Finding Balance

— Please Join Us For —

Practitioners' Day 2019

Presented by: Injury Prevention Centre | Alberta Health Services

Collaborating to Prevent Falls

Do you work with older adults and want to know more about preventing falls? Join us!

Date: **Thursday, October 17, 2019**
Main Location: Red Deer Regional Hospital Centre: Dana Soltes Auditorium
Other Locations: Via Telehealth sites across Alberta
Time: **8:30 am – 12:00 pm**

Search for **Injury Prevention Centre Events on Eventbrite** and **register online**.
Some travel may be required to reach your nearest Telehealth site.

Stay Independant. Prevent Falls.

Reducing falls and related injuries: a paradigm shift

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Internist/Geriatrician

Red Deer Regional Hospital Centre, Central Zone

17th October 2019

Alberta Health Services

Disclosure

- Relationships with commercial interests:
  - None

Mr JC

- 85 year old male, retired teacher
- Usually fit and well – independent with his ADLs and IADls
- Very active – cross country skiing, hiking, wlking and weightlifting
- Very supportive family
- GP referral - functional and cognitive decline

*Composite patient details disguised

Mr JC

- GP referral - functional and cognitive decline
  - 2 falls in last 2 weeks
  - Some concerns around driving
  - Caregiver for wife who has dementia. Wife has recently moved to a care home as was increasingly difficult to manage at home
  - Hearing and visual impairment

*Composite patient details disguised

Mr JC

- Past medical history:
  - Remote prostate cancer
  - Graves disease, radioiodine treatment
- Medications:
  - Synthroid 88mcg daily
  - Tamsulosin 0.4mg daily
  - Zopiclone 5mg prn

*Composite patient details disguised

Expectations/Questions from Mr JC

- Why did it happen?
- What is the cause?
- How do I stop it happening?
- Will it happen again?

*Composite patient details disguised

Learning objectives

- Why did it happen?
  - Understand the scale of the problem
- What is the cause?
  - Understand the common causes of falls in older adults
  - Understand pathophysiology of gait disorders
- How do I stop it happening?
  - Identify evidence based falls prevention strategies
- Will it happen again?
  - Shifting paradigm

Why did it happen?

Scale of the problem

- 1/3 of people >65 years old fall each year and 1/2 if > 85 years
- 68% of these had an injury - Leading cause of injury for seniors across all Canadian provinces and territories
- 24% of these injuries required intervention from a healthcare professional
- 35% of those who have a fall have a subsequent decline in function
- **66% chance of having another fall within a year after a first fall**
- It accounts for over 85 per cent of all injury-related hospitalizations

WHO Factsheet

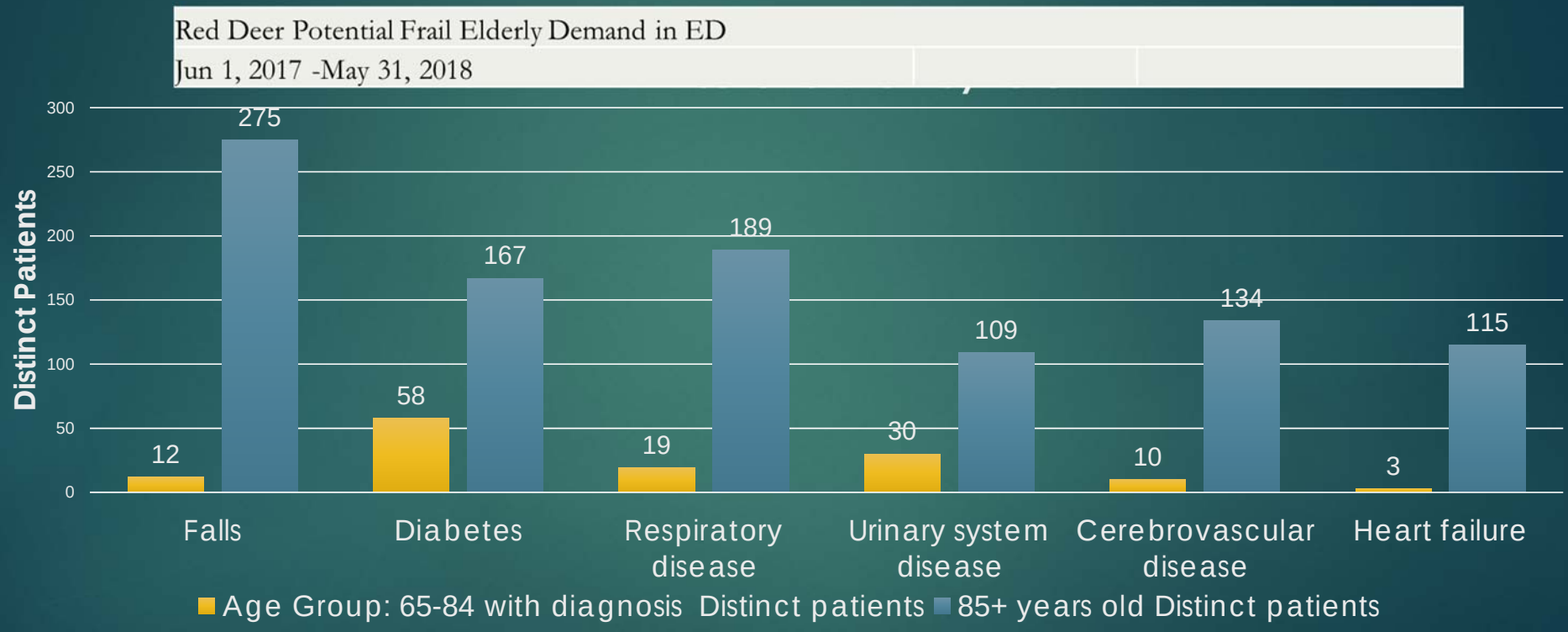
Scale of the problem

- The total economic burden of falls is estimated at $6 billion annually.
- Direct health care costs for fall-related injuries are $2 billion annually.
- By 2031, it is projected that approximately $4.4 billion will be spent on direct health care costs for fall-related injuries for seniors.
- The average acute length of stay for a fall-related injury was 80 per cent longer
- 8% of fall-related hospitalizations ended in death

Scott, V., Wagar, L., & Elliott, S. (2011, April 1). *Falls & related injuries among older Canadians: fall-related hospitalizations & prevention initiatives.*

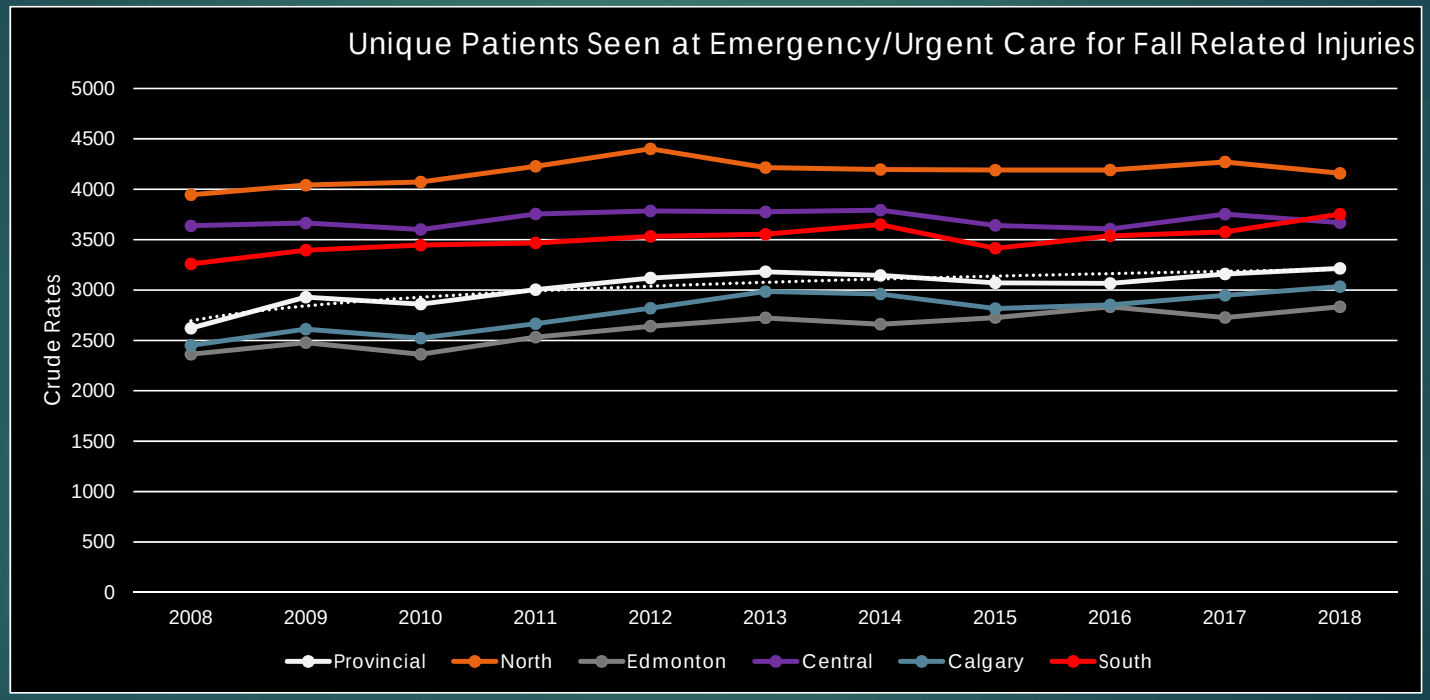
Parachute. (2014). Fall prevention. Retrieved from http://www.parachutecanada.org/injury-topics/item/fall-prevention1.

RDRHC Emergency Unit Top 8 ICD code for older adults living with frailty

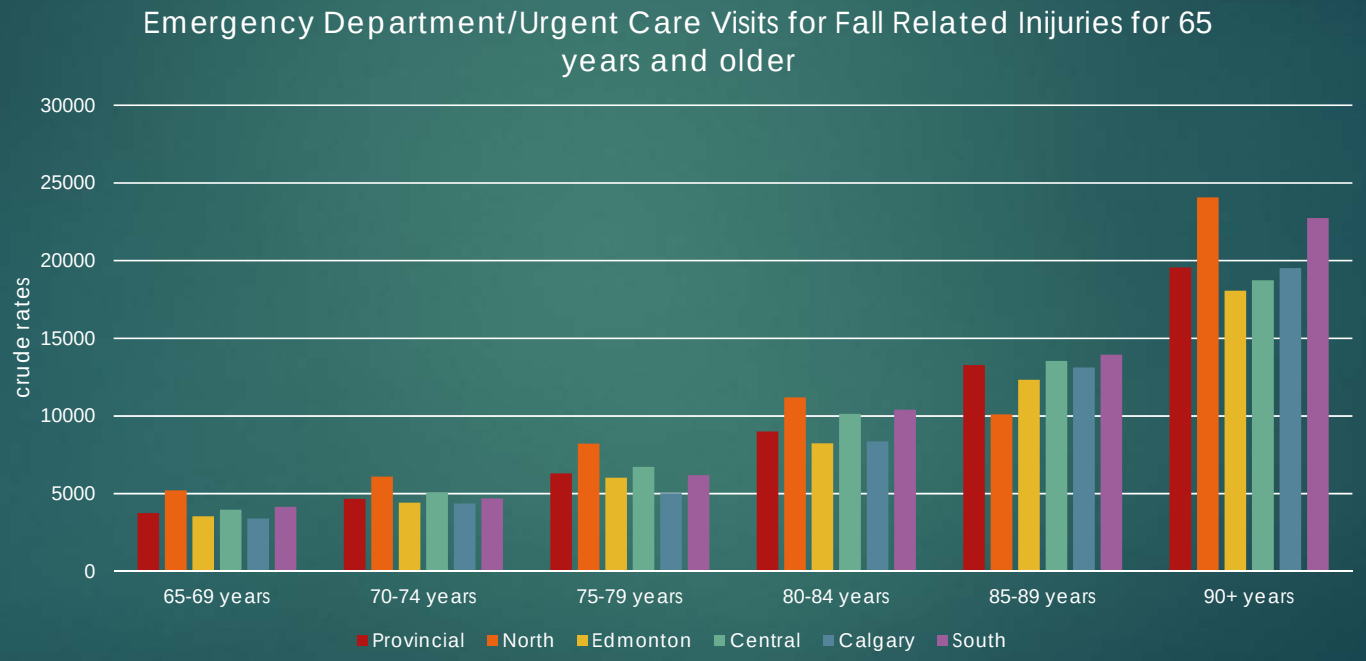


Data source: National ambulatory care reporting systems (NACRS)

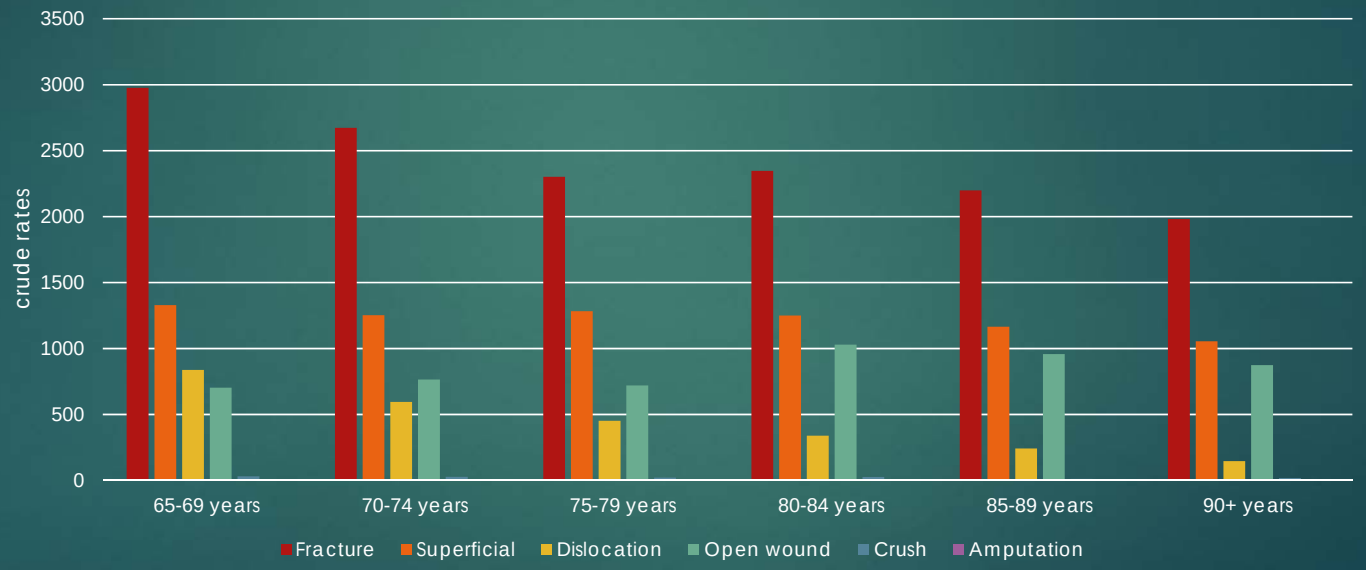
Unique Patients Seen at Emergency/Urgent Care



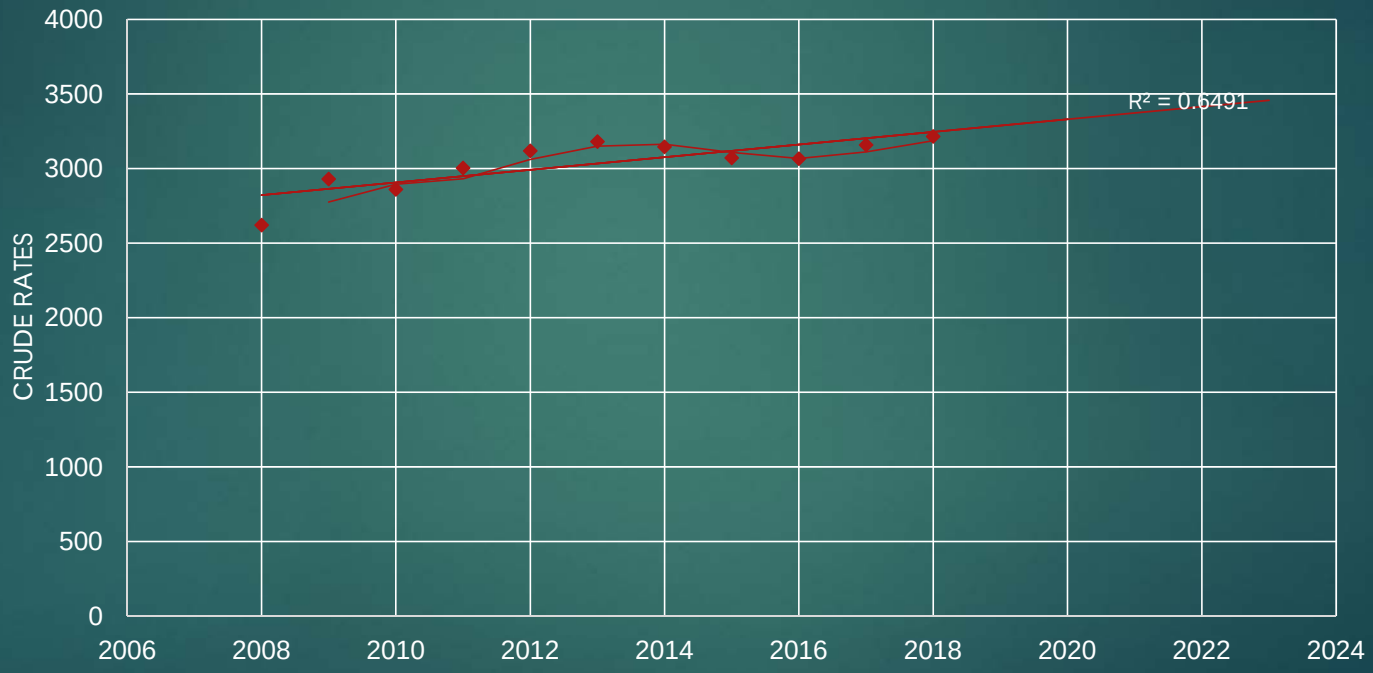
As Older Adults Age the Crude Rates for Fall Injuries Increase



Severity of Older Adult Fall Injuries seen at Emergency Department/Urgent Care 2018



Linear Provincial Forecast of Fall Injuries



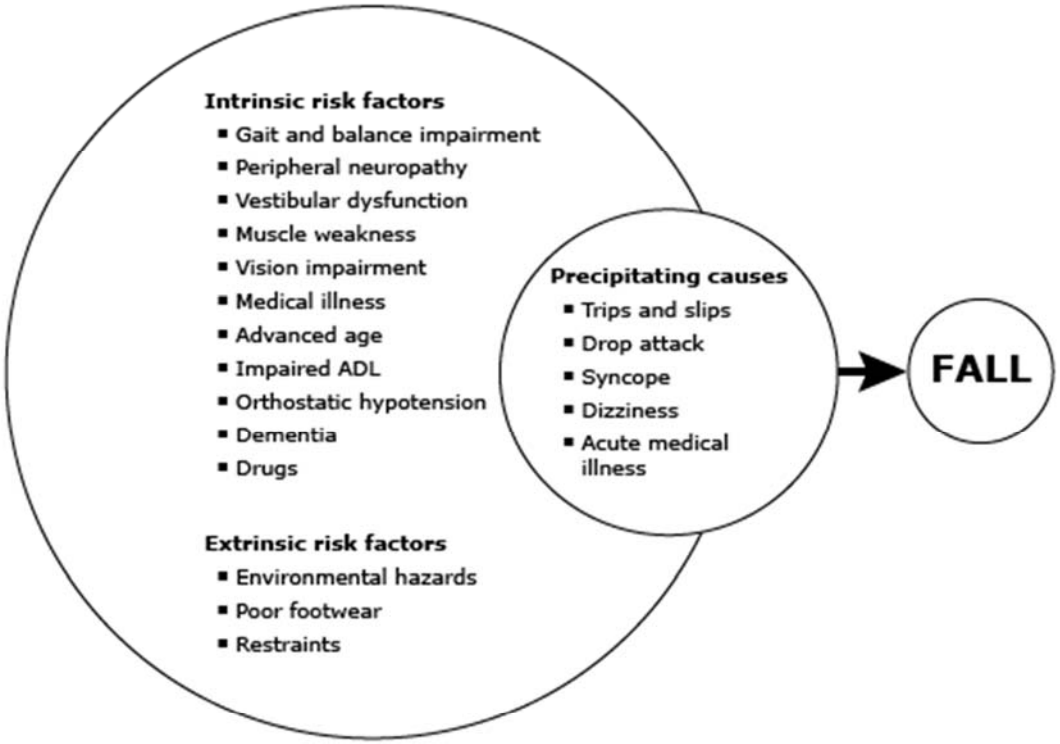
What is the cause?

Common causes of falls

Most likely cause for falls in elderly living in community	%	Range
Accident/environment-related	31	
Gait/balance disorders or weakness	17	(1-53)
Dizziness/vertigo	13	(4-39)
Drop attacks	9	(0-30)
Confusion	5	(0-52)
Postural hypotension	3	(0-14)
Visual disorder	2	(0-24)
Syncope	0.3	(0-5)
Other specified causes	15	(0-3)
Unknown	5	(2-39)
		(0-21)

The epidemiology of falls and syncope. *Rubenstein LZ, Josephson KR. Clin Geriatr Med 2002;18:146..*

The multifactorial and interacting causes of falls



ADL: activities of daily living.

Gerontology & Geriatric Research

Singh, et al., Gerontol Geriatr Res 2015, S4:001
http://dx.doi.org/10.4172/2167-7182.S4-001

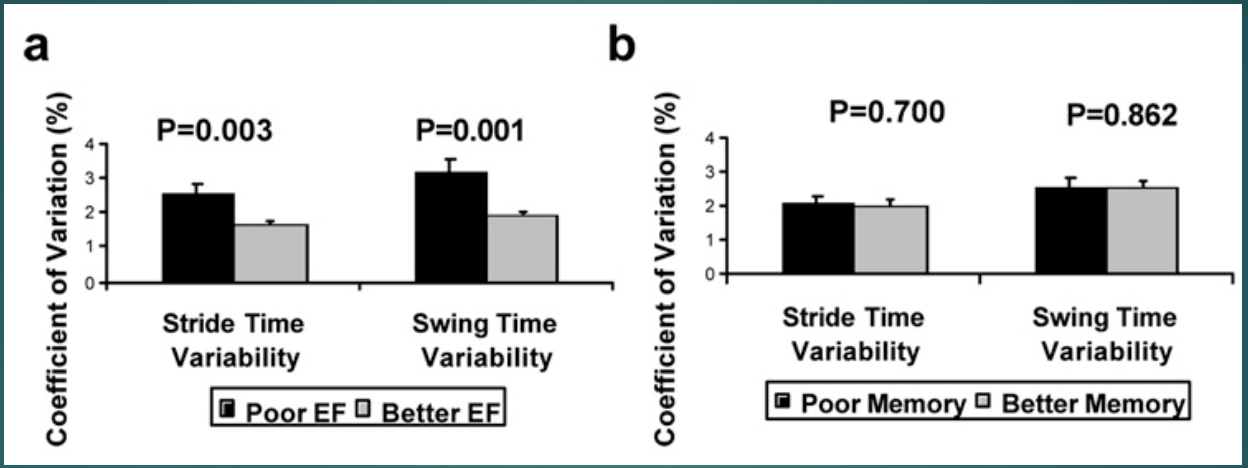
Research Article Open access

Impact of Cognitive Impairment on Inpatient Falls in Single Room Setting and its Adverse Outcomes

Singh I[1*], Edwards C[2] and Okeke J[3]

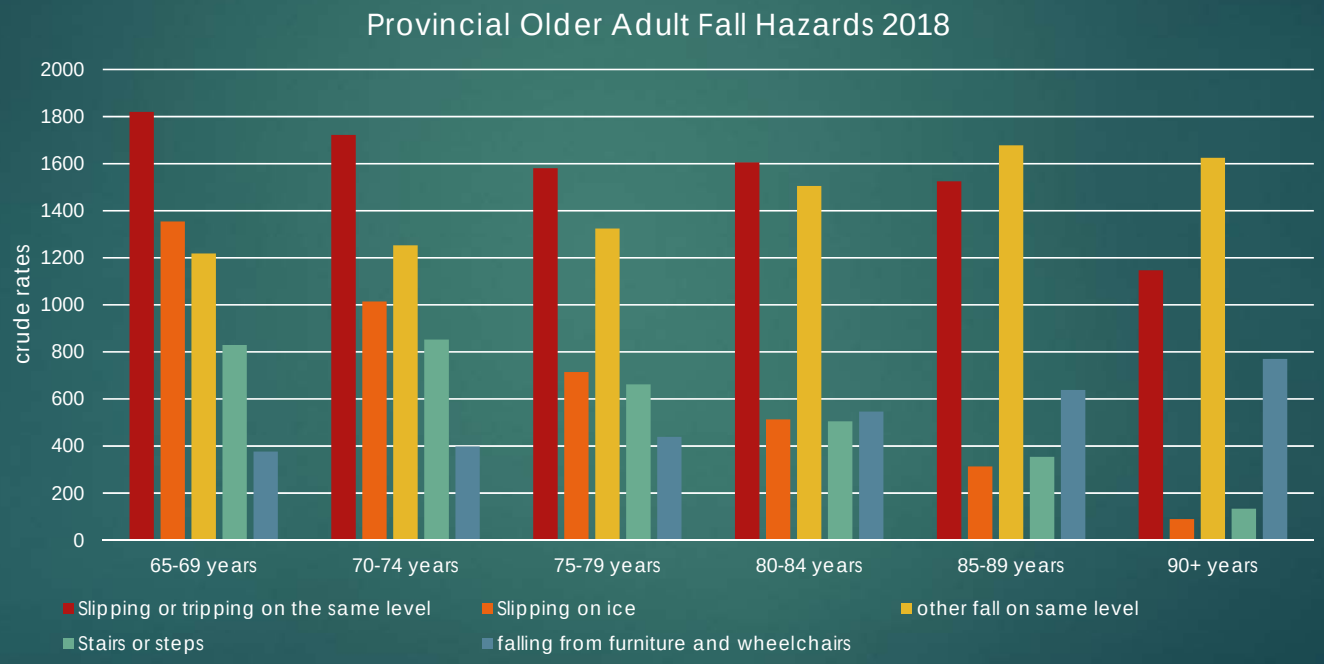
- This was a retrospective observational study. 1611 falls incidents over the review period.
- Cognitive Impairment (CI) was defined on the basis of case notes recording of dementia, CI, chronic confusion, functional impairment due to memory problems or MMSE/MoCA< 25.
- 25% had cognitive impairment and recorded more than 50% of falls incident
- **Conclusion**: Older people with CI have significantly higher incidence of inpatient falls

Gait variability and cognition



Among older adults, a) measures of gait variability are associated with executive function (EF), but not with memory b). Adapted from Hausdorff et al. (2005).

Fall Hazards for Older Adults Change with Age



Gait disorders

- Gait disorders are a major cause of functional impairment and morbidity in the elderly population
- Most gait disorders in elderly people are multifactorial and have both neurologic and non-neurologic components

Gait disorders

- Neurologic causes:
  - Hemiparetic, Paraparetic, Sensory, Steppage
  - Petit pas, Apraxic, Propulsive, Retropulsive
  - Ataxic, Waddling, Dystonic, Choreic
  - Antalgic, Vertiginous, Psychogenic

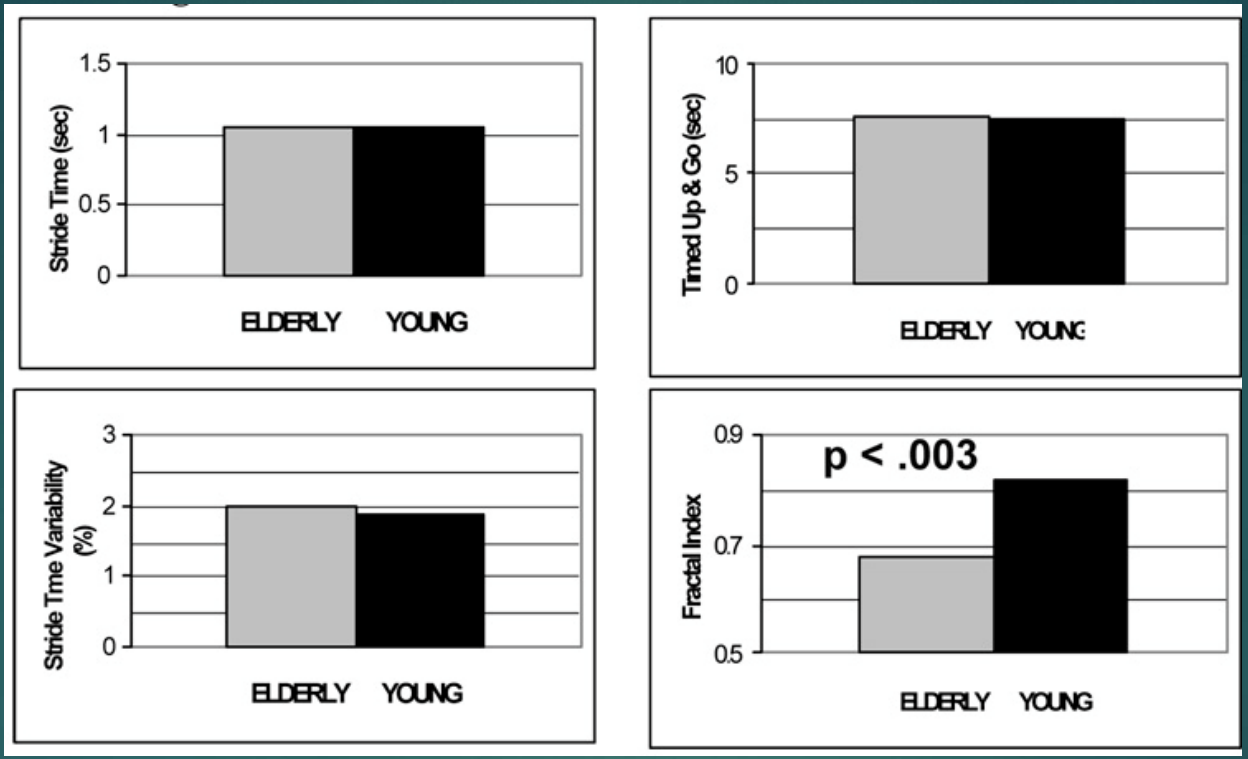
Gait disorders

- Non-neurologic causes:
  - Visual loss
  - Orthopedic disorders
  - Rheumatologic disorders
  - Pain
  - Side effects of drugs
  - Cardiorespiratory problems
  - Multifactorial gait disorder

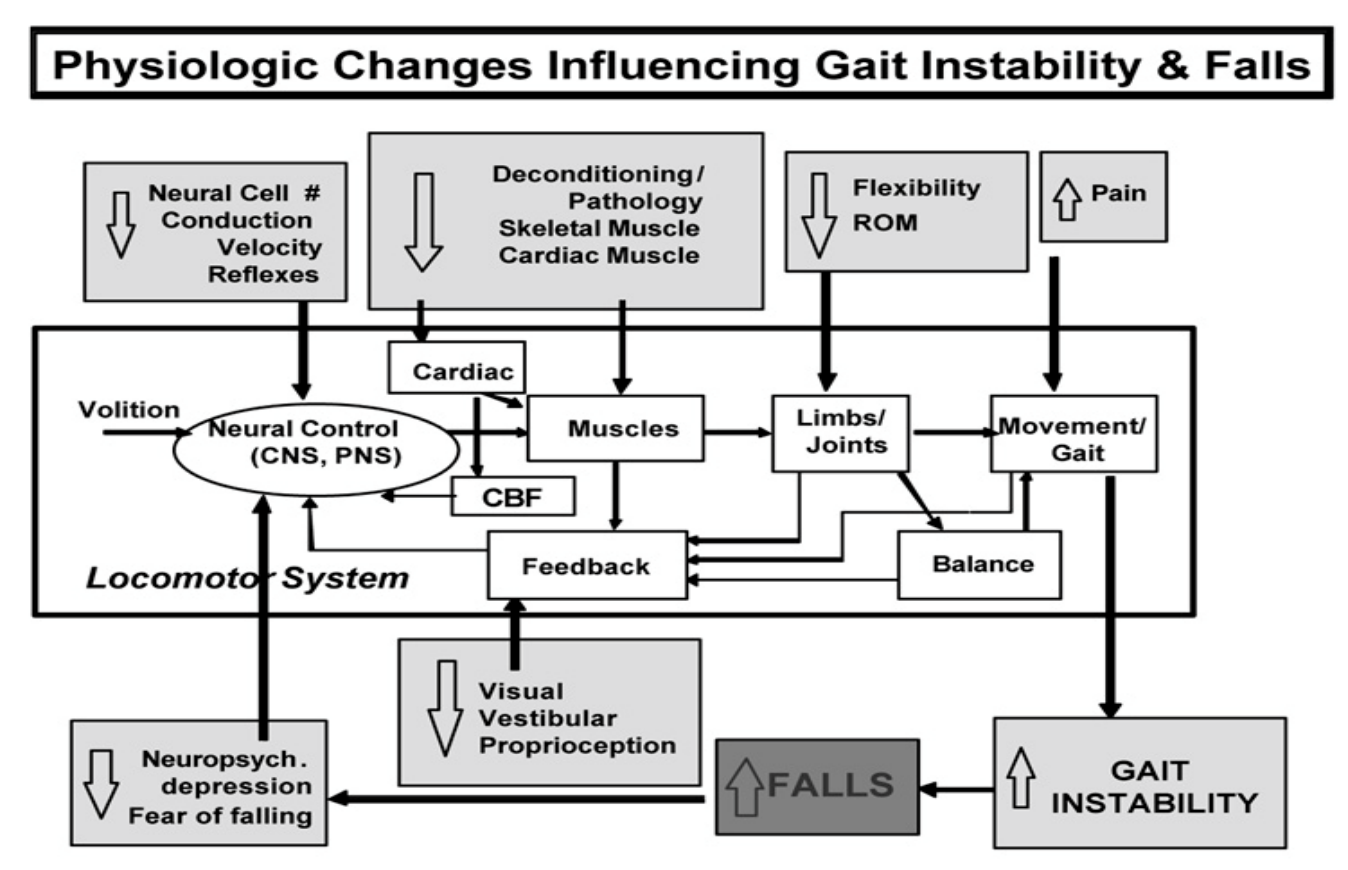
Neurologic gait disorders in elderly patients

Cause	Characteristics of gait
Upper motor neuron weakness	The toes do not adequately clear the ground because the hip flexors are weak, and the toes scuff with each step. The strategy of circumduction at the hip helps with toe clearance.
Lower motor neuron weakness	With lower motor neuron foot drop, the gait is high stepping because the hip flexors are strong and compensate for the weakness to allow foot clearance.
Myopathic weakness	Waddling gait and abnormal pelvic tilt with each step because of limb girdle weakness.
Spasticity	Gait is narrow-based; the toes turn in and scrape on the floor with each step, producing a scuffing sound and wearing of the tips of the soles.
Deafferentation	Classically, gait is high stepping and stamping, and may be slightly wide-based. Stride length is normal or a little reduced. The gait deteriorates markedly in the dark.
Extrapyramidal	Narrow-based gait with reduced stride length; the feet barely clear the floor. Posture is stooped and arm swing reduced when walking. The forward center of gravity causes increasingly faster, short steps (hurrying or "festinating"). Turning is by small steps rather than pivoting. Additional manifestations may include gait initiation difficulty, start hesitation, freezing, and retropulsion.
Cerebellar ataxia	The gait may appear to be stumbling, lurching, staggering, reeling, drunken, or slow, with reduced step length and a wide base. Associated features can include other signs of ataxia, including scanning and slow speech, finger-nose and heel-shin dysmetria, and dyssynergia.
Vestibular dysfunction	Deviation on walking to the side of the affected ear. The gait varies from an occasional stumble to frank veering. The legs are slightly spread, and stride length is slightly reduced. Stamping on the spot with eyes closed demonstrates veering (Unterberger test). Often associated with nystagmus.
Frontal lobe dysfunction	• Cautious gait, a consequence of compensatory adjustments in response to real or perceived disequilibrium • Isolated gait ignition failure, characterized by difficulty initiating or maintaining locomotion • Frontal disequilibrium, characterized by inappropriate or counterproductive postural and locomotion responses • Frontal gait disorder, characterized by variable base (narrow to wide), short shuffling steps, disequilibrium, and start and turn hesitation
Orthostatic myoclonus	Leg jerking occurs while upright. The locomotion problem is variable, with either gait "apraxia" or gait initiation difficulty noted in approximately one-half of the patients.
Psychogenic	Walking is bizarre and does not conform to any of the usual patterns. There may be excessive slowness and stiffness, or maintenance of postural control on a narrow base with flailing arms and excessive trunk sway.
Confusional state	Asterixis of the lower limbs may throw the patient to the floor. Inattention to task may lead to gait ataxia.

UpToDate®



Effects of healthy aging on gait: sensitivity of fractal dynamics. The average stride time, stride time variability, Timed Up and Go performance are similar in this group of healthy older adults and healthy young adults, while the fractal scaling index is reduced with aging. Adapted from Hausdorff, Mitchell et al. (1997).



Simplified block diagram depicting some of the factors that contribute to gait stability and fall risk. Adapted from Hausdorff, Nelson et al. (2001).

How do I stop it happening?

Falls prevention exercise programs

- NNT (number needed to treat) to reduce falls from strength and balance training is only 11.
- Group and home-based exercise programs, and home safety interventions reduce both **rate** of falls and **risk** of falling.
- Multifactorial assessment and intervention programs reduce **rate** of falls but **not risk** of falling; Tai Chi reduces **risk** of falling.

Interventions for preventing falls in older people living in the community. Gillespie et al. 2012 Cochrane review

Falls prevention exercise programs

1. Exercise must provide a moderate or high challenge to balance.
   - Reducing the base of support.
   - Movement of the centre of gravity.
   - Reduce the need for upper limb support.
2. Exercise must be of a sufficient dose to have an effect:
   - A cut-off of 50 hours is 'high' dose. This would equate to around **2 hours a week for a 6 month** period.
   - This can include a mixture of **group-based and home-based exercise**.
3. Ongoing exercise is necessary.
   - The benefits are rapidly lost when exercise is ceased.

Sherrington et al (2011)

Effectiveness of a Therapeutic *Tai Ji Quan* Intervention vs a Multimodal Exercise Intervention to Prevent Falls Among Older Adults at High Risk of Falling: A Randomized Clinical Trial

Table 2. Incidence of Falls During the 24-Week Intervention by Intervention Group

Falls[a]	TJQMBB (n = 224)	Multimodal Exercise (n = 223)	Stretching Exercise (n = 223)
Total falls, No. (mean) [SD]	152 (0.68) [1.3]	218 (0.98) [1.8]	363 (1.63) [3.9]
No. of falls, No. (%) of participants			
Any	85 (37.9)	112 (50)	127 (57)
1	55 (24.6)	68 (30.5)	62 (27.8)
2	13 (5.8)	25 (11.2)	31 (13.9)
≥3	17 (7.6)	19 (8.5)	34 (15.2)
Total injurious falls, No. (mean) [SD]			
Moderate[b]	88 (0.39) [0.9]	109 (0.49) [1.2]	156 (0.70) [1.7]
Serious[c]	8 (0.04) [0.19]	14 (0.06) [0.26]	25 (0.11) [0.37]

Conclusion: Among community-dwelling older adults at high risk for falls, a therapeutically tailored tai ji quan balance training intervention was more effective than conventional exercise approaches for **reducing the incidence of falls**.

JAMA Intern Med. 2018;178(10):1301-1310.

Effectiveness of Tai Ji Quan vs Multimodal and Stretching Exercise Interventions for Reducing Injurious Falls in Older Adults at High Risk of Falling: Follow-up Analysis of a Randomized Clinical Trial.

- **Conclusion:** For **preventing injurious falls**, including those that resulted in medical treatment, TJQMBB intervention was found to be superior to multimodal and stretching exercises for older adults at high risk of falling

JAMA Netw Open. 2019 Feb; 2(2):

- **Conclusion:** Among community-dwelling older adults at high risk for falls, TJQMBB is a **cost-effective means** of reducing falls compared with conventional exercise approaches.

The Journals of Gerontology: Series A, Volume 74, Issue 9, September 2019

Home visit

- A RCT of 842 houses showed that modifications to a home reduced the rate of injuries from falls by 39% compared with those on a waiting list control group.

Home modifications to reduce injuries from falls in the home injury prevention intervention (HIPI) study: a cluster randomized controlled trial. ***Lancet: Keall et al. 2015***

Collaboration to reduce falls through Quality Improvement

Open Access BMJ Quality Improvement Programme

Submitted from BMJ Quality

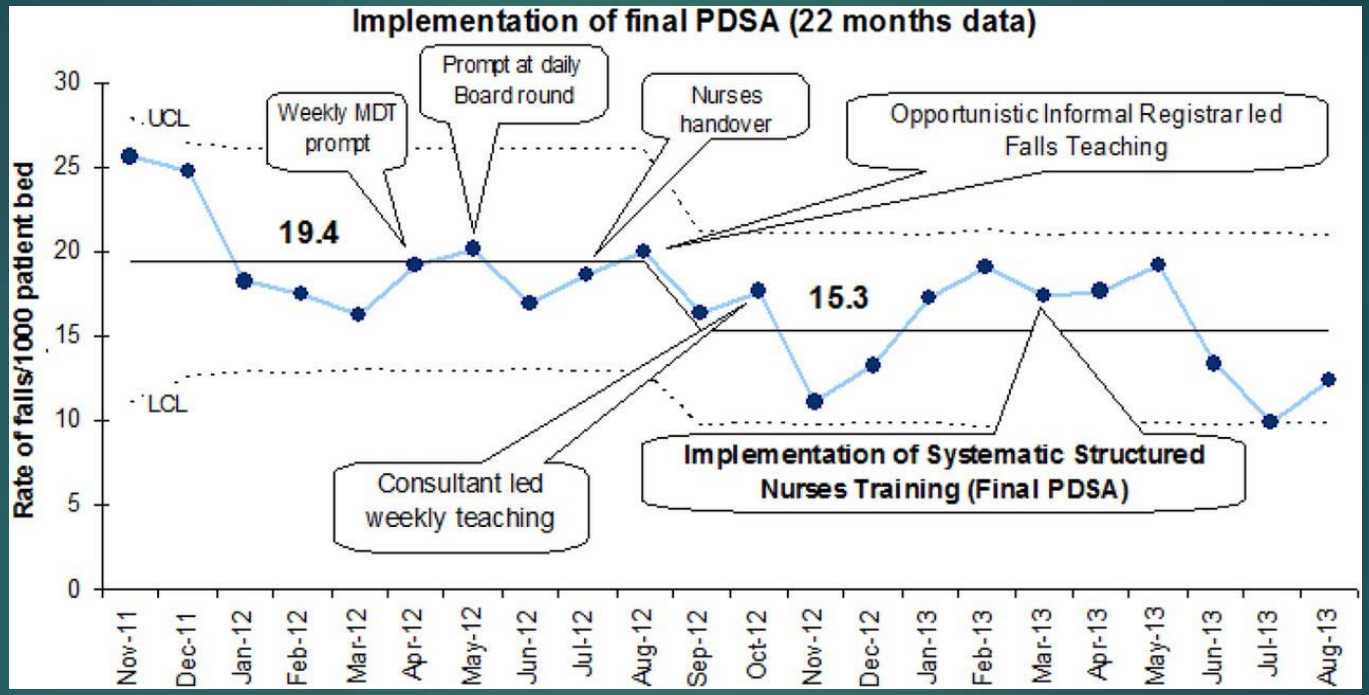
Reducing inpatient falls in a 100% single room elderly care environment: evaluation of the impact of a systematic nurse training programme on falls risk assessment (FRA)

Inderpal Singh, Justin Okeke

BMJ Qual Improv Report: first published as 10.1136/br

BMJ Open Quality

Implementation of final PDSA – Statistical process U-control chart displaying reduced incidents of inpatient falls over 22 months.



Inderpal Singh, and Justin Okeke BMJ Qual Improv Report 2016;5:u210921.w4741

BMJ Open Quality

Evidence based falls prevention strategies

Interventions for preventing falls in older people living in the Community.

	Rate ratio
Multi component group exercise	0.78
Tai Chi	0.63
Individually prescribed home-based exercise	0.66
Multi-factorial assessment and intervention	0.75
Anti-slip shoes for icy weather	0.42
Cutting down psychotropic drugs	0.34
First cataract surgery	0.66

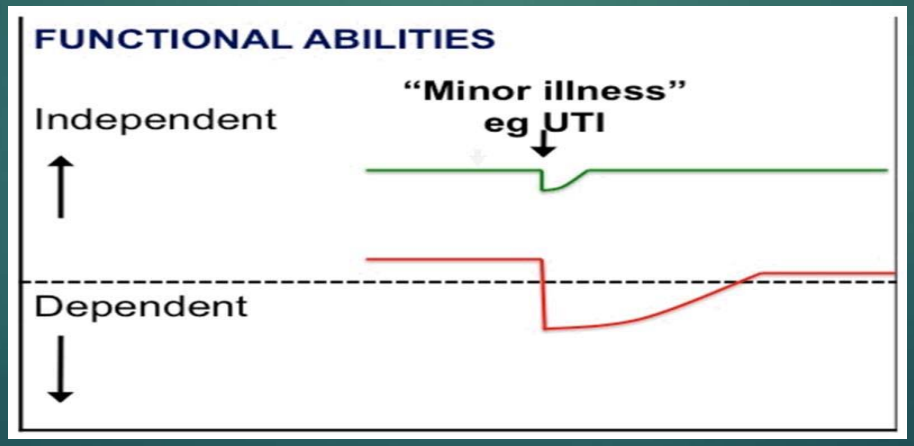
Cochrane Systematic Reviews 2009. Gillespie *et al.*

Will it happen again?

- Shifting paradigm

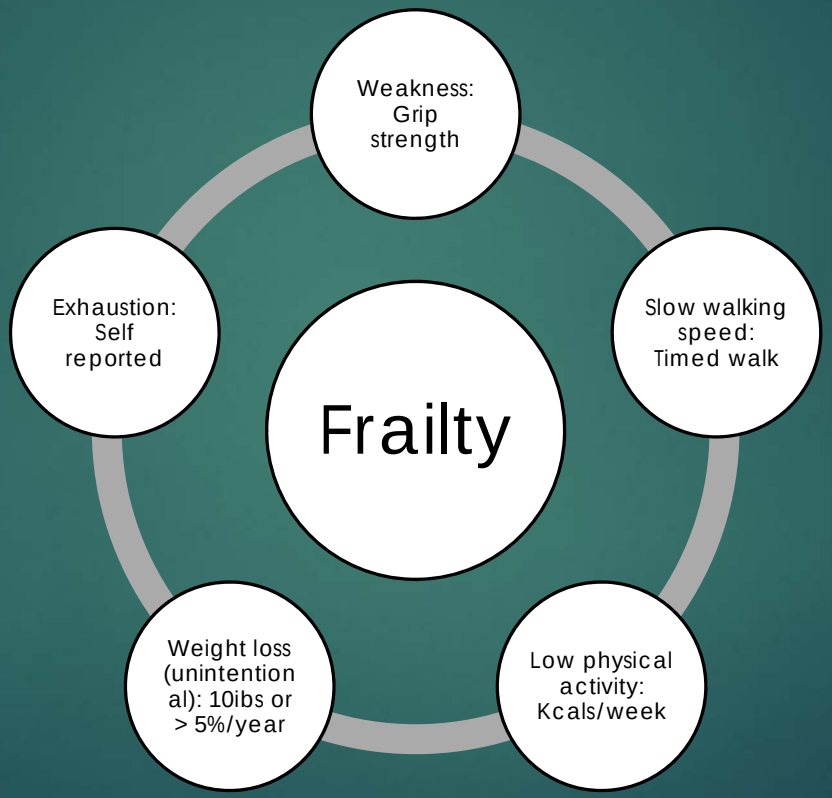
Frailty

- a **state** of vulnerability to poor resolution of homeostasis after a stressor
- a **physiological syndrome** characterized by decreased reserve and diminished resistance to stressors, resulting from cumulative decline across multiple physiological systems, causing vulnerability to adverse outcomes and high risk of death."

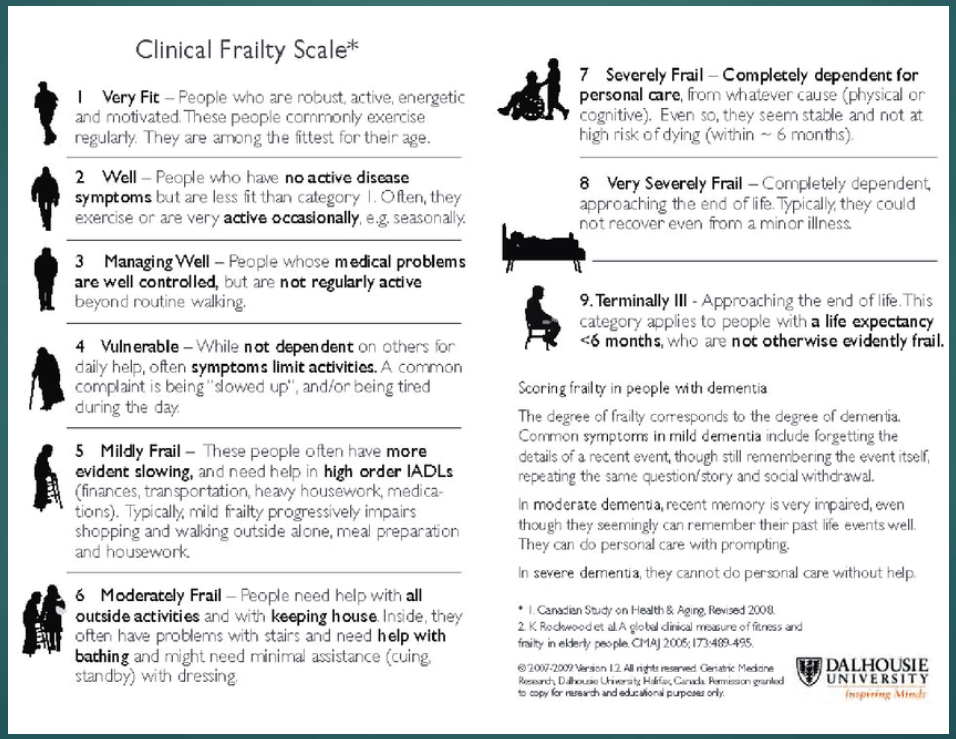


Clegg et al. Lancet. 2013 March 2; 381(9868): 752–762.

Physical frailty phenotype (Fried et al)



Accumulation of deficits (Rockwood et al)



Clinical Frailty Scale*

1 **Very Fit** – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 **Well** – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.

3 **Managing Well** – People whose **medical problems are well controlled,** but are **not regularly active** beyond routine walking.

4 **Vulnerable** – While **not dependent** on others for daily help, often **symptoms limit activities.** A common complaint is being "slowed up", and/or being tired during the day.

5 **Mildly Frail** – These people often have **more evident slowing,** and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 **Moderately Frail** – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 **Severely Frail** – **Completely dependent for personal care**, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 **Very Severely Frail** – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9. **Terminally Ill** - Approaching the end of life. This category applies to people with **a life expectancy <6 months,** who are **not otherwise evidently frail.**

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common symptoms in **mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia,** recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In severe dementia, they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005; 173:489-495.

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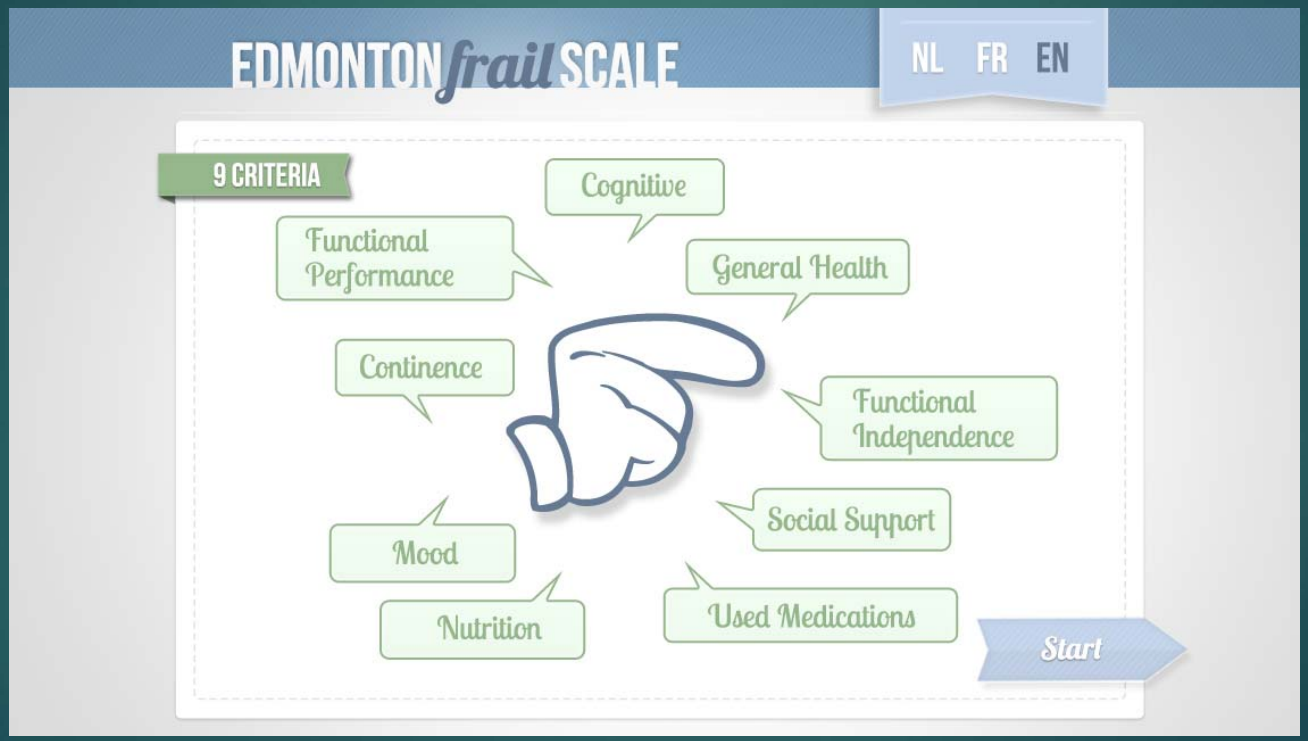
Accumulation of deficits (Rolfson et al)



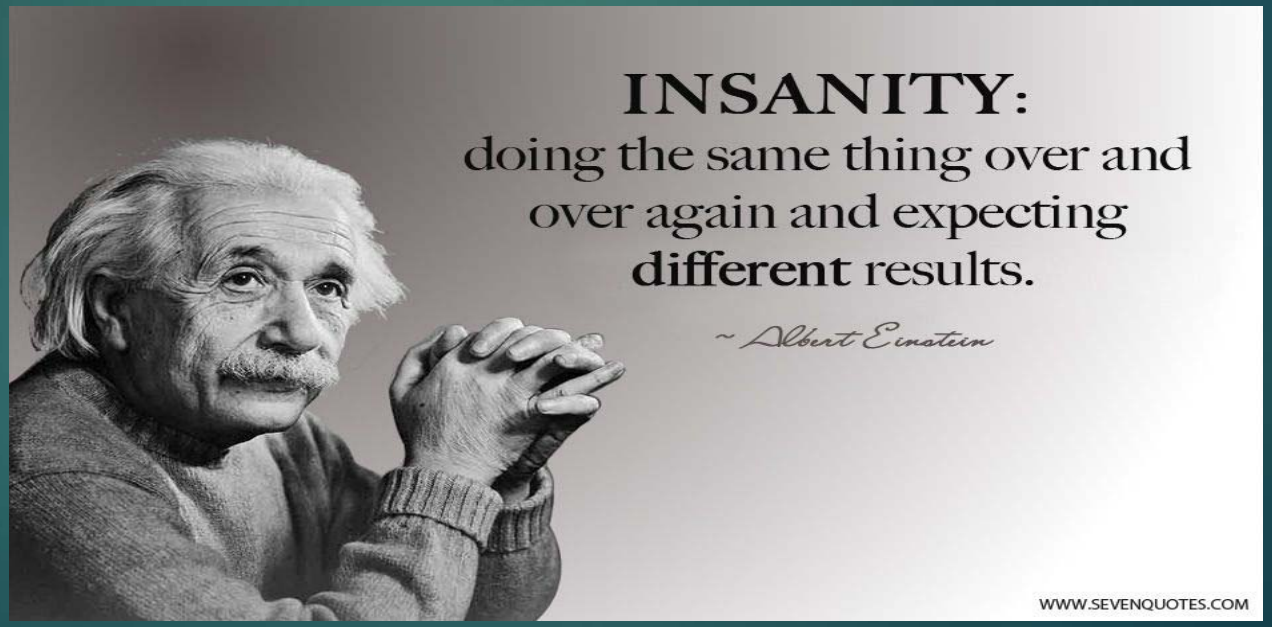
Back to Mr JC

- Edmonton Frail Scale was 4 (vulnerable)
- Issues identified: Caregiver burnout, poor nutrition, reduced physical activity, dehydration (orthostatic hypotension) and acute functional decline.
- MMSE 30/30 and MoCA of 23/30 (delayed recall impaired) – Likely Amnestic MCI (mild cognitive impairment)
- Wife in a care home and he moved to independent section of same home.
- He is doing well. No further falls reported and is looking to move back to a seniors apartment.

*Composite patient details disguised

Take home

- Falls are common in older adults
- There appears to be linear progression forecast for Alberta
- The crude rate for falls related injuries increase as people age
- It is important to look for multifactorial causes
- Recognize gait disorder as one of the commonest causes of falls
- Falls are preventable - NNT (number needed to treat) to reduce falls from strength and balance training is only 11.
- Collaboration through quality improvement can be effective
- Identifying and addressing frailty


INSANITY:
doing the same thing over and over again and expecting different results.
~ Albert Einstein
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