



Richard E Gans, PhD,
Founder and CEO of the
American Institute of
Balance, 8200 Bryan
Dairy Road, Suite 340
Largo, FL 33777, USA.

Correspondence
E: rgans@dizzy.com

**Declaration of
Competing Interests**
None declared.

Dizziness, Vertigo and Falls: issues for older adults and practitioners

The ageing of the world's population

The older population is growing faster than the total population in virtually all regions of the world and the difference in growth rates is increasing. The post World War II generation born between 1946 and 1964, commonly referred to, as 'boomers' are here in numbers never seen before. According to the World Health Organization (WHO) the number of individuals aged 65 and over has tripled from 205 million in 1950 to 606 million in 2000. In 1950 only three countries, China, India and the United States of America, had more than 10 million people over 60. By 2000, 12 countries had reached the 60 plus population of 10 million and five countries had reached 20 million. Europe currently has the world's highest proportions of older persons and is projected to remain so for at least the next 50 years. Approximately 37% of the European population is projected to be 60 or over in 2050, an increase of 20% from 2000. As this exponential growth continues, the global population of those 60 or over is projected to triple and reach two billion by 2050. By then, one in every five persons throughout the world is projected to be 60 years or older. For Europe, the United States, Japan, and other developed countries, the percentage is already significantly higher.

Social and economic impact

The boomers now represent 25% of the United States' population. Beginning January 1st, 2011, the oldest of the boomers begin turning 65. This equates to 10,000 individuals turning 65 years old every day for the next 18 years. Perhaps even more significant is the increase in the number of those 85 years of age and older referred to in gerontology, as the 'old-old'. It has now become the fastest growing segment of the ageing population. This cohort group also has the most acute and chronic medical conditions requiring the greatest expenditure of medical and economic resources.

This emerging population demographic will pose significant challenges and stress on social and healthcare

systems to manage the needs and provide appropriate medical and allied healthcare services specific to this demographic. Enrollment in the United States' Federal Medicare Program (for individuals 65 years old or those on disability) is expected to expand from 47 to 80 million participants by the year 2030. The economic strains will be significant, with costs rising to \$929 billion dollars by 2020, an increase of 80% from today's spending level. In 1994 the National Institute's of Health (NIH) Strategic Research Plan, described this approaching demographic as a looming healthcare crisis for the United States. It is apparent, however, that there has been little, if any, planning or new thinking in the past 17 years to accommodate the social and economic impact of this demographic.

This burgeoning demographic will provide unprecedented opportunities to create and implement new and innovative evidenced-based protocols and delivery of care. The sheer magnitude of this population and the economic strain will force healthcare practitioners, government and private payers to seek out the most efficient, cost-effective, and efficacious treatments.

*This burgeoning
demographic will
provide unprecedented
opportunities to create
and implement new
and innovative
evidenced-based
protocols and delivery
of care.*

The role of otolaryngology and audiology

For the specialties of otolaryngology and audiology, this growing population of older adults has special importance. Dizziness, vertigo, and falls are among the top complaints told to physicians by older patients. Family doctors or patients themselves will seek out expertise for these sometimes elusive complaints, particularly when cardiac, neurologic or radiographic studies prove negative. Patients are not content to be told to 'learn to live with it', or that they 'are just getting up there in years'. These better-educated boomers, along with the internet, have changed the way health-care consumers seek solutions to chronic conditions. These conditions have a significant impact on the morbidity and mortality of older adults. A review of the literature over the past 10 years indicates:

- Dizziness is the number one complaint of persons over 70
- 85% of vertigo and balance dysfunction may be inner ear related
- 50% of individuals over 70 will experience Benign Paroxysmal Positioning Vertigo (BPPV)
- Individuals with BPPV have a greater incidence of depression, falls, and reduced activities of daily living
- Falls are the leading cause of accidental deaths in persons over 65
- Falls are the leading cause of traumatic brain injury and bone fractures (femur, wrist, and hip)
- Falls are the 6th leading cause of death for the elderly
- 20% of those who sustain a hip fracture from a fall will die within a year
- Of those who sustain a hip fracture, 49% will die within six months
- Of those who do fall, 20% will require placement within a long-term care facility

Is it normal for older adults to have these symptoms and if so, why? Could any of these conditions be preventable, or is it simply inevitable that older people will suffer from dizziness, vertigo, and falls. What role does otolaryngology and audiology play in the early identification of these 'at risk' older adults? Which evaluation protocols will have the strongest diagnostic efficiency and predictive value to indicate who is most at risk? Finally, what intervention and treatments will be the most effective, keeping individuals safe, independent, and with a higher quality of life.

Normal versus pathologic ageing

Ageing is defined to have begun at birth. The normal ageing process is dependent on the individual's exposure to illnesses, trauma, disease, good genetics, and better nutrition throughout the life cycle. Gerontologists suggest that the primary reason for the increased lifespan is not the result of better medical care for the older adult towards the end of life, but rather due to less exposure to childhood diseases, illness, and the availability of antibiotics and immunisations. Successful ageing typically implies that the individual has enjoyed relative good health through their early years, benefited from good genetics and has practised a healthy lifestyle.

With the ageing process does come an increased prevalence of health issues such as diabetes, cardiovascular disease, arthritis, and a myriad of other medical conditions. However, while medical conditions become more common, it should not be considered part of the normal ageing process. As people age, they become more heterogeneous or different from one another, due to the wide variability in their life experiences.

Health issues associated with dizziness, vertigo, and falls

It is important to recognise that there are many possible causes of symptoms described by patients as dizziness or vertigo. Likewise, falls are less likely to be attributable to ear-related origins, but rather to co-morbidities, which may or may not include otologic disease. The following is an overview of the most common causes and medical conditions:

- **Pharmacy and poly-pharmacy:** Over 1,000 drugs list vertigo as a side-effect, and 2,000 drugs list dizziness. In addition, the effect of poly-pharmacy and drug interaction is nearly infinite. Older adults often are taking numerous prescriptions from a variety of physicians.
- **Vision:** low vision secondary to common age-related degenerative visual conditions – glaucoma, macula degeneration, diabetic retinopathy, retinal stroke.
- **Orthopedic:** arthritis, osteoporosis, history of fractures, ankle, knee, hip or subsequent replacement surgeries all affect biomechanical function.
- **Otologic:** Prevalence of BPPV. Higher incidence of herpes simplex virus (shingles) in individuals over 50 years, leading cause of vestibular neuritis. Estimated that by the age of 80, there could be a loss of 50% of vestibular neurons.

- **Cardiovascular:** Circulatory problems in the lower extremities causing peripheral neuropathy, low cardiac output.
- **Neurologic:** History of stroke, cerebrovascular and vertebrobasilar insufficiencies.
- **Endocrinologic:** An almost epidemic increase in the incidence of diabetes and associated capillary and micro-vascular issues leading to retinopathy, neuropathy, and vestibulopathy. All three of the primary sensory modalities of equilibrium are affected.
- **Sedentary life-style:** Leading to obesity and de-conditioning. This typically begins a domino effect of medical co-morbidities, all of which affect balance function.

Identification of older adults – risk of falling (ROF)

Given the percentage of the population that is 60 years of age or older along with the strain on the economic system and health-care provider capacity, it is impossible and unnecessary to screen or evaluate everyone as they enter the later part of the lifecycle. It would be prudent, however, to identify those individuals whose prior history or present medical conditions place them at elevated risk. The risk factors are as follows:

- **History of falls:** Differentiate falls which have occurred inside and outside of the home. Research has shown this is among the strongest predictors of future falls.
- **Orthopedic:** Prior fractures of the lower extremities, particularly hip weakness.
- **Diabetes:** Vision; retinopathy, somatosensory; neuropathy of lower extremities, vestibular; vestibulotoxic due to its microangiopathic effects, which lead to ischemia of vestibular structures. Also it has been suggested, impaired glucose metabolism may alter labyrinthine metabolism, this affecting its function.
- **History of vestibular disorders** for example Ménière's, neuritis and so on. Especially true of a history of shingles, which has an increased prevalence in those over 50 years of age.
- **Reported fear of falling:** An elevated fear of falling by an individual, whether or not they have actually fallen in the past, has been shown by numerous investigators to have a strong correlation with predicting a fall in the future.
- **Medications:** Studies show individuals who take four prescriptive medications or more have a higher incidence of falls.
- **Low vision:** Fall risk assessment data has indicated that individuals whose best

The practice of otolaryngology and audiology is uniquely trained and possess the expertise to play a critical role in the identification, evaluation, and management of dizziness, vertigo, and falls in the older adult population.

corrected vision is 20/80 or poorer have a higher incidence of falls.

- **Positional vertigo:** Undiagnosed and untreated BPPV has been reported to double the incidence of falls and depression in older adults and reduce their activities of daily living by one half.

Those individuals with none of these ROF indicators have only a 12% chance of falling. Those with three or more ROF indicators have a 100% likelihood of a fall.

Evaluation and management strategies

Studies have shown a poor correlation between both high technology test results that is VNG, rotary chair, Posturography and the results of popular and standardised physical therapy protocols such as the Berg balance test and others. In view of this evidenced-based data, it may be advisable to take a pragmatic approach and not assume that any one technology or specific test result in isolation will produce the exact origin of the patient's symptoms. Nor will they necessarily provide a clear triage for that individual patient. Therefore, the following evaluation protocols and management may be desirable when evaluating patients:

- Test for positional vertigo. Evaluate multiple semicircular canals (particularly posterior and horizontal) when performing positioning tests. Dix-Hallpike will only test the posterior canal.
- Consider cervico-spinal, vertebrobasilar and orthostatic hypotension influences when positioning / positional tests are negative for BPPV. These conditions cannot be ameliorated by canalith repositioning manoeuvres or vestibular rehabilitation therapy (VRT) and are likely contraindicated.
- When performing Videonystagmography (VNG), remember, the absence of a caloric weakness on VNG testing does not preclude a vestibular dysfunction and a caloric weakness likewise may not be the origin of the patient's complaints.
- Include tests of physiological function, that is, Dynamic Visual Acuity, Clinical Test of Sensory Integration of Balance, headshake tests when determining if a patient is experiencing an uncom-

pensated vestibular dysfunction requiring Vestibular Rehabilitation Therapy.

- VRT was developed for those experiencing an acquired vestibular dysfunction. It is based on neural plasticity of the brain. While some individuals with a non-otologic condition may benefit from increased activity, VRT is not intended to treat other non-vestibular forms of dizziness with the same efficacy.
- Balance re-training, fall prevention, and fall recovery strategies are best suited for those with gait, ambulation, coordinated movement and overall balance problems.
- Long-term carry-over or management once VRT or balance retraining is complete. If they have become sedentary or de-conditioned they should be encouraged to engage in an active lifestyle to maintain the long-term benefit of their VRT or balance therapy.
- Evaluate home environment: Recommend they fall-proof their home accordingly.
- Evaluate footwear. Style should not preempt safety.
- Evaluate use of assistive device despite their protestations of appearing 'old'.
- Patient awareness-education. Even the most common-sense advice becomes more meaningful when provided by a medical practitioner.

Patient education: helpful suggestions for older adults

Although it is impossible to guarantee that someone will never fall, the following are helpful suggestions for patients and their families from the American Institute of Balance, Better Balance for Life Patient Education Series:

- Be aware of your surroundings.
- Eliminate excessive clutter.
- Slow down. Move at your own pace.
- Use nightlights.
- Use the restroom frequently to avoid rushing and before retiring to bed.
- Limit or avoid alcohol. For older adults, alcohol alone or in combination with medications increases your risk for a fall.
- Install grab bars in the bathroom and stairways.
- Increase wattage of light bulbs but be careful of adding too much glare.
- Remove throw rugs.
- Arrange frequently used items in cup-

boards and closets within easy reach to avoid using step stools.

- Be aware of long or loose fitting clothing that could become entangled underfoot.
- Be mindful of pets, their toys and water bowls.
- Wear appropriate and well-fitting footwear. Avoid loose fitting slippers or flip-flops.

Conclusions

The world is preparing for the largest demographic of older adults ever to exist on this planet. The practice of otolaryngology and audiology is uniquely trained and possess the expertise to play a critical role in the identification, evaluation, and management of dizziness, vertigo, and falls in the older adult population. These conditions are among the most common complaints of this population and have significant impact on the quality of life and the management of medical economics associated with the fastest growing segment of the world's population. ■

Further reading

1. Gamiz M, Lopez-Escamez J. Health-related quality of life in patients over sixty years old with benign paroxysmal positional vertigo. *Gerontology* 2004;**50**:82-6.
2. Gans R, Crandell C. Overview of BPPV: evaluating treatment outcomes with clinimetrics. *Hear Rev* 2000;50-4.
3. Oghalai J, Manolidis S, Barth J, Stewart M, Jenkins H. Unrecognized benign paroxysmal positional vertigo in elderly patients. *Otolaryngol Head Neck Surg* 2000;**122**:630-4.
4. Roberts R, Gans R, Kastner A, Listert JJ. Prevalence of vestibulopathy in benign paroxysmal positional vertigo patients with and without prior otologic history. *Int J Audiol* 2005;**44**(4):191-6.
5. National Institutes of Health, Deafness and other Communication Disorders NDICD; 2011. [www.nidcd.nih.gov/health/balance/balance_disorders.html]
6. National Institutes of Health, NIH Senior Health, Falls and Older Adults; 2011. [www.nihseniorhealth.gov/falls/toc.html]
7. Tinetti ME. Multifactorial fall prevention strategies: time to retreat or advance. *J Am Geriatric Society* 2008;**56**(8):1563-5
8. Tinetti ME, Kumar C. The patient who falls: it's always a trade off. *JAMA* 2010;**303**(3):258-66.
9. United Nations Department of Economic and Social Affairs Population Division; 2011. [www.un.org/esa/population/worldageing19502050/]
10. World Health Organization; 2011. [www.who.int/ageing/en]