

Geriatric Giants Lecture Series

FALLS

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FALLS

DEFINITION

Event resulting in a person inadvertently coming to rest on the ground or another lower level, with or without loss of consciousness or injury (1)

FALLS ARE NOT PART OF NORMAL AGING!!

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

STATS (2)

In 2003 Alberta seniors' fall-related injuries resulted in:

- 50 deaths
- over 6200 hospital admissions (or 17 fall-related hospital admissions daily)
- over 17,350 ED visits (or 2 fall-related ED visits per hour)
- female rates for injurious falls exceed male rates in all age groups

Falls are the second most frequent event Edmonton EMS responds to yearly and accounted for > 5700 EMS calls in 2005

30% of those older persons living in the community will sustain a fall and 40 - 50% of those living in institutions (5). The incidence increases with age; 50% of women and 30% of men aged 85+ fall annually (25)

Approximately 2 – 12 % of patients admitted to the hospital experience at least one fall during hospitalization (20, 26)

Falls are under reported by patients - Cumming's prospective study revealed 59% of community dwelling seniors fell in one year and of those who fell within 3 - 6 months, falls were recalled only 32% and 26% of the time respectively (6)

50% who fall, do so repeatedly (7)

OTHER SEQUELAE OF FALLS (8,11,17,18,25,26)

DEATH

Death within one year from complications of hip # occurs in some 14 - 36% of those living in the community (8,26) Rate of death after an injurious fall increases with age and is higher in men than women.

LONG LIES

Those unable to get up after a fall are at risk for dehydration, pressure sores, pneumonia, rhabdomyolysis and ultimately hospitalization and possibly death. Long lies are a sign of physical frailty.

FEAR OF FALLING

Post fall syndrome coined by Murphy and Issacs (17). Characterised by exaggerated fear of falls, leading to restriction of walking and poor cooperation with rehab efforts. 40-73% of older persons who have had a recent fall, and 20-46% of those who have not, admit to fear of falling. Fear of falling is related to decreased mobility, poor life satisfaction and depressed mood.

INSTITUTIONALIZATION

Tinetti's study (18) 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.

DECLINE IN FUNCTION

Among community-dwelling seniors with fall-related hip fractures, between 25- 75% do not recover their prefracture level of function in ambulation or ADL's (25)

INJURY

- a. Hip fractures – 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
- b. Traumatic brain injury / spinal cord injuries – falls are the second leading cause of both head and spinal cord injuries (35% and 37%, respectively; CIHI data 2004)

HOSPITALIZATION

Average LOS for a fall injury is consistently longer for those 65+

COSTS

- a. Estimated annual direct cost of falls is \$1.0 Billion in Canada (Smartrisk 2004)
- b. 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

RISK FACTORS FOR FALLS (8,9,10,11,12,13,20,21,22)

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, behavioral, environmental, and social / economic.

a) Biological / Medical risk factors

- 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. Those with a \downarrow of 1 standard deviation of bone density have an increased risk of fracture 2.7 times (11).
- acute illness → causes of delirium, immobility / deconditioning, new meds
- physical disability → gait and/or balance disorders (3 fold risk), decreased sensation in the lower extremities, decreased hearing and vision, feet problems, muscle weakness (4 fold risk)
- Medications – total number > 5; especially those affecting balance, cognition, vision or alertness such as psychoactive meds, antihypertensives, anticholinergics, opioids, muscle relaxants, PPI's, anticonvulsants

b) Behavioral risk factors

- risk taking → eg. climbing chairs, walking without aids
- inattention
- alcohol usage
- inappropriate footwear (slippery soles, high heels, thick soles)
- heavy handbags (displaces balance)
- poor diet (risk for osteoporosis)
- lack of exercise

- fear of falling

c) Environmental risk factors – accounts for 1/3 to 1/2 of all falls among seniors

Common environmental factors implicated in falls:

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

d) Social / Economic risk factors

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

In an analysis of seven studies and 2312 falls in community-dwelling older people, Rubenstein reported that 41% of falls had environment-related causes (trips, slips), and 13% were caused by weakness or a disorder of gait / balance. Gill et al found that those who fall at home, most often do so in the bedroom (30%) and living room (31%). (21)

This was in contrast to causes of falls in the NH, where the most frequent causes were weakness/ deconditioning, gait or balance disorder (26%) and dizziness or vertigo (25%); only 16% of falls were environment-related. Poor care giver/ patient ratios and limited exposure to PT's add to the fall risk. With increased co-morbidity, cognitive / behavioral issues and high level of frailty there is, in general, a three-fold increase of falls in institutionalized vs community-dwelling seniors.

In acute care hospitals, acute illness/delirium, immobility / extended bed rest, psychoactive meds, incontinence and environmental factors (wet floors, obstacles, improper footwear, tubing, restraints) play a role. Most falls occur in the patient room as the patient attempts to transfer, ambulate or toilet independently (20). The rate of falls is increased in the first month after discharge from hospital.

The likelihood of falling increases with the number of intrinsic risk factors present (13). 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.

APPROACH TO PATIENTS WITH FALLS

Evaluate for physical injury and/or acute medical problems

1) History (14)

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

- S** (symptoms associated with the fall)
- P** (previous falls; change in premorbid functional status)
- L** (location)
- A** (activity preceding fall)
- I** (toxins, trauma)

2) Physical

Postural BP, temperature, heart rate, oximetry

Cardiovascular (murmurs, rhythm, hydrational status)
Respiratory (adventitious findings)
Musculoskeletal (strength – knee/ hip extensors, joint stability and ROM, pain, feet/nails, footwear)
Neurological (focal signs, vision/hearing, cerebellar, sensory)
Cognitive assessment (FMMSE, CAM)

3) Performance-oriented evaluation of gait and balance

a) Tinetti's performance-oriented assessment (15)

Requires no equipment and little experience to master
Incorporates gait and balance subscales
Score < 20/28 predictive of recurrent falling
Unable to detect small yet clinically significant gait developments
Less evidence as an outcome measure than for identifying high risk of falling
Interrater agreement 85%

b) Berg Balance scale – used primarily by physiotherapists

Consists of 14 items; inter/intra rater reliability 0.95
Some tasks cannot be done in a recent post fracture situation
Takes 20 minutes to administer; often performed by physiotherapy
45/56 = cut off for likelihood of falling
Predictor of walking aid:
45-50/56 = no aids
33-45/56 = cane (odds of falling 3X in this range)
27-36/56 = walker

c) Timed Up and Go Test (16)

Subjects timed in their ability to rise from a chair walk 10 feet, turn, and return to the chair
Most adults can complete the task in 10 seconds; 11-20 seconds is considered within normal limits for frail elderly; if it takes >20 seconds, there is need for a more comprehensive evaluation
< 20 seconds correlates well with independence in ADL's

d) Sharpened Rhomberg test

Tandem, semi-tandem, feet together

e) Timed 50' Walk – often used in the acute care setting to gauge progress

Simple and sensitive to change
Abnormal if > 30 seconds or < 1.0 m/sec

4) Diagnostic testing in selected cases

CBC, ESR, BUN, electrolytes, BS, Calcium, TSH, CPK
Urinalysis, stools OB
EKG; Holter monitor(with syncope, previous cardiac history or evidence of CV abnormalities on exam)
EEG
EMG / nerve conduction
Neuroimaging such as CT head

MULTIFACTORIAL FALL INTERVENTION (22)

Clinical Intervention

The goal is to determine the risk factors for those who have fallen (secondary prevention) and to screen for those who are at high risk of falling (primary prevention). 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 those with gait and balance issues. All older persons should be asked once a year about their history of falls and if they have any gait and balance problems. If there are no falls issues, a referral to a community exercise program would still be appropriate. Those older persons noted to have gait and balance deficits associated with falls, need to have the full multifactorial assessment performed.

To reduce subsequent falls and injuries in the elderly, a comprehensive post-fall assessment should be performed after the first fall (19), followed by targeted (multifactorial) intervention. Reversible medical factors need to be addressed following accurate assessment and diagnosis. Once that has been completed, the individual with falls may need a referral to additional services. Some of these referrals can be directed to other medical specialists, GRH START Day Hospital Program, GRH Syncrude Center for Motion and Balance, Home Care for assistive devices / assessment for home hazards, community rehab day programs, foot clinics, dietary, pharmacy, and inpatient evaluation within an ACE unit. 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. (23).

A recent meta-analysis by Gates et al. concluded, that evidence of benefit from multifactorial risk assessment and targeted intervention for falls in primary care, community or emergency-care settings was limited (for reducing the number of fallers or fall related injuries) (28). Data were insufficient to assess fall and injury rates. This was largely due to few, large scale, high quality RCT's available. Another meta-analysis in examining effectiveness of fall prevention programs in hospitals (26) found insufficient evidence that these programs reduce the number of falls or fallers in this acute care setting. The authors suggested that more studies are needed to analyze the effect of targeting the patient's most important risk factors for falls in this environment, since it does have some impact on patients admitted for longer stays (on geriatric or rehab units). Also, there may be a need to collaborate with community providers, since on discharge, unnecessary duplication of falls assessment could be avoided and facilitation of ongoing falls intervention could continue. Efficacy of risk assessment tools is limited in acute care as most patients are high risk. There is still a role for increasing staff awareness about falls, providing fall prevention education and reporting fall stats to staff members (personal communication Susan Young, CH)

The effectiveness of vitamin D in preventing older persons from falling was analyzed by a meta-analysis performed by Bischoff-Ferrari et al. (27) 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.

Exercise

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 given with different patient populations. The types of exercise generally include balance/gait training, and strength building. 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 also been associated with reduced fear of falling. Moderate walking is protective, but one study found that brisk walking for post-menopausal women showed an increase in the number of falls. Consistent evidence from prospective and case-control studies reveal that physical activity is associated with a 20-40% reduced risk of hip fractures relative to sedentary individuals (24)

Environmental /Home Modifications

These can be effective, if the individual has manual and/or financial help to make the modifications and if the modifications are combined with other risk reduction strategies. Comprehensive, in-home functional assessments, in which a professional analyzes how an older person carries out an activity, is the "gold

standard” vs home safety checklists. Outdoor community hazards exist – multiple stakeholders need to partner for effective falls prevention and should include city planners, road engineers, public work officials, businesses / government officials and the seniors themselves.

Education

By itself, education may not be an effective intervention. When it is included as part of a multifactorial approach, it can increase senior’s awareness of the falls issue and enhance their readiness to change their behavior to reduce fall risk. More research is required to determine if education programs targeting health care professionals, families / caregivers of seniors are effective.

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