

Evaluation and Prevention of Falls

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Please cite this article as: V. Selcuk Engin, Suleyman Ersoy. Evaluation and prevention of Falls. Middle East Journal of Age and Ageing. 15(3):3-6. DOI: 10.5742MEJAA.2018.93585

ABSTRACT

Falling is a major clinical challenge which has a great impact on older adult's life. To achieve successful aging, this condition must be properly addressed in preventive strategies against risk factors for frailty.

Key words: Older adult, falls, prevention

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DOI: ???

Introduction

The baby boomer generation have become older adults. The following generations didn't follow suit. Birth rates have never attained the post war era level in western countries while life expectancy constantly increases throughout the World. The result is the greying population. This is a challenge not only for welfare systems, but also for health services. It was projected that the 65 plus population will reach 8 million by 2020 and will exceed 10 million by 2050 in Turkey. So far, this number is nearly 7 million. The rate of the older population is constantly increasing and attained approximately 8.5% during the recent year. Projections show 3.5% increase of this rate for every decade. (1)

US citizens older than 64 years constitute 50% of hospitalizations and 40% of health expenditure. The most crucial issue is whether we provide our seniors with a successful pattern of aging, or a frail one. And when it comes to successful aging vs frail aging, falling is a breaking point. It triggers the vicious cycle of frailty in the most vulnerable period. It is a matter of debate as to whether the major threatening aspect of falls is the breaking of bones or breaking the confidence of older adults and let him/her surrender to inactivity and depression and consequently, frailty.

The wider clinical notion of frailty includes physical as well as mental and social well being (2). It is noteworthy that whatever is true about frailty is also valid for falls in terms of risk indicators. This is not surprising as frailty phenotype is reported independently predictive of incident falls, worsening mobility or ADL disability, hospitalization, and death, with hazard ratios ranging from 1.82 to 4.46, over 3 years. Intermediate frailty status, as indicated by the presence of one or two criteria, showed intermediate risk of these outcomes as well as increased risk of becoming frail over 3-4 years of follow-up (3).

Preferred definition of falls is ‘Unintentionally coming to the ground or some lower level other than as a consequence of a violent blow, loss of consciousness, sudden onset of paralysis as in stroke or an epileptic seizure’ (4). This syndrome resembles frailty in terms of risk factors and consequences. Rates of falls increases nine fold in the population beyond 65 years old and it’s annual rates range between 28-39% varying with different communities and study settings. Falls constitute 14% of emergency admissions, 4% of all hospital admissions, 1% of all cause mortality while accounting for 40% of injury-related deaths (5).

Studies in Europe, Canada and Australia reported rates of falls ranging from 28% to 39% annually (5). Studies in Turkey shows rates among 29.6-47.7% in community dwelling older adults (6). However, this rate is up to 69% in institutionalized older adults in Turkey (7).

The most prominent complication of falls is fractures (10%) and the most threatening one is hip fractures, which mostly occur in older women.

A study in 120 older adults who suffered a hip fracture reported that before their fractures, 86% could dress independently, 75% could walk independently and 63% could climb a flight of stairs. Six months after their injuries, these percentages had fallen to 49%, 15% and 8%, respectively (8).

Another indicator of poor prognosis is the “long lie” – remaining on the ground or floor for more than an hour after a fall. The long lie is a marker of weakness, illness and social isolation, and is associated with high mortality rates among older people. Time spent on the floor is associated with fear of falling, muscle damage, pneumonia, pressure sores, dehydration and hypothermia. Even if there was no injury related to the fall, half of those who suffered a long lie die within six months (5).

Location of falls:

- 56% outside the home
- 26% level surface
- 6% on the stairs
- 6% shower/bath
- 3% getting out of bed
- 3% on chair/ladder

Studies revealed that less women and frail older adults fall outside.

Also it was reported that most falls occur in the active hours (morning or afternoon) and only 20% occurred after evening hours. We may conclude that older adults fall during their usual practice and at their usual places (5).

Most fallers (40%) reported that they had tripped while 21% accounted poor balance. 14% were unsure of the cause. 13% experienced slipping, 6% had felt weakness of the legs while 5% felt dizziness and only 1% had lost consciousness (5).

Studies showed that 2/3 of falls are preventable. So, determination of related risks is essential in prevention (9).

To avoid a fall, a three-stage response is required: Perception of a postural threat; selection of an appropriate corrective response; and proper response execution.

The causes of falling are multi-factorial and include extrinsic (environment-related), intrinsic (person-related) and behavioural (activity-related) factors. Gait instability has been identified as a relatively consistent risk factor for falls and the majority of screening programmes to identify those at risk of falls comprise an assessment of gait and balance.

STRATIFY clinical prediction rule (St. Thomas Risk Assessment Tool in Falling elderly inpatients), consists of five items that address risk factors for falling including past history of falling, patient agitation, visual impairment affecting everyday function, need for frequent toileting, and transfer ability and mobility. The STRATIFY rule yields a possible score between 0 and 5 (each item scoring 1 if present or 0 if absent). A recent systematic review examined the predictive value of the rule in elderly inpatients at risk of falls and found that at a score ≥ 2 points, the STRATIFY rule had only limited predictive ability with moderate summary estimates of sensitivity (0.67, 95% CI 0.52 – 0.80) and specificity (0.57, 95% CI 0.45 – 0.69) (10).

Postural stability can be defined as the ability of an individual to maintain the position of the body, or more specifically, its centre of mass, within specific boundaries of space, referred to as stability limits. Stability limits are boundaries in which the body can maintain its position without changing the base of support. Regardless of the task being performed, maintaining postural stability requires the complex integration of sensory information regarding the position of the body relative to the surroundings and the ability to generate forces to control body movement.

Thus, postural stability requires the interaction of musculo-skeletal and sensory systems. The musculo-skeletal component of postural stability encompasses the biomechanical properties of body segments, muscles and joints. The sensory components include vision, vestibular function and somatosensation, which act to inform the brain of the position and movement of the body in three-dimensional space. Normal ageing is associated with changes in function of each of the subcomponents.

A wide range of clinical rating scales and functional tests have now been evaluated in older people to determine their ability to predict falls. These include sit-to-stand ability, turning, bending down, tandem walk, one leg stance, functional reach test, Romberg test, heel walk, toe walk, etc.

TUGT, derived from the original Up and Go Test, is an indicator of basic mobility and measures the time required for a person to rise from a chair, walk three meters, turn, walk back and sit down. Note that not only consumed time, but also unsteady gait patterns are important in evaluating patient’s risk for falls. Studies report cut-off value of increased fall risk from 14 to 20 seconds (11).

A meta-analysis showed that TUGT has limited value in terms of sensitivity, thus it’s a better option to rule out than detect problems that increase the risk of falls (12).

Also it was reported to have no superiority to gait speed measurement despite consuming more time to practice (13). On the other hand, its qualitative elements may provide additional information pertaining to patient's stability. However, these would be purely subjective as they depend on observations of the applicator. So we may conclude that the supervisor would better be the most relevant member of the geriatric team to provide additional subjective information.

The Tinetti Performance Oriented Mobility Assessment tool is an easily administered task-oriented test that measures an older adult's gait and balance abilities: It has a three-point ordinal scale, ranging from 0-2. "0" indicates the highest level of impairment and "2" the individual's independence. Total Balance Score = 16. Total Gait Score = 12. Total Test Score = 28. The patient is to sit in a hard armless chair and will be asked to rise up and stay standing. The patient will then turn 360° and then sit back down. This is to test the patient's balance. Testing this, the evaluator will look at several key points. These are: How does the patient rise from and sit down on his/her chair, whether or not the patient stays upright while sitting and standing, what happens when the patient's eyes are closed or when the patient gets a small push against the sternum. Next, the patient will have to walk a few meters at normal speed, followed by turning and walking back at a "fast but safe" speed. The patient will then sit back down. As well as in the first part of the test there are some points the evaluator has to look at. These are: The length and height of the steps, the symmetry and continuity of the steps and straightness of the trunk. During this test the patient can use any assistive devices (14).

The people who have a score of 26 or lower have a two-fold risk of falling in the following year. This test has a sensitivity of 70% and a specificity of 52%. This means that 70% of the people with a higher fall risk will have a test score lower than 26. It also means that 52% of the people who have a test score lower than 26 have a higher fall risk and will have a fall within a year (15).

Most injuries that older adults suffer occur at home (16). The rate of injury for people with Alzheimer's disease is 1.6 times higher than the national average for community-dwelling older adults, and the fall rate is 1.9 times higher (17). Comprehensive assessment of home safety and common hazards allows nurses to identify potential risks and educate caregivers on preventative measures (18). Home safety inventory had been developed especially for homebound older adults. This is a checklist to be controlled. The assessment tool may not include all of the possible safety problems. Health professionals should individualize the items based on clinical assessment of the individual and home environment (19). The patient also must be instructed on how to deal with a sudden fall. For the proper management, instructions must be as follows:

Just after the fall:

- Keep calm.
- Call help if possible.
- Avoid sudden moves.

If patient can't get up:

- Find a blanket, cushion etc.
- Try to get away from the wet place
- Change position to avoid pressure sores

Medication has a significant role in falls. Potential culprits are:

- Psychological medications such as antidepressants, anxiolytic, hypnotics.
- Cardiovascular medications such as antihypertensive agents, diuretics, vasodilators.
- NSAIDs, pain-killers, skeletal muscle relaxants.
- Alcohol, opioids, depressants, dopaminergic drugs, anticonvulsants, antiparkinsonism drugs, etc.

Detection of polypharmacy is of paramount importance and duplicate used drugs, hazardous combinations, and wrongly used drugs must be ruled out (20).

According to earlier research, posture's priority in dual tasks shifts gradually as people age. Recent research suggests that's not the case in static dual tasks. Dynamic complex activities cause a decline in either task. Nature of the tasks, goal and prior instructions, change the result. So, rehabilitation with multiple tasks is necessary.

Some researchers report good results with dual task exercises and call this cognicising. One of the proposed schemes is:

- 10 minutes of warm-up and stretching exercises,
- 20 minutes of muscle strength exercise and postural balance training,
- 25 minutes of dual-task (cognicise) training,
- 5 minutes of rest,
- 25 minutes of aerobic exercise (stair stepping, endurance walking, and walking on balance boards. The mean aerobic exercise intensity was 60% to 80% of maximum heart rate).
- 5 minutes of cooling down.

Safety instructions during exercise shouldn't be omitted:

- Have assistive devices, medicines and cell phone nearby
- If needed, hold on to stable objects
- Avoid painful or strenuous movements

Stop when:

- Dizziness,
- Chest pain,
- Shortness of breath occurs.

Psycho-social support is an integral part of the treatment. It must include:

- Building self confidence (reasonably),
- Detection and treatment of depression,
- Proper management of dementia,
- Awareness about delirium symptoms,
- Education and support for the caregiver.

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