

Stay Safe!

Fall Prevention



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2019 Polio Health and Wellness Retreat, Baulkham Hills, NSW.

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Thanks to Maryann and the team for the invite, and for the opportunity to present to and meet you all.

Session Structure

We have about 90 minutes to cover the following:

- **SLIDES (20):**

- Health impact of falls
- Three risk categories for falls
- Polio and falls
- Prevention for falls

- **SHARED EXPERIENCES:**

- What is your fall risk?
- Pick three things to change!
- What do you tell your doctor?
- Open discussion and questions

It's 17x per hour



It's a risky environment

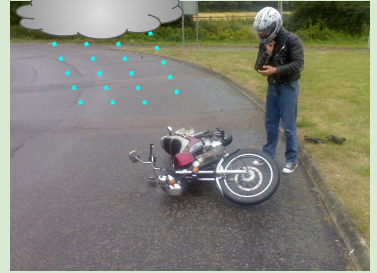


It's technology



Humans 'fall' under very different circumstances.

MATCH PHRASE TO PHOTO!



It's their job

It's the weather

It's for fun

"17x per hour" = toddlers; learning to walk.

"It's technology" = the upside down girl; selfies!

A 2018 study of news reports showed that between October 2011 and November 2017, there were 259 selfie deaths in 137 incidents reported globally, with the highest occurrences in India followed by Russia, United States, and Pakistan. The mean age was 23 years old, with male deaths outnumbering female about three to one. [from Wikipedia] AUSTRALIA = 4 incidences, 9 casualties (one event was 6 deaths in a plane that lost control after passenger elbowed the pilot in the head).

General population aging, and responses to a health event. This is NOT specific to any health event or diagnosis.

Event could be anything that causes a change in functional status. Appreciate that we have different trajectories.

GREY line = our maximum potential gradually reduces as we age.

BLUE line = health event where we can continue to function independently, although maybe not easily. First up arrow is a quick recovery, second is a longer recovery, third is still functional but not recovering highest potential function.

RED line = Health event which causes a loss of function to where someone needs assistance. Red arrows show different possible trajectories of recovery.

Falls and Their “Impact”

1. The 7th leading cause of **unintentional injury and death** in people > 65 y.o., is falling
2. Falls are the most common cause of **traumatic brain injury**.
3. **Hip fractures** are the most serious fall injury (95% of hip fractures are due to falls).
4. Of the 1% of elders who fall and sustain a hip fracture, **20-30% die** within one year of the fracture.
5. **Costs increase 3 to 7 fold** for treatment and services.

In elders who experience one or more injurious falls **in the general population**:

- a. home health costs increase **seven-fold**
- b. hospitalization costs increase **three-fold**
- c. emergency room costs increase **four-fold**

Category One: Intrinsic Factors

- **History of falls**
- **Age**
- **Gender**
- Living alone
- **Ethnicity**
- Sedentary behaviour
- Fear of falling
- Medication use (if >3 prescribed;
tr tranquilizers, sedatives, or antidepressants)
- Vitamin D deficiency

Physiological

- Heart arrhythmias
- Dizziness, lightheadedness, or disorientation
- Nausea
- Pain
- Weakness or fatigue
- Vision problems
- Poor sensation in legs/feet
- Balance deficits

This is for the general elderly population. NOT polio or other diagnosis specific. These factors are the internal or intrinsic or INDIVIDUAL specific variables. **Bold** items are **non-modifiable** ones. Other items can all can be modified with interventions, strategies, education.

Category Two: Extrinsic Factors

- **Rugs**
- **Cords**
- Pets
- Footwear
- Clothing
- **Poor lighting or light transitions**
- Wet or icy areas
- **Stairs**
- Ramps or driveways
- Time of day
- Irregular surfaces
- New or unfamiliar environments
- Inappropriate walking device

EXTRINSIC variables are things in the environment in which you exist. The **bold** items are the BIG FOUR that are most common in reasons for falling in the elderly. These are all modifiable, but you have to identify them... and then DO SOMETHING about them. Take action!

LIGHTING: No less than a 60W bulb, and only use nightlights for turning on a regular light, not to navigate a room by!

Category Three: 'U' Shaped Risk

LOW Activity Extreme

- Wheelchair dependent
- Bed bound
- Severe debility
- Cognitive deficits

This group has difficulty with
low level mobility.

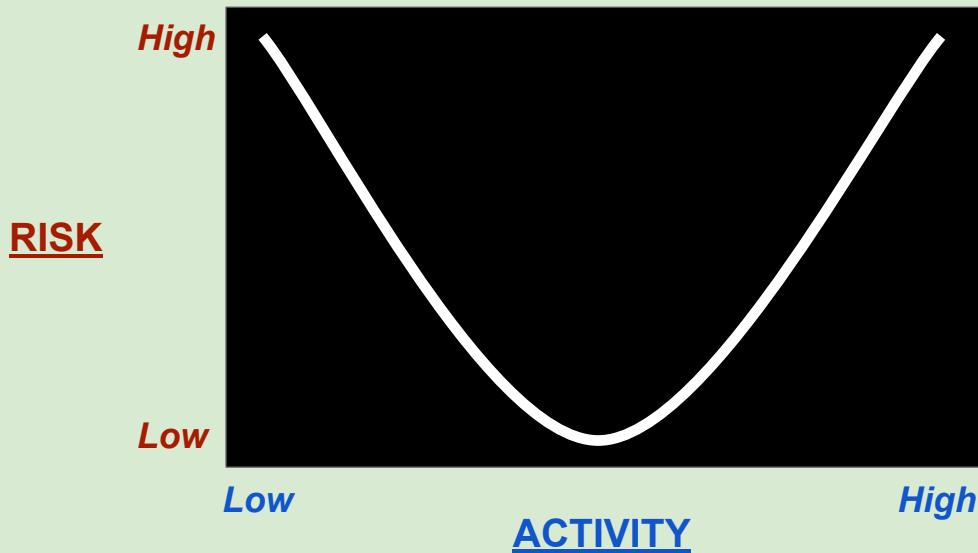
HIGH Activity Extreme

- Tennis players
- Skiers
- Starting a new sport
- Gardening

This group participates in very
dynamic or new-skill activities.

This is how you physically engage with your environment. Both extremes are HIGH risk for falls! The middle level of function is the lowest risk (not explained on this slide); this being harder to define or identify the "sweet spot" as it is very individual. See next slide for better visual of the 'U'.

U-Shaped Fall Risk Association



High risk for both very low and very high activity levels. Each activity has an inherent risk.

Even lying down can be risky, because you can roll off a bed!

Activities That Make You Most Likely to Fall

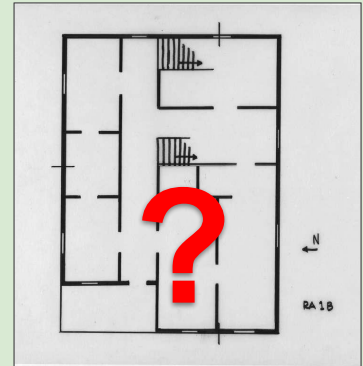
1. The **most common activities** associated with elderly falls are:

a. **Walking**

- i. level ground
- ii. going up/down stairs

b. **Transferring**

- i. beds, chairs
- ii. toilets and in/out of the bathtub or shower



This is a general consensus from the literature on general elderly population, stroke populations, multiple sclerosis populations, and polio populations.

The picture with the '?' on the right is a floor plan - most falls occur in the home or inside.

Table 2.
Fall Incidence, Location, Circumstance, and Injury by Faller Classification

	One Fall		More Than One Fall	
	N	%	N	%
Fall incidence and injury	21	43 ^a	28	57 ^a
Fracture	0		3	
Soft tissue	3		1	
Cuts	1		1	
Bruising	5		6	
No injury reported	12		17	
Fall circumstances	21		96	
Location				
Indoor	13	62 ^b	52	54 ^c
Outdoor	5	24	40	42
Unknown	3	14	4	4
Activity				
Walking	10	48	58	60
Standing (turning)	4	19	14	15
Transferring	5	24	14	15
Stairs	2	10	3	3
Unknown			7	7

^a Percentage derived by total number of participants who fell (n=49).

^b Percentage derived by total number of falls (n=21) by participants who fell once.

^c Percentage derived by total number of falls (n=96) by participants who fell more than once.

STROKE POPULATION

Commonality is unilateral weakness

- **Indoors = 56%** of the falls
- In **own home = 62%** of indoor
- Activity at time = **51% walking**
- **41%** reported an injury, with most (**85%**) then seeking medical attention

KEEP THESE NUMBERS IN MIND AS WE SOON DISCUSS THE POLIO FALLS PROFILE!

Harris JE, et al, 2005. Relationship of balance and mobility to fall incidence in people with chronic stroke. Phys Ther. 2005;85:150-158.]

Falls indoors accounted for 56% of the falls, with 62% of these in own home. The most frequent activity at the time of the fall was walking (51%). Of the 49 participants who reported a fall, 41% reported an injury, with 85% of those seeking medical attention.”

Polio: Asymmetrical Weaknesses, With 'Most of the Crew Absent'.

Muscle Grade in Polio Survivors % of Functioning Muscle Fibers in Muscles Having This Muscle Grade

5	53.5% to 100%
4	42.5%
3+	9.5%
3	9.1%
3-	6.3%
2	2.5%
2-	1.9%
1	1.0%
0	0.7%

<http://www.post-polio.org/edu/hpros/ptexamtreatmtc.pdf>

NOW WE ARE POLIO SPECIFIC!

Polio analogy = viking boat with 100 oarsmen = 100%. With Polio, you lose oarsmen (motor neurons), and in recovery some of the remaining oarsmen start using a few oars.

To show a normal manual muscle test (MMT) a person post polio may only have 53.5% of their fibers working, but those fibers can apply normal strength. All other grades of MMT show less motor units (oarsmen) able to apply force. Notice the severe drop off at MMT of 3+. Less than ten oarsmen trying to propel the ship forward.

Loss of strength = decreased power to halt a fall; a decreased reaction adequacy. Stability and variability with movement (asymmetry) increases fall risk; step width variability (staggering with wide feet) is a high risk for falls, while increased step length variability shows adaptability/responsiveness and lower risk for falls.

Polio and Falls: Some Research

- **Circumstances and Consequences of Falls** (Bickerstaffe et al.)
- **Falls, Fear of Falling, Impairments, Walking Limitations**
(Brogårdh, Lexell)
- **Challenges of Lower Limb Fractures** (Gupta)
- **Aging Well With PPS** (University of Washington)

These are the four articles we will discuss, now SPECIFIC to polio population.

Circumstances and Consequences of Falls

(Bickerstaffe et al., J Rehabil Med 2010; N=376)

- Polio survivors fall up to **4 times as much** as similar community-dwelling adults
- **Most sustained an injury** after a fall in the last year
- Falls occur in the **afternoon**,
- Falls usually occur **during walking**
- Falls occur in a **familiar environment**; hence the importance of removal of domestic hazards.

BIG THREE: Quadriceps* weakness of the weak leg, fear of falling, frequent complaints of imbalance.

“Tailor-made interventions are required and, based on our findings, these should focus on: increasing safety of walking and reduction in domestic hazards, reduction in fear of falling and on increasing muscle strength or stability where possible (especially).”*

Why afternoon walking at home? FATIGUE! A bit like MS where there are ‘only so many spoons to use’; this is a energy conservation and planning analogy used in MS populations. If you play hard early, expect to have diminished function later in day. Afternoon or evening falls suggest that the weakness is at a threshold of function for a few hours, but very easily fatigued to be non-functional. Time to consider AT or WC or scooter.

“Tailor-made interventions are required “ this states that every case is different. There is no cookie-cutter approach.

IN A KOREAN STUDY: Nam KY, et al. J Korean Med Sci. 2016.

- Most falls occurred during ambulation (76.6%), outside (75.2%) and by slipping down (29.7%).
- Of fallers, 23.3% reported fractures specifically.

Falls, Fear of Falling, Impairments, Walking Limitations

(Brogårdh and Lexell., <https://onlinelibrary.wiley.com> 2014; N=325)

Similar findings to Bickerstaffe et al.

- Doctors
- Orthotists
- Physiotherapists
- Occupational therapists
- Social workers
- Polio Australia

“To reduce falls and fear of falling in persons with late effects of polio and to increase their activity level and participation in various life situations, evidence-based interdisciplinary fall management programs are needed.”

“evidence-based interdisciplinary fall management programs are needed”...
this is what a POLIO CLINIC model provides - key clinicians performing assessments and evaluation and contributing to education and an individual patient plan.

Challenges of Lower Limb Fractures [1 of 2]

(Gupta, Delhi Orthopedic Association 2016; N=NA)

TABLE 1. Polio and Fractures

- Polio predisposes to falls
- Proximal femur fractures common
- Osteoporosis increases the risk
- Fractures show normal healing
- Difficult to manage (...?!)

Conservative Management Option?

"...predisposes to further reduction in mobility of the patient, increasing loss of muscle mass and strength and osteoporosis of the already porotic bones in addition to the other known hazards of prolonged recumbency." (joint contractures, pressure sores)

This is a heavy article to read.... even for clinicians! Table one and two nicely draw out some practical information in point form.

Conservative management is always an option, but for the polio survivor, recumbency can be very debilitating in a motor ability sense.

Notice that this is for LOWER LIMB fractures. Upper limb fractures and surgery are different as they often have a 6 week protection phase BEFORE you can do anything with the limb. There's a lot to consider.

Challenges of Lower Limb Fractures[2 of 2]

(Gupta, Delhi Orthopedic Association 2016; N=NA)

TABLE 2. Hip fractures in polio patients. *(The “Difficult to manage” bit...)*

- Higher incidence
- Difficult reduction and fixation (small, valgoid, anteverted femoral necks)
- More chances of nonunion and implant failure
- Dynamic hip screw or cannulated cancellous screw fixation may not be possible
- May require proximal femur locking plates or rarely external fixators
- Nonunions very difficult to manage
- Limited arthroplasty options (altered anatomy, paralyzed limbs, contractures, etc.)

The last item in Table 1. is a bit of a questionable comment that leaves one hanging. In Table 2. The explanation is given (phew!) The “difficult” is related to anatomy, physiology factors, and viability of surgical options.

Why all the fuss about hip fractures?

*“One in three adults aged 50 and over dies within 12 months of suffering a hip fracture. Older adults have a five-to-eight times higher risk of dying within the first three months of a hip fracture compared to those without a hip fracture. This increased risk of death remains for **almost ten years.**”*

Sharon Brennan-Olsen Senior Research Fellow, NHMRC Career Development Fellow, University of Melbourne, in 2018.

<https://theconversation.com/why-hip-fractures-in-the-elderly-are-often-a-death-sentence-95784>

REASONS: comorbidities, clots, infection, pneumonia, cardiopulmonary complications, worsening debility, a sign of decline, nursing home admittance.

“Prevalence of chronic diseases at baseline was found to have a **super-additive** effect with hip fractures on mortality“

“It seems that although hip fracture incidence in men is substantially lower compared to women, mortality after hip fracture is higher in men”

FACTORS NOT RELATED = Obesity or living at home.

Aging Well With PPS

(University of Washington, Post-Polio Health, 2011; N=447)

What can you do to prevent falls?

“Knowledge is half the battle. Falls inside the home have been linked to stairs with four or more steps, slippery floors, sliding rugs, low lighting levels, missing handrails, uneven flooring and obstructive walkways. Falls outdoors are often linked to walking on uneven or cracked sidewalks, curbs or streets.”

- **Have vision and hearing checked.**
- **Talk to your doctor** about side effects of medications (and also your fears and abilities).
- **Keep your home safe** – remove things from stairs and high traffic areas. Keep clutter down!
- **Improve the lighting** in your home.
- **Consider footwear and surfaces.**

Look up, look down, look around. Like crossing the road.

Prevention of Falls

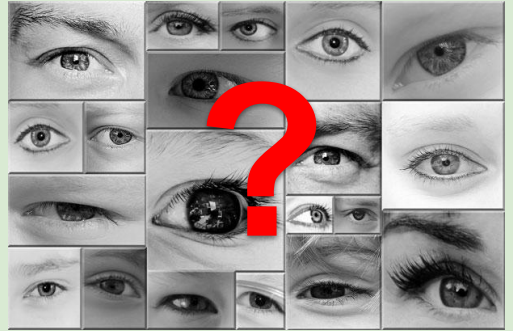
Reduce i_____c factors.

Reduce e_____c factors.

Appreciate your a_____y level risk.

If fearful of falling, i_____m your d_____r.

Look u__! Look d_____! Look a_____!



What do adults say to children when crossing a road? You need the same vigilance when walking and transferring.

SHARED EXPERIENCES

- **What is your fall risk?**
- **Pick three things to change!**
- **What do you tell your doctor?**
- **Open discussion, questions.**

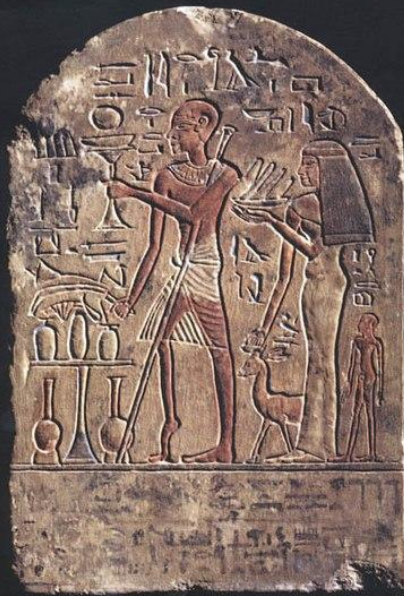


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Discussion Notes

- **We discussed many things in the remaining time, notably:**
 - How to fall (crumple/roll with it if falling onto on a basic surface)
 - How to get up (it's not a race; communicate; plan the recovery)
 - Footwear (firm fitting, firm sole, sharp edged sole are best)
 - Personal scenarios and circumstances with falls
 - How our youthful optimistic minds don't appreciate aged bodies
 - Using the right device, using prescribed AT, knowing your limits
 - More eyes on your profile/environment = more identification of risk = more ability to do something to reduce the risk = less falls

October is
Polio
Awareness
Month



2019:
Access.
Inclusion.
Equality.