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Review

Falls and Fractures: A systematic approach to screening and prevention

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ABSTRACT

Falls are one of the major causes of mortality and morbidity in older adults. Every year, an estimated 30–40% of patients over the age of 65 will fall at least once. Falls lead to moderate to severe injuries, fear of falling, loss of independence and death in a third of those patients. Falls account for 87 % of all fractures in the elderly. These fractures are almost always due to low impact injuries in osteoporotic bones. Several organizations have recommended screening older patients to identify those with a high risk of falling and, or fractures. The present review provides a brief summary and update of the relevant literature, summarizing screening tools and interventions to prevent falls and fractures. The major risk factors identified are impaired balance and gait, polypharmacy, and history of previous falls. Other risk factors include advancing age, female gender, visual impairments, cognitive decline especially attention and executive dysfunction, and environmental factors. Recommendations for the clinician to screen and prevent falls in older patients are also summarized.

Contents

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1. Introduction

Falls are a leading cause of morbidity and mortality among older adults [1]. One in three adults over the age of 65 [2] and one in two adults over the age of 80 fall annually [3]. However, less than half their physicians are aware of the falls or the circumstances [4]. In 2013, there were 2.5 million nonfatal falls among older adults treated in emergency departments and 734,000 hospitalization, costing $30 billion in direct medical costs [1,5]. Twenty to thirty percent of people who fall suffer moderate to severe injuries such as lacerations, fractures and traumatic brain injuries [6,7] resulting in reduced independence, early death and development of a fear of falling [8]. Falls account for 87% of all fractures in the elderly [9]. Fractures are associated with major complications such deep vein thromboembolism (40%) and delirium (10–40%) which in turn leads to prolonged hospital stays, increased mortality and risk of nursing home placement. The mortality following a hip fracture is about 20% and is mainly due to pneumonia, cardiac disease, pulmonary embolism and surgical complications [10]. The most common fractures occur in post-menopausal women with osteoporosis. Age affects the type of fracture sustained. Women under the age of sixty, tend to extend their arms as they fall resulting in a higher incidence of forearm fractures. After that age, women tend to fall sideways and have a higher incidence of hip fractures [11].

2. Method

In this narrative review, we aimed to identify the epidemiology, etiology and risk factors of fall-related fractures in the elderly population. Screening tools and interventions to prevent falls and fractures are also presented. The bibliographic search strategy focused on articles published in peer-reviewed, English language journals up to December 2014. The databases used included PubMed, CINAHL and Scopus. When they existed, RCT and meta-analyses were selected preferentially and, in their absence, we used clinical trials. Editorial, case reports, letter or other type of commentaries were not considered. We did not apply formal meta-analysis methods.

3. Epidemiology of fractures

After the age of 50, 4 in 10 women can expect to have a hip, vertebral or forearm fracture in their remaining lifetime, and are more likely to die from its complications than from breast cancer [12,13]. Women aged 65 years and older accounted for 74% of all fractures and bore the overwhelming share (89%) of related total costs. Approximately 300,000 hip fractures, and 90,000 fractures [14] of the distal radius, occur annually, the majority of which was a result of falls [15–17]. Among the elderly, vertebral fractures are also common. However, the true incidence is unclear because patients are less likely to recognize that the back pain following a trivial fall is a vertebral fracture and thus less likely to present to the emergency room. Most of the spinal fractures occur at T8–T12, L1 and L4 and can result in spinal deformity, chronic pain and incomplete paraplegia [18]. Falls are the leading cause of spinal cord injury among persons aged above 60 [19]. Proximal humerus fractures account for four to five percent of all fractures and are the third most common fracture in elderly patients after those of the hip and distal radius [20]. Although less common in the elderly, tibial fractures carry higher mortality rates and have been associated with long-term bisphosphonate.

4. Falls and osteoporosis

Falls are the most common mechanism of fractures among older adults, especially in those with osteoporosis [14]. This population often sustains falls with low impact forces such as falling from a standing height. In the elderly this can result in “fragility fractures”. There were an estimated nine million osteoporotic fractures worldwide in 2000, of which 1.6 million were hip, 1.7 million forearm, and 1.4 million clinical vertebral fractures [21]. The World Health Organization operationally defines osteoporosis as a hip bone mineral density (BMD) of 2.5 or more standard deviations (SD) below the mean for young adult reference population. Each 1 SD decrease in BMD is associated with a 1.5- to 2.5-fold increase in risk of fracture [22]. Women ages 65–69 have a BMD loss at the hip of 0.32% per year and this numbers increases to 1.64% per year in ages 85 and older. This leads to an increase in hip fractures by 20–25% over a 5-year period. Men account for 30% of hip fractures worldwide but have a higher mortality than women [23,24,12]. Other risk factors for osteoporosis include being Caucasian, having a petite frame, low body weight, family history or prior history of osteoporosis, cigarette smoking, heavy alcohol use, diseases such as rheumatoid arthritis and medications such as steroids.

5. Screening and Prevention

As the number of elderly increases, the ability to identify those at risk of falls and subsequent fractures has become increasingly important. The American Geriatrics Society published guidelines in 2010 urging practitioners to screen older patients for fall risk at least annually [25]. Similarly, the CDC recommends screening for falls at each visit by using the Staying Independent Brochure as part of their Stopping Elderly Accidents, Deaths and Injuries (STEADI) initiative [see Fig. 1] [26]. A comprehensive fall assessment is prompted when a patient Scores 4 or more on the Stay Independent Brochure or answers yes to having fallen in the past year, feeling unsteady or have a fear of falling [26]. This initial screening tool is a self-assessment, but there are also tools that can be used by the physician.

6. History taking

6.1. Patient history and history of fall

Details of the injury and mechanism of fall are helpful in understanding the circumstances around any past falls. A focused history should include prodromal symptoms (lightheadedness, dizziness, palpitations) and environmental factors such as poor lighting, carpets, uneven terrain, or stairs. A complete review of medications taken or changed, is also warranted. Identifying underlying chronic diseases that increase risk of fall or fracture, such as postural hypotension, Parkinson’s disease, diabetes, osteoporosis, stroke, or cognitive impairments, is also necessary. Other risk factors such as urinary incontinence, visual impairment, alcohol consumption, and footwear should be evaluated.