10 factors that undermine our balance as we age

There's a maxim I recall from my hospital training in the 80s: *"GOMERs go to ground."*

It was one of the sardonic 10 Commandments from Samuel Shem's (real name Samuel Bergman, MD) "The House of God". The 1978 book became anodyne to our arduous residency training when we routinely pulled 100 hour+ weeks. Exhausted and beleaguered, our "esprit de corpse" (deliberate pun) was buoyed by Shem's cynical humor.

GOMER is an acronym for "Get out of my emergency room!" and refers to the endless parade of elderly debilitated patients who seemed the banes of our existence. We were on overload, and every new admission of a complex senior with limited life expectancy meant a diversion from caring for our more viable charges. Sounds cynical, but we young doctors were in survival mode.

And, as if in confirmation of Newton's inexorable laws of gravity, our frail admittees would often go to ground. Each fall guaranteed another long convalescence on our wards, with the risk of more medical complications, straining our patient care responsibilities to the breaking point.

The CDC informs us that:

- Each year, three million older people are treated in emergency departments for fall injuries.
- Over 800,000 patients a year are hospitalized because of a fall injury, most often because of a head injury or hip fracture.
- Each year at least 300,000 older people are hospitalized for hip fractures, 95% of which are caused by falling.
- In 2015, the total medical costs for falls totaled more than $50 billion. Medicare and Medicaid shouldered 75% of these costs.

We tend to think of fractures as merely the consequence of weak bones. DEXA bone density tests yield an estimate of the 10 year likelihood of a major fracture. We pump patients full of medications to forestall their bone loss, but it's falls that actually precipitate most fractures.

Many factors converge to undermine our balance as we age:

Vestibular system: The inner ear contains the vestibular system—a complex set of fluid-filled tubes that contributes to our sense of balance. Semicircular canals oriented in three dimensions contain fluid and tiny particles that slosh around like snow globes with movement, sending nerve impulses to the brain via tiny hair-like mechanoreceptors.

Animals like cats and squirrels have highly-developed vestibular systems, enabling them to right themselves as they fall from heights. Humans—unless you're a highly-trained gymnast or trapeze artist—less so. As we age, the vestibular system deteriorates. Our ability to orient in space declines. Vertigo may develop. Short of that, unsteadiness of gait.

Vestibular rehabilitation—in which a series of exercises is designed to gradually reaccustom patients to position change—can help in fall prevention.

Brain: The cerebellum is important for making postural adjustments in order to maintain balance. It integrates signals from the eyes, vestibular system, muscles and sensory nerves in the feet to keep us upright.

Additionally, other parts of the brain are responsible for responding to imminent falls. 20-something hard-to-tackle running backs excel at keeping their footing; the average octogenarian has slowed corrective reactions. A crack in the pavement can send them flying.

Certain neurological diseases like multiple sclerosis and Parkinson's Disease amplify the risk for falls, as does the aftermath of strokes.

Muscles: A universal tendency is for muscles to decline in volume and strength as we age—a process called sarcopenia. As muscles weaken and shrink, their ability to recover from minor pratfalls decreases.

Exercise—especially weight-bearing regimens—can stave off sarcopenia. So, too, does adequate protein—which many seniors don't get enough of.

Vitamin D has also been shown to be effective in fall prevention because it supports muscle strength.

Joints: As we age, our collagen deteriorates, resulting in tears and thinning of

articular cushioning. Moreover, a high percentage of seniors have osteoarthritis, with inflammation-mediated joint damage. Hips, knees, ankles and feet are frequently affected. These changes restrict mobility and undermine gait stability.

Anti-inflammatory nutrients like glucosamine/chondroitin, collagen, curcumin, Boswellia, ginger, and omega-3s may help to forestall joint problems; by contrast, NSAIDs and steroid injections, while temporarily reducing pain, may ultimately accelerate joint deterioration.

Obesity: Does being overweight increase the risk for falls? According to one comprehensive review of multiple studies, it does. Overweight individuals were at 18% higher risk of falls. But, paradoxically, there was *no evidence* of increased fractures. The possible reason: one advantage of carrying extra weight is increased bone density, reducing fragility.

Conversely, elderly *frail* individuals, who are frequently underweight, undoubtedly have a greater risk of falls resulting in fractures.

Spine: Another common consequence of aging is spinal stenosis—impingement of the spinal canal by osteoarthritis. This cuts off nerve impulses to the lower extremities, resulting in weakness or numbness.

Once it's advanced, spinal stenosis is hard to reverse. That's why back flexibility exercises, an anti-inflammatory diet, and an anti-inflammatory supplement regimen deserve early implementation for prevention.

Vision: Visual deficits including cataracts, macular degeneration and glaucoma may limit older individuals' ability to discern obstacles or maintain depth perception.

Proprioception: This is the sensory faculty that enables us to feel the ground and discern the positions of our limbs. Neuropathy, due to a variety of causes, or merely the consequence of aging, may make us feel like we're walking on mush.

There are sometimes nutritional contributors to neuropathy; supplementation of B1 or B12 can help relieve it. Diabetics frequently suffer from numb or painful feet; alpha lipoic acid and acetylcholine-l-carnitine are neuroprotective.

Drugs: Polypharmacy is rife among the aged; the more drugs you take, the greater the risk for falls. Blood pressure meds can make patients dizzy or cause fainting. Sleep meds can leave patients drowsy and disoriented. Psych meds can cloud perception. Pain meds slow responses. Diabetes drugs can drop blood sugar so low that patients pass out.

And it's worthwhile mentioning that your tolerance for alcohol decreases as you age.

Heart: Worth mentioning in terms of risk factors for falls, bouts of low heart rate (bradycardia) can drain blood from the head and make seniors woozy; the fix is a pacemaker. For the same reason, atrial fibrillation can hike susceptibility to falls, according to studies.

With all these factors conspiring together as one ages, it's no wonder that, eventually, "GOMERs go to ground". What's the answer?

Fall prevention campaigns: The global osteoporosis drugs market annual sales was valued at $14.6 billion in 2021, and the market size is predicted to reach $23 billion by 2030. Would that even a small fraction of that outlay were to be

allocated to fall *prevention!*

But fall prevention is gaining traction. Physical therapists are increasingly attuned to their senior clients' needs to address balance deficits with specialized training. These emphasize lower extremity strength but also improvements in gait. A series of simple balance-training exercises can be found here.

Dancing, stationary bicycling, yoga and Tai Chi are excellent ways to engage seniors in exercise for fall prevention.

A comprehensive program of fall prevention should include a review of patients' medications with a view toward deprescribing superfluous drugs; a thorough audit of the home environment for obstacles; an evaluation of nutritional status to ensure adequate protein, vitamin D and critical B vitamins; remediation of visual deficits; as well as exercise, along with physical therapy to address vulnerabilities.

The message is clear: when it comes to falls, use it or lose it. Starting in middle age might give you a leg up.