Those programs that use two or more of those exercise components reduce rate of falls and number of people falling. Tai Chi is generally used for healthier, sedentary, community-residing older adults. It enhances controlled movements, postural alignment, range of movement of joints and muscles of the lower body. It has been demonstrated that it too reduces rate of falls and risk of falling (RaR 0.63, 95% CI 0.52-0.78)¹⁵ as does group exercise and individually prescribed multiple-component home based exercise.

Comprehensive, in-home functional assessments, in which a professional such as an occupational therapist, analyzes how an older person carries out their activities of daily living, is the "gold standard" vs

home safety checklists. The correct equipment is part of the assessment and it needs to be in safe working order with the appropriate usage demonstrated by the individual at risk. Equipment examples include mobility aids, grab bars, bathroom aids, stair lifts, bed rails and/or electronic alarms. Data from cluster randomised studies provide some evidence of effectiveness of hip protectors in reducing the risk of hip fractures in those living in nursing homes and considered to be at high risk of hip fractures. They were less effective in reducing hip fractures in older persons living in the community, when individualized randomization methods were used.²⁰ Those with visual impairment are likely to benefit most from home safety interventions. First eye cataract surgery does reduce rate of falls (RaR 0.66, 95% CI 0.45-0.95).¹⁵ The usage of anti-slip footwear in icy conditions (eg. Yaktrax Walker®) has also been effective in reducing rate of falls (RaR 0.42, 95% CI 0.22-0.78).¹⁵

By itself, education may not be an effective intervention. When it is included as part of a multi-factorial approach, it can increase senior's awareness of the falls issue and enhance their readiness to change their behaviour to reduce fall risk.

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