

# Fall Prevention and the AlterG

## Introduction

On April 7, 2010, Federal Reserve Chairman Ben S. Bernanke warned Americans that they might be facing increasing budget deficits and higher taxes to fund programs like Medicare and Social Security.<sup>1</sup> With the aging population and medical advances, it is predicted that the 65+ population will increase by 147% from 2000-2050. This will account for about 21 percent of America's population, or approximately 86.7 million people.<sup>2</sup> The significant growth in this sector of the population will undoubtedly tax our healthcare and financial system. To help alleviate some of these stresses, it will be important to shift our focus in medical care from treating illness/injury to promotion of preventative care measures.

## Falling Is A Problem

One of the most common problems plaguing the elderly is falling. Causes are usually multi-factorial and incidence and severity increase with age. It is purported that approximately 35-40% of community-dwelling adults 65+ fall each year. These rates are even higher in elderly adults in residential care, with an estimated incidence rate 3x higher than their community-dwelling counterparts.<sup>3</sup>

One key concern with falls in the elderly is the high susceptibility of injury and the severity of those injuries. There are many factors that increase the likelihood of fall-related injury amongst the elderly including comorbid diseases and age-related physiological decline.<sup>3</sup>

One of the most common injuries associated with falls in the elderly is hip fracture. In addition to fall rates being higher in elder adults in residential care, hip fractures are also more common. It is estimated that hip fractures are 10.5 times more likely with this population of elders than in the community dwelling ones.<sup>4</sup>

Approximately 15% of those who fracture their hip, will not return to pre-injury functional status. It can be accompanied by a downward spiral consisting of increased pain and suffering, reduced mobility, further decline in physiologic status as the patient becomes more sedentary, and increased caregiver stress.<sup>4</sup> Incurring a fall-related injury can have potentially devastating consequences for the patient, family, and caregiver.

Adding to the individual consequences of a fall incident, there are significant national implications that support tackling the issue of falls and fall prevention. In 2000, the economic cost of falls exceeded \$19 billion for people age 65 and older.<sup>5</sup> By 2020, it is projected that the costs for fall injuries is expected to reach \$54.9 billion.<sup>6</sup> With these projections, you can see the potential impact falling episodes could have on our already taxed healthcare system and the economic ramifications for our nation already in financial crisis.

## Fall Prevention

There are many causes for falling in the older population. Some of the more common causes include:

- Motor and sensory deficits
- Postural instability and balance deficits
- Decreased muscle strength/tone
- Decreased bone mass and density
- Decreased flexibility
- Co- morbidities (impaired thinking, impaired vision, medications)
- Environmental hazards<sup>7</sup>

Many of the above causative factors can be impacted by skilled physical therapy intervention. The most direct route is probably through proper application of therapeutic exercise along with patient education. In a patient handout published by the Journal of the American Medical Association (JAMA)

in 2010, they provide suggestions for fall prevention and outline four major areas that can be focused upon. The most important of those is participation in regular exercise to improve balance and strength.<sup>7</sup>

### **Exercise and Fall Prevention**

Exercise programs are used widely in physical therapy to increase flexibility and strength, improve proprioception and balance, and develop coordination and agility. The question of whether or not it decreases fall risk factors or prevents falls amongst the elderly is often debated, but there is evidence to show that a moderate exercise program can help reduce fall incidents.

In an journal publication by *Arnold et al (2008)*<sup>8</sup>, the authors performed an article review and found 22 articles that substantiated that both individualized and group exercise programs were effective in reducing falls and fall risk. The articles included randomized clinical trials involving exercise or physical activity intervention. Though the optimum exercise parameters have yet to be defined, the conclusion was reached that exercise is a beneficial intervention for reducing falls.

In one of the articles referenced by Arnold, *Suzuki et al (2004)*<sup>9</sup> performed a study where 52 elderly Japanese women were randomized into intervention and control groups. The experimental group was provided 6 months of bimonthly exercise sessions along with a home exercise program. The control group was given a pamphlet and advice on fall prevention. The results of the study showed that the experimental group exhibited improved functional reach and confidence upon completion of the study. At 8-month follow-up, there was only a 13.6% incidence of falls in the experimental group versus a 40.9% fall incidence in the control group. At 20-month follow-

up, the control group fall incidences remained unchanged, whereas the control group incidences rose to 54.5%. The conclusion again was that exercise intervention decreases incidents of falling in both the short- and long-term.

In a *Barnett et al study (2003)*,<sup>10</sup> 163 people 65 years of age or above, identified as at-risk for falls, were randomized into exercise intervention and control groups. Physical performance and general health measures were assessed at baseline and 6-months and falls were measured over the 12-month trial with a monthly survey. Data collected at retest showed improved stability and decreased postural sway in the experimental group. Both of which could have been factors in the decreased rate of falls for the exercise intervention group, found to be 40% less during the duration of the 12-month trial.

Though exercise standards have not been established for reducing fall risk and incidents, effective interventions have included Tai Chi, supervised exercise programs in individual or group settings, and home exercise instruction prescribed by a physical therapist. While the proper type, frequency, and intensity of exercise are still being discussed, it can be seen from the aforementioned studies that any amount would be an improvement from the decreased activity and sedentary nature of most elderly lifestyles.

### **Why the AlterG?**

The AlterG Anti-Gravity Treadmill has an advantage over other methods and interventions in helping regain early endurance and cardiovascular fitness for post-injury and post-operative patients. While maintaining normal walking and running mechanics in a safe environment, the AlterG allows for precise unloading and early incorporation of closed kinetic-chain

activities. This ability to provide early functional AROM with precise protected weight bearing allows for more rapid restoration of motion and muscle control. This in turn will help normalize walking mechanics in a timely fashion.

The foundation whereby the AlterG is able to provide these training effects, is the ability to begin early/immediate closed kinetic chain activity. Closed kinetic chain activities have been hypothesized to be much safer for joints<sup>11</sup> and more closely resemble normal function in their ability to recruit more than one muscle at the same time and in their ability to move several joints at the same time. In comparison to other current options such as parallel bars, harness suspension systems, and underwater treadmills, the AlterG is the ONLY modality that is able to provide lower extremity progressive weight bearing with precise, safe unweighting in an environment that allows for normal biomechanics.

The key for fall prevention lies in the ability once again for the elderly to exercise. Any amount is better than none. One of the main benefits of the precise unweighting achieved by the AlterG, is its ability to enable those with lower extremity degenerative conditions or injuries to participate in closed-kinetic chain exercise. Because users are comfortably supported in the AlterG, it is a safe modality for those with balance deficits and protects both the patient and clinician. And because of its simplicity, minimal direct assistance is needed once users familiarize themselves with the AlterG.

### **Conclusion**

Falls can significantly impact the physical, psychological, and emotional wellbeing of the elderly individual, their family, their caregivers, and possibly, the economics of our country. The AlterG provides a safe, comfortable

exercise modality that enables individuals that could not otherwise participate in closed-kinetic chain activities the opportunity to do so. Creating the ability for exercise in these individuals along with optimizing current rehabilitation trends could result in significantly decreasing fall incidents in the elderly. The potential financial cost savings on our already taxed healthcare system could be tremendous.

### **References**

- 1) Kaiser Health News-  
[www.kaiserhealthnews.org](http://www.kaiserhealthnews.org)
- 2) <http://usgovinfo.about.com/od/censusandstatistics/a/olderstats/>
- 3) American Geriatrics Society, British Geriatrics Society, American Academy of Orthopedic Surgeons Panel on Falls Prevention. Guideline for the prevention of falls in older persons. *J Am Geriatr Soc.* 2001;49:664–72.
- 4) Cakar, E., Dincer, U., Kiralp, M.Z at al. Jumping Combined Exercise Programs Reduce Fall Risk and Improve Balance and Life Quality of Elderly People who live in a Long-Term Care Facility. *European J Phys Rehabil Med* 2010; 46:59-67.
- 5) Stevens JA, Corso PS, Finkelstein EA, Miller TR. The costs of fatal and nonfatal falls among older adults. *Injury Prevention* 2006;12:290–5.
- 6) Englander F, Hodson TJ, Terregrossa RA. Economic dimensions of slip and fall injuries. *Journal of Forensic Science* 1996;41(5):733–46.
- 7) Chang, H.J., Lynn, C., Glass, R.M. Falls and Older Adults. *JAMA*, 2010 January 20; 303 (3):288.
- 8) Arnold, C.M., Sran, M.M., Harrison, E.L. Exercise for fall risk reduction in community-dwelling older adults: a systematic review. *Physiotherapy Canada.* 2008; 60:358-372.
- 9) Suzuki, T., Kim, H., Yoshida, H., Ishizaki, T. Randomized controlled trial of exercise integration for the

- prevention of falls in community-dwelling elderly Japanese Women. *J Bone Miner Metab.* 2004;22:602-11.
- 10) Barnett, A., Smith, B., Lord, S.R., Williams, M., Baumand, A. Community-based group exercise improves balance and reduces falls in at-risk older people: a randomized controlled trial. *Age and Ageing.* 2003; 32: 407-414.
  - 11) Morrissey, M.C., Hudson, Z.L., Dreschler, W.I., Coutts, F.J., Knight, P.R., King, J.B. Effects of open versus closed kinetic chain training on knee laxity in the early period after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc.* 2000; 8(6): 343-8.

### **Author**

*Jacon C. Chun, MPT, SCS, ATC, CSCS*, serves as clinical specialist for AlterG. He is a private practice owner in Fremont, CA and is an adjunct faculty instructor in Samuel Merritt University's Doctorate of Physical Therapy Program.

For more information, Jacou can be reached at [Jacon@alter-g.com](mailto:Jacon@alter-g.com).

