

The Fracture Risk Scale (FRS): Assessing and Managing Fracture Risk in Long-Term Care

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Presenter Disclosure

- Dr. Alexandra Papaioannou
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Mitigating Potential Bias

- Pharmacological therapy will be presented only as part of clinical recommendations determined using a GRADE approach (evidence-based approach) to guideline development
- All pharmacological therapy will be presented in its generic form



Objectives

At the conclusion of this activity, participants will be able to:

1. Recognize potential fracture risks in older adults living in long-term care (LTC)
2. Assess fracture risk using the Fracture Risk Scale (FRS)
3. To be able to implement the Clinical Assessment Protocol after assessing the Fracture Risk.

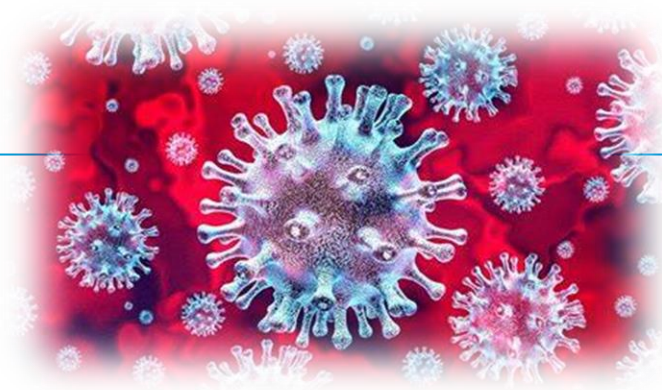


Biomechanics of falls in the frail elderly are different



Yang et al 2020 JBMR, May 13 2020 e-pub ahead of print.

What do we know about fractures within the context of the COVID-19 pandemic?



Added strain during COVID-19 pandemic on fracture care in orthopedic departments around the world

Hospital overcrowding and reorganization^{1,2}

operating rooms for elective surgeries transformed into ICUs, reorganized staffing to care for COVID-19 patients

Surgery needed for many osteoporotic fractures, followed-by inpatient care²⁻⁵

urgent surgery needed for hip and humerus fractures; surgery needed for pelvic, long-bone, complex fractures

Altered fracture management to limit COVID-19 spread^{6,7}

CT scans and swabs of surgery patients, number of outpatient visits limited due to social distancing

Strain on surgical capacity to operate on emergency cases^{1,2}

lack of staff (eg, anesthesiologists), operating theatres and post-surgery beds

Outpatient care needed for fractures^{4,6}

wound check, suture removal, evaluation of fracture healing, x-rays, cast application and removal, etc.

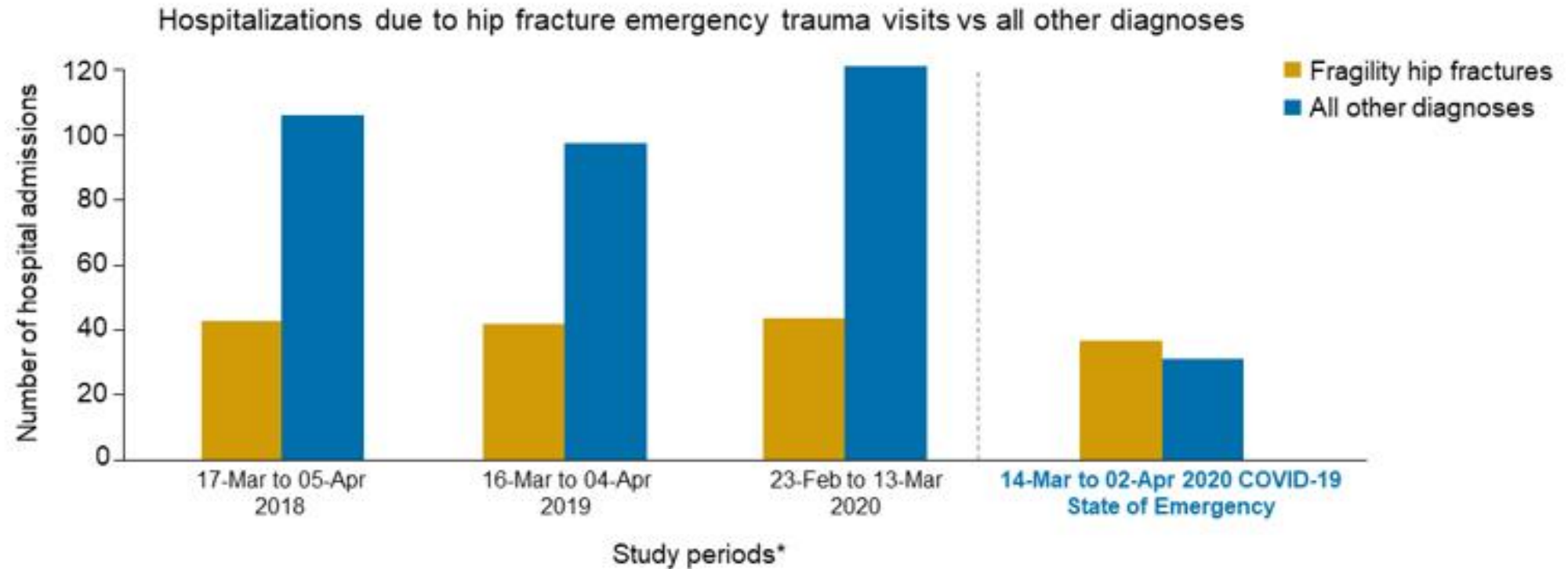
Altered surgical management of COVID-19 suspected fracture patients^{1,7,8}

isolation pre/post surgery, operability criteria changes, anesthesia care changes to allow operation with respiratory symptoms, operating equipment alterations to protect personnel

1. Munoz JM, et al. J Bone Joint Surg Am. 2020; <http://dx.doi.org/10.2106/JBJS.20.00686>; 2. Gómez-Barrena E, et al. J Surg Case Rep. 2020;4:1-3; 3. Zhu Y, et al. Int Orthop. 2020; <https://doi.org/10.1007/s00264-020-04575-0>; 4. Ambrosio L, et al. J Experimental Orthopaedics. 2020;7:35 (<https://doi.org/10.1186/s40634-020-00255-5>); 5. Iyengar K, et al. J Clin Orthop Trauma. 2020; <https://doi.org/10.1016/j.jcot.2020.05.010>; 6. Lal H, et al. J Clin Orthop Trauma. 2020; <https://doi.org/10.1016/j.jcot.2020.05.009>; 7. Catellani F, et al. J Bone Joint Surg Am. 2020; <http://dx.doi.org/10.2106/JBJS.20.00617>; 8. Tongu A, et al. Reg Anesth Pain Med 2020; <http://dx.doi.org/10.1136/rapm-2020-101626>.

Hospitalizations due to hip fractures during COVID-19 pandemic vs control periods at a Spanish tertiary hospital

Hospitalizations number due to hip fractures remained stable in emergency trauma setting, compared to other diagnoses



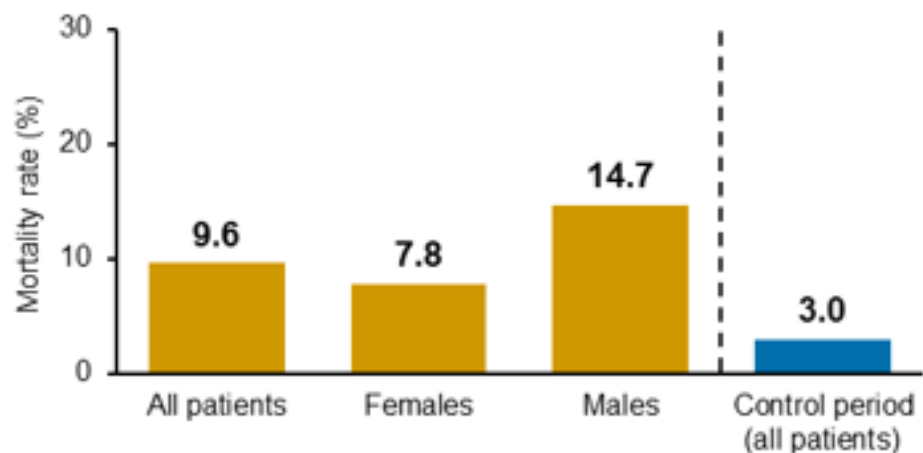
*Four 20-day periods included Spain's beginning of the COVID-19 State of Emergency (14-Mar to 02-Apr 2020) and three control periods.
1. Nunez JH, et al. Injury. 2020; <https://doi.org/10.1016/j.injury.2020.05.016>.

Mortality in all hip fracture patients during COVID-19 pandemic

Spain^{1,*}

Patients: 136 patients (75% female) aged ≥65 with hip fragility fracture during COVID-19 pandemic at 13 major hospitals

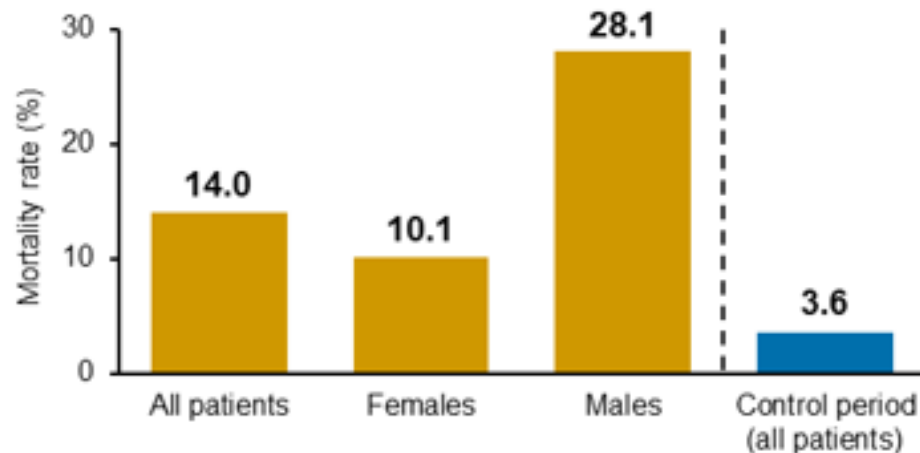
Mortality rate over 14 days of mean follow-up during COVID-19 pandemic (yellow) vs control period a year prior (blue)



Italy^{2,†}

Patients: 121 (74% female) patients aged ≥41 with a hip fracture surgery during COVID-19 pandemic at 2 academic hospitals

Mortality rate over 8 weeks of follow-up during COVID-19 pandemic (yellow) vs control period a year prior (blue)

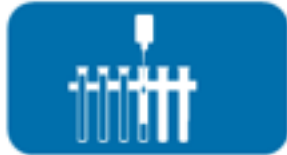


*11 hospitals had institutional changes in the infrastructure to accommodate COVID-19 and 2 were more severely affected with a decrease in hospital's capabilities to operate on fractures; control period was based on registry data observed during the same season prior year. †Hospitals were located in the cities of Piacenza and Parma which have been significantly affected by COVID-19; control period examined in the study included a comparable 8-week period during a prior year at the same institutions.

1. Munoz JM, et al. J Bone Joint Surg Am. 2020;http://dx.doi.org/10.2106/JBJS.20.00686; 2. Maniscalco P, et al. Acta Biomed 2020;91:89-96.

Mortality in all hip fracture patients during COVID-19 pandemic: Potential contributors to surgery delays

All patients



COVID-19 screening

Screening for COVID-19 with CT scan and swabs prior to surgery, with results not always available ≤ 24 hours.¹⁻³



Reduced surgical capacity

Strain put on some hospitals' surgical capacity to operate quickly due to reformulation of medical/surgical personnel.²

COVID-19-positive patients



Contraindications for surgery

Contraindications for surgery and anaesthesia due to low oxygen saturation, fever and systemic organ dysfunction¹



Transfer and isolation

Transfer to isolation room and other care adjustments to protect staff and other patients.^{1,3}

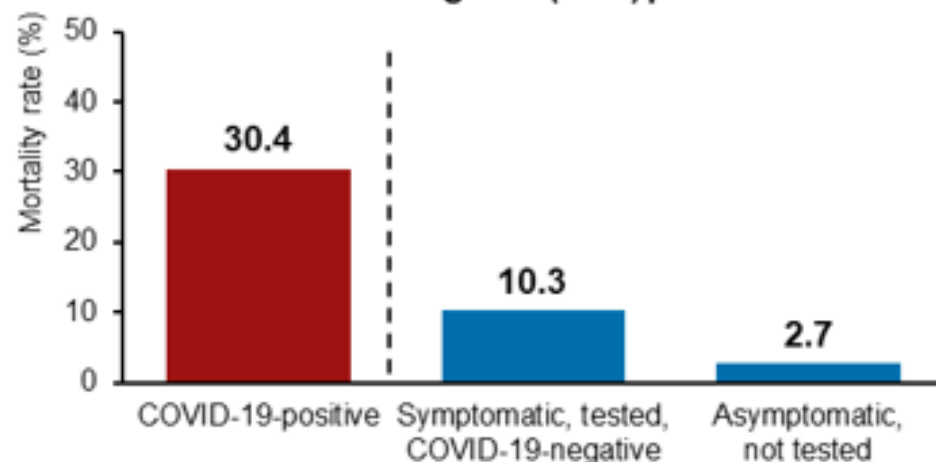
1. Catellani F, et al. J Bone Joint Surg Am. 2020;<http://dx.doi.org/10.2106/JBJS.20.00617>. 2. Munoz JM, et al. J Bone Joint Surg Am. 2020;<http://dx.doi.org/10.2106/JBJS.20.00686> 3. Ambrosio L, et al. J Experimental Orthopaedics. 2020;7:35. CT=computed tomography.

Mortality in COVID-19-positive hip fracture patients

Spain^{1,*}

Patients: 136 patients (75% female) aged ≥65 with hip fragility fracture during COVID-19 pandemic at 13 major hospitals

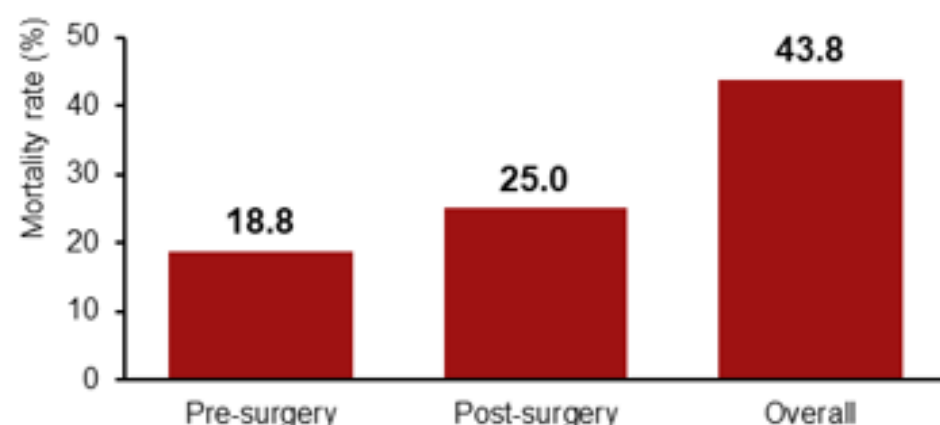
Mortality rate over 14 days of mean follow-up in COVID-19-positive (red) vs COVID-19-negative (blue) patients



Italy^{2,†}

Patients: 16 (38% female) patients aged 74-90 followed up post hip fragility fracture surgery at one hospital

Mortality before and 7 days after surgery in COVID-19-positive hip fracture patients



*Study examined 136 patients (75% female) aged ≥65 presenting to ER with hip fracture during Spain's State of Emergency in one of 13 major hospitals and mortality was examined in COVID-19-positive patients tested with CT scan / swabs, COVID-19-negative patients with symptoms and also undergoing testing, and asymptomatic patients not undergoing testing. †Study examined 16 patients (38% female) with hip fragility fracture and COVID-19 presenting to a hospital in Lombardy, Italy. ER ER=emergency room. 1. Munoz JM, et al. J Bone Joint Surg Am. 2020;http://dx.doi.org/10.2106/JBJS.20.00686; 2. Catellani F, et al. J Bone Joint Surg Am. 2020;http://dx.doi.org/10.2106/JBJS.20.00617.

Mortality in COVID-19-positive hip fracture patients: Potential contributors to increased mortality



Older age

Because of older age, hip fracture patients are at higher mortality risk due to COVID-19.¹



Susceptibility to pneumonia

Due to hip fracture, patients are also susceptible to pulmonary infection and pneumonia.^{2,3}



Prolonged bed confinement

Prolonged confinement stay pre/post surgery makes it difficult to discharge lower respiratory tract secretions, potentially altering treatment process for COVID-19.^{4,5}

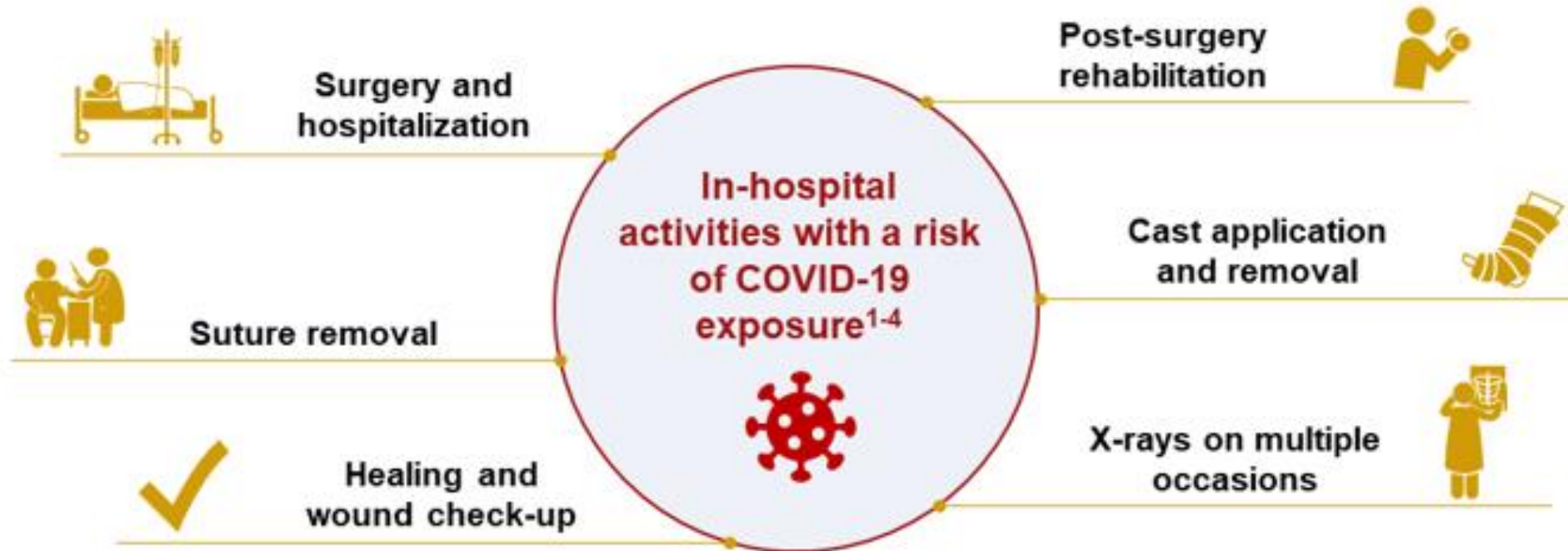


Diminished incision healing

COVID-19-related weakness, fevers and immune responses may interfere with incision healing, thus prolonging rehabilitation and bed confinement and further increasing risk of hip surgery complications.⁴

1. Munoz JM, et al. J Bone Joint Surg Am. 2020;<http://dx.doi.org/10.2106/JBJS.20.00686>; 2. Ambrosio L, et al. J Experimental Orthopaedics. 2020;7:35; 3. Mi B, et al. J Bone Joint Surg Am 2020;102:750-8; 4. Liu J, et al. Aging. 2020;12:7619-7625; 5. Catellani F, et al. J Bone Joint Surg Am. 2020;<http://dx.doi.org/10.2106/JBJS.20.00617>

Fracture patients and risk of in-hospital exposure to COVID-19¹⁻⁴



1. Gómez-Barrena E, et al. J Surg Case Rep. 2020;4:1-3; 2. Zhu Y, et al. Int Orthop. 2020; <https://doi.org/10.1007/s00264-020-04575-0>; 3. Ambrosio L, et al. J Experimental Orthopaedics. 2020;7:35; 4. Iyengar K, et al. J Clin Orthop Trauma. 2020; <https://doi.org/10.1016/j.jcot.2020.05.010>; 5. Munoz JM, et al. J Bone Joint Surg Am. 2020; <http://dx.doi.org/10.2106/JBJS.20.00686>.

What is the impact of Vitamin D on COVID-19?



Vitamin D and COVID-19

Requirements for admission to the Intensive Care Unit, in patients hospitalized with COVID-19 (treated or not with calcifediol).

	Without Calcifediol Treatment (n = 26)	With Calcifediol Treatment (n = 50)	p value (1d712;2) Fischer Test
Need for ICU			<0.001
Not requiring ICU, n (%)	13 (50)	49 (98)	
Requiring ICU, n (%)	13 (50)	1 (2)	

* Univariate Risk Estimate Odds Ratio for ICU in patients with Calcifediol treatment vs Without Calcifediol treatment: 0.02 (95 %CI 0.002–0.17).

** Multivariate Risk Estimate Odds Ratio for ICU in patients with Calcifediol treatment vs Without Calcifediol treatment ICU (adjusting by Hypertension and T2DM): 0.03 (95 %CI: 0.003–0.25).

What is the impact of fractures on mobility in LTC residents?



Systematic Review – 28 studies with mobility outcomes

- Mobility 1 to 2 years following hip fracture is significantly worse than for matched control
- Number of people disabled after 2 years was 26 per 100 people with hip fracture for walking 10 feet and 22 per 100 for bed transfers
- People experiencing hip fracture were four times more likely to be unable to ambulate 2 years after fracture

Table 3 Outcomes for hip fracture patients and control participants not experiencing hip fracture

Study	Outcome	Follow-up time	Controls matched for	Hip Fracture	Control	P-value
Activity - Mobility						
Boonen 2004 [19]	Unable to walk independently	1 year	age, residence			
	<80 years			30 %	7 %	<0.001
	>80 years			56 %	15 %	<0.001
Magaziner 2003 [21]	Disabled walking 3 m (SE)	1 year	age, gender, walking ability	54 % (2)	21 % (2)	<0.01
Marottoli 1992 [16]	Walk independently across room	6 mo (HF)	age, gender, physical function	15 %		NR
		1 year (Con)			72 %	
Norton 2000 [22]	Retain community mobility	2 years	age, gender	54 %	87 %	$P < 0.001^e$
Wolinsky 1997 [17]	Mean increase in no. lower body limitations	Median 2.3 years	nil ^f	1.75	0.75	$P \leq 0.0001$
	Mean increase in no. upper body limitations			0.50	0.27	$P < 0.001$

Mobility recovery – 7 studies

- The bulk of recovery of walking ability occurred within 6 months after fracture.

Supplementary Table 1 Outcomes from studies reporting activity, participation and accommodation outcomes at multiple follow-up times after hip fracture

Study	Outcome	Pre-fracture	Follow-up time					
			3-5 mo	6-9 mo	9-18 mo	19 mo – 2 yrs	3-5 years	6-10 years
Activity - Mobility								
Borgquist 1990	Walking (% survivors)	95%	73%		80%		80%	76%
Griffin 2015	Walking regularly:							
	indoors without aids ≤80 years	66%	37%	49%				
	indoors without aids >80 years	46%	14%	20%				
	outdoors without aids ≤80 years	51%	18%	26%				
	outdoors without aids >80 years	29%	6%	8%				
Kitamura 1998	Walking alone outdoors (± assistive device)	68%	51%	58%	58%			
	Walk alone outdoors + helper	8%	13%	10%	8%			
	Walk alone indoors (± assistive device)	11%	10%	7%	9%			
	Walk alone indoors + helper	8%	10%	8%	6%			
	Sit/wheelchair	3%	11%	9%	11%			
	Bedridden	2%	5%	8%	8%			
Tsuboi 1998	Walking alone outdoors (± assistive device)	68%	51%	56%				
Magaziner 1990	Walk independently or with 1 stick	87%	26% ²	54%				
Magaziner 2003	Walking 3m without assistance	74%		46%	47%			
Neuman	New total locomotion dependence		28%	27%				
Samuelsson 2009	Walking independent/1 stick	51%	25%		28%			
	2 sticks/frame	45%	61%		54%			
	Non-walking	4%	15%		18%			

Mobility recovery

- Between 40 and 60 % of study participants recovered their pre-fracture level of mobility

Table 4 Proportion of survivors that recover their pre-hip fracture levels of activity, participation or health outcomes

Study	Outcome measure	Pre-fracture residence	Surgical cohort	3–4 months	6 months	1 year	2 years	
Activity – Mobility								
Bentler 2009 [14]	Mobility activities without difficulty ^e	NR	N				47 %	
Crotty 2000 [49]	Level of ambulation ^b	Community	Y	69 %				
		LTC	Y	58 %				
Holt 2008 [62]	Walk unaided and unaccompanied	Mixed	Y					
				Ages 75–89		22 %		
				Ages ≥95		2 %		
Keene 1993 [41]	Walk unaided	Mixed	N				40 %	
Koval 1998 [44] ^g	Ambulatory ability	Community	Y	22 %	38 %		47 %	
Shah 2001 [47] ^g	Ambulation independence	Community	Y				44 %	
Magaziner 2000 [43]	Walk 3 m without assistance ^{a, d}	Community	N				60 % 63 %	
Norton 2000 [22]	Retain community mobility ^d	Mixed	U				54 %	
Osnes 2004[25]	Walking independence ^f	Mixed	U				44 %	
Pereira 2010 [39]	Remain stable on BOAS ^d						55 %	
Vochteloos 2013 [37]	Mobility	Mixed	Y	46 %			48 %	
	Mobility without aid		Y	27 %			40 %	
	Mobility with aid		Y	58 %			58 %	

LTC: Hip Fractures, mortality and mobility impairment

By 180 days post-hip fracture (N = 60,111):

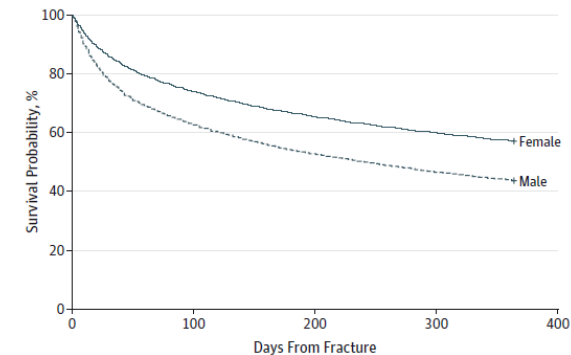
- 36% died
- 28% new total dependence in mobility*

By 365 days post-hip fracture (N = 52,914)

- 47% died
- 27% total dependence mobility*

* Independent at baseline

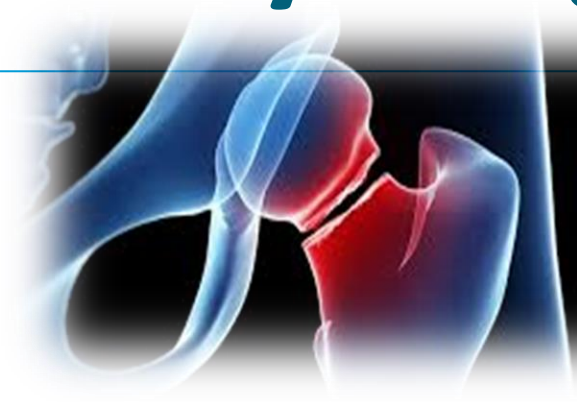
Figure 1. Survival at up to 365 Days Among 60 111 US Long-term Care Residents Hospitalized With Hip Fracture Between July 1, 2005, and June 30, 2009



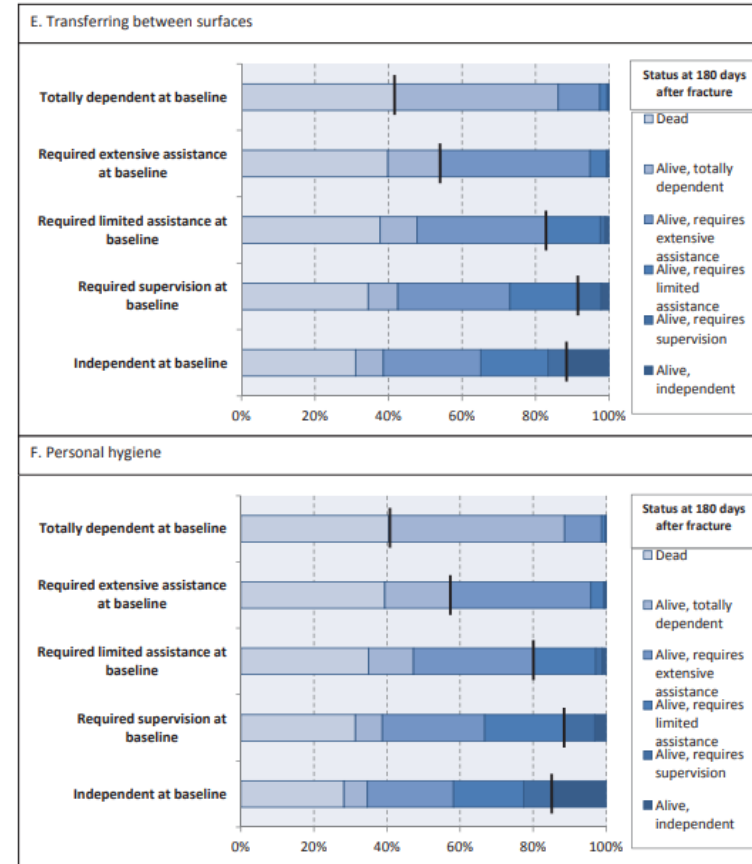
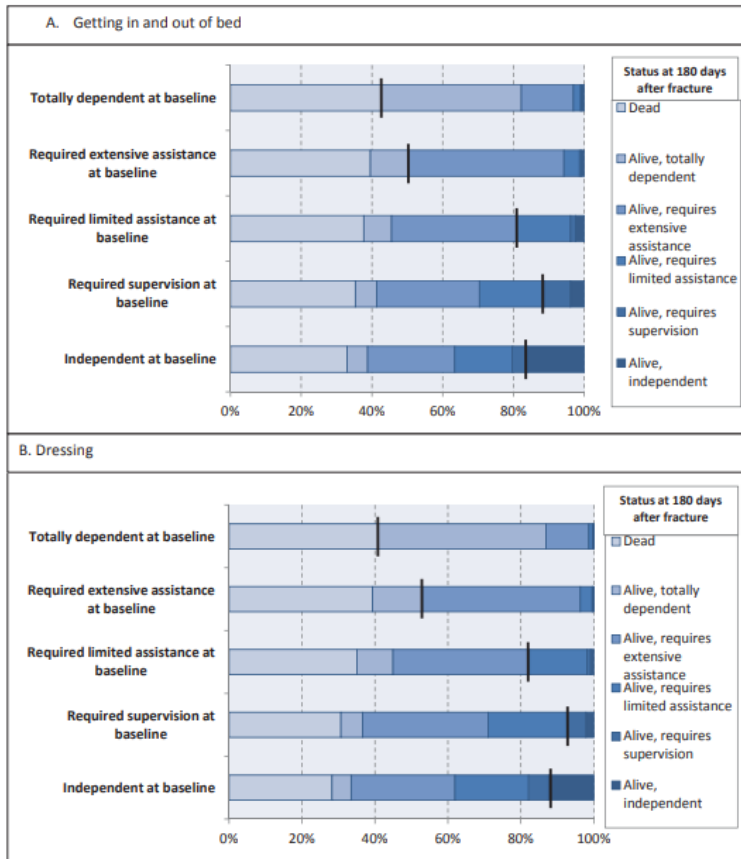
Male patients demonstrate a lower probability of survival than women at all time points after fracture ($P < .001$ by log-rank test).



What is the impact of fractures on LTC residents' ability to perform activities of daily living?



Marked changes in ADLs – mobility in bed, dressing, transferring and person hygiene 180 days after fracture



**How can fracture risk be
assessed in long-term care?**



Issues with Fracture Risk Assessment in LTC

- Tools have been well characterized in community dwelling populations (CAROC, FRAX) but are not validated for LTC
- Provide 10-year fracture risk – not helpful given that the average length of stay in LTC is 18 months
- Missing LTC risk factors applicable for the LTC population





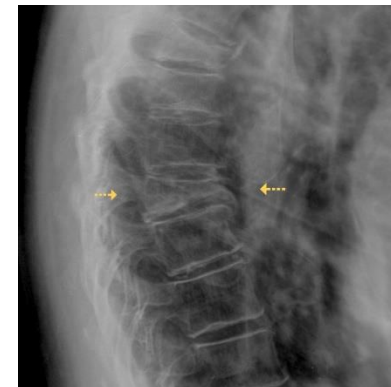
Meet Mrs. Andrews

87 year old woman just admitted to LTC – six months following the death of her husband; she was unable to care for herself at home



Mrs. Andrews

- History:
 - moderate dementia
 - wrist fracture 8 years ago – from a fall while walking
 - prescribed antidepressant for 2 years; PPI recently prescribed while in hospital
 - Prior fall
 - no osteoporosis diagnosis/ no osteoporosis medications
 - family reported recent weight loss and height change from 5'5" (165 cm) to 5'2" (157 cm) on admission
 - Height loss prompted a lateral thoracolumbar x-ray ordered
 - 2 vertebral fractures found



Mrs. Andrews

- LTC Assessment:
 - Appetite seems good and she is willing to eat food without difficulty
 - No significant dysphagia noted by staff
 - Wandering frequently around the home
 - Able to walk in corridor independently
 - BMI <18

At what level of risk for fractures is Mrs Andrews?

How can you estimate fracture risk?

Fracture Risk Scale



(FRS) *Assessing fracture risk for LTC residents
to put strategies into place to prevent fractures*



The FRS:

- ✓ Predicts hip fractures for LTC residents
- ✓ Requires no additional documentation or resources
- ✓ Does not require BMD testing
- ✓ Validated across Canada
- ✓ Can improve care, quality of life, and prevent fractures
- ✓ Supports the fracture prevention recommendations for LTC, which stress the importance of identifying fracture risk.

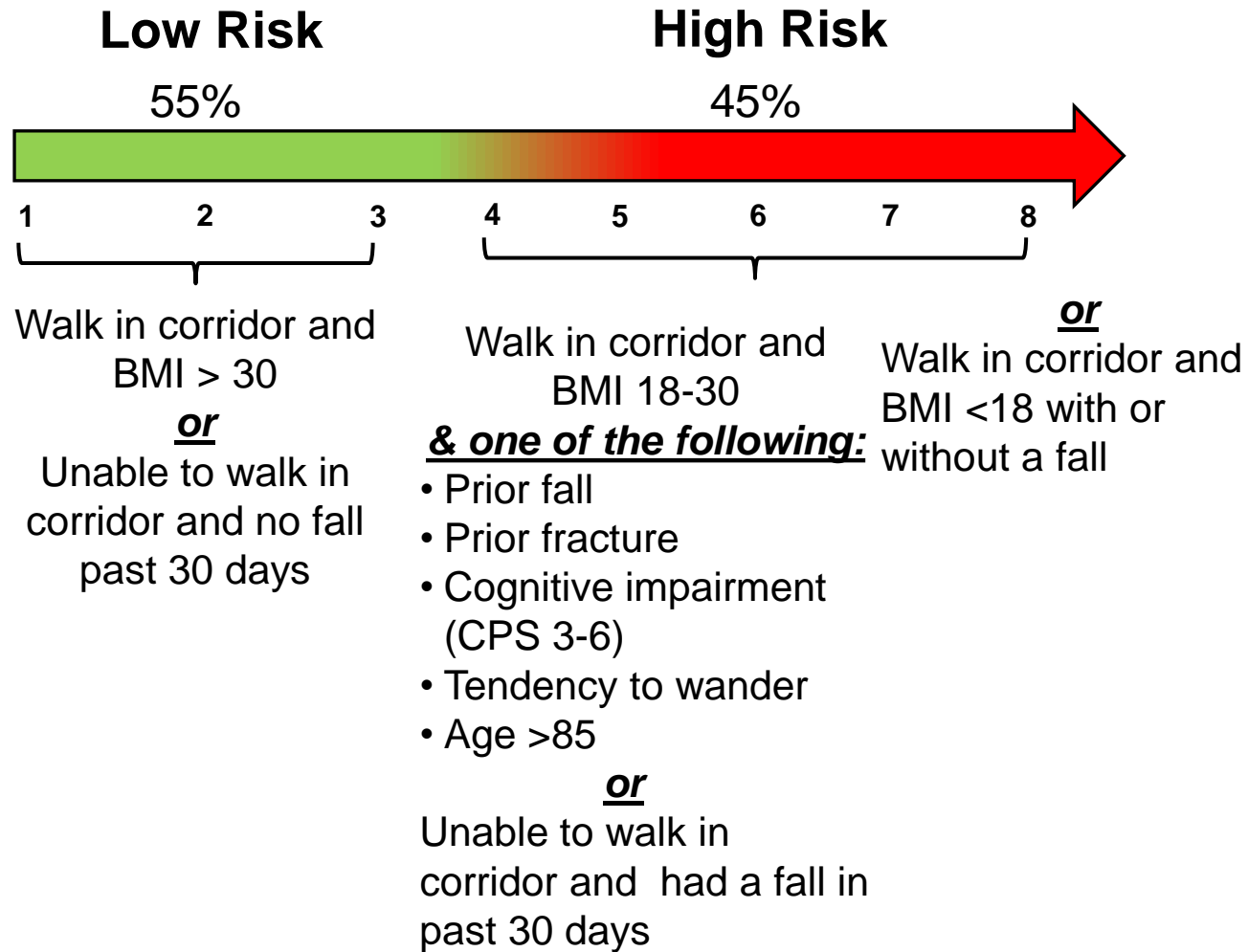
Ioannidis G, et al. *BMJ Open*, 2017;7.

Negm A, et al. *BMC Geriatrics*, 2018; 18(320)

Papaioannou, A. et al *CMAJ*, 2015; 187(15): 1135-44.

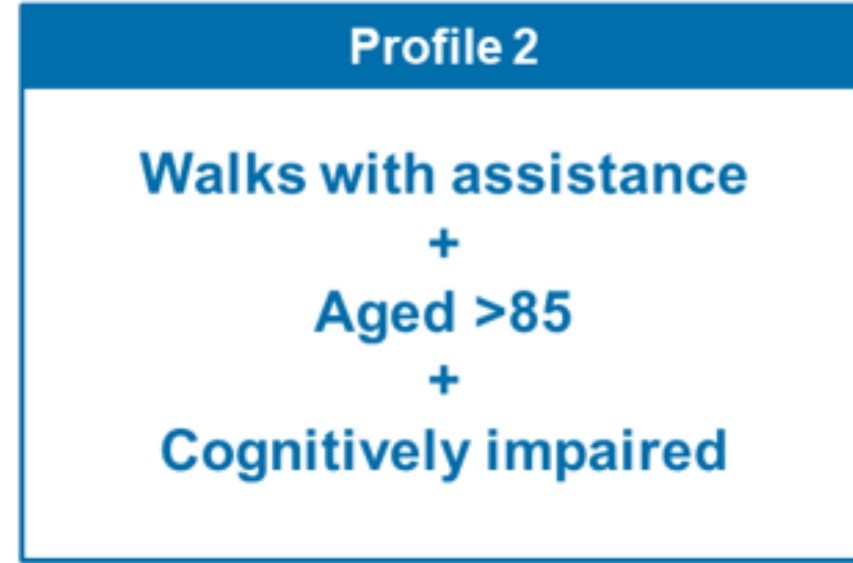


Fracture Risk Scale Scores



Fracture-risk related frailty characteristics^{1,2}

Research in long-term care setting across Canada by the GERAS group has validated a Fracture Risk Scale to help **predict hip fracture over a 1-year time period in older frail adults without needing BMD testing**, based on two patient profiles:^{1,2}



* Body Mass Index <18

1. Ioannidis G, et al. BMJ Open. 2017; 7:e016477. doi:10.1136/bmjopen-2017-016477.

2. GERAS Centre for Aging Research. <https://www.gerascentre.ca/the-fracture-risk-scale-frs/> (Accessed May 27, 2020).



Where do I find the FRS score for my resident?

PointClickCare[®]

RAI-MDS (MDS 2.0) / LTCF



Outcomes Summary Report



What is the fracture risk for residents who are immobile?

- **Fracture Risk Scale** - hip fracture risk
 - Inability to walk independently = low risk
 - Inability to walk independently + a fall in last 30 days = high risk
 - May underestimate vertebral fractures and potential for these with transfers or shifting in bed
- **Immobilization** is a risk factor for bone loss and increases risk for osteoporotic fractures¹



Some Cautions

- FRS assesses risk for hip fracture but may underestimate the risk for vertebral fractures
- FRS calculates risk based on variables available in the RAI-MDS 2.0 – other risk factors may exist that are not included



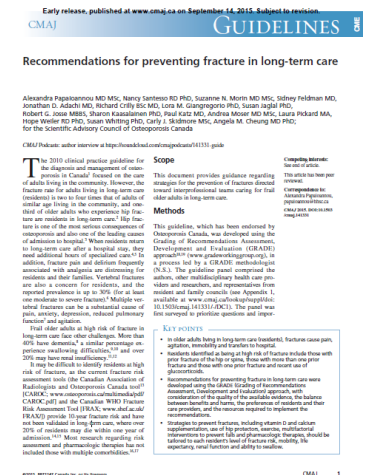
**How can we manage
fracture risk?
The Fracture Risk CAP**

Clinical Assessment Protocols (CAP)

- MDS-RAI - FRS algorithm alerts assessor to identified fracture risk
- Care plans/ protocols are identified to address risk
- CAP goals of care:
 - Identify and change underlying risk factors for fractures
 - Review and monitor supplements and medications related to bone health and falls risk
 - Recognize the importance of adequate nutrition and falls prevention for fracture prevention

Recommendations for Fracture Prevention in LTC¹

- Published in 2015; first of its kind aimed at LTC
- Integration of osteoporosis and falls assessment and management to reduce fractures
- Developed using GRADE approach,² considering:
 - Quality of evidence
 - Balance of benefits and harms
 - Values and preferences
 - Resources



1. Papaioannou, A. et al. CMAJ, 2015; 187(15): 1135-44.

2. Guyatt, GH. Et al. BMJ 2008; 336:1049-51.

Interpreting the Recommendations

Implications	Strong Recommendation <u>"we recommend"...</u>	Conditional Recommendation <u>"we suggest"...</u>
for patients/residents	Most individuals in this situation would want the recommended course of action, and only a small proportion would not	The majority of individuals in this situation would want the suggested course of action, but many would not
for clinicians	Most individuals should receive the intervention	Clinicians recognize that different choices will be appropriate for each individual and that clinicians must help each individual arrive at a management decision consistent with his/her values and preferences





BRIEF CLINICAL REFERENCE GUIDE:

interRAI Fracture Risk Scale (FRS)

Identifies fracture risk in the next year. Scored from 1 (lowest risk) to 8 (highest risk).

Located in the Outcome Summary Report Page ([PointClickCare](#)®: MDS 2.0, [interRAI LTCF](#)).

	LOW RISK			HIGH RISK				
FRS Score	1	2	3	4	5	6	7	8
Hip Fracture (yearly incidence)	0.6%	1.8%	2.5%	3.1%	5.0%	6.8%	7.8%	12.6%
% LTC Residents at Fracture Risk	13.5%	18.3%	24.1%	17.0%	16.6%	2.1%	8.0%	0.5%
	56% of all LTC residents			44% of all LTC residents				
Treatment Considerations	<ul style="list-style-type: none"> • Vitamin D: 800-2000IU • Calcium: 1200mg (daily total diet & supplement) • Exercise: functional strength & balance 			<ul style="list-style-type: none"> • Vitamin D: 800-2000IU • Calcium: 1200mg (daily total diet & supplement) • Exercise: functional strength & balance • Osteoporosis medications • Hip protectors 				

CAP

Papaioannou et al. Recommendations for preventing fracture in long-term care. CMAJ 2015 187(15), 1135–1144.

Ioannidis et al. Development and validation of the Fracture Risk Scale (FRS) that predicts fracture over a 1-year time period in institutionalized frail older people living in Canada: an electronic record-linked longitudinal cohort study. BMJ Open 2017;7:e016477.

McArthur et al. Developing a Fracture Risk Clinical Assessment Protocol for Long-Term Care: A Modified Delphi Consensus Process, JAMDA





... Back to Mrs. Andrews

Mrs. Andrews' FRS score

Mrs. Andrews:

- is able to walk in the corridor (independently)
- has a BMI <18
- had a fall in last 180 days



- FRS Score = 8

**Mrs. Andrews is at the highest level of risk.
(one year hip fracture risk = 12.6%)**

Treatment recommendations for Mrs. Andrews

Calcium & Vitamin D

Recommendation:

Dietary interventions to meet the recommended dietary allowance (RDA) for calcium (>70 = 1200 mg calcium; 3 servings of dairy or dairy equivalents)¹

- She is able to get sufficient calcium from her diet, so no supplement required
- Added 1,000 UNITS vitamin D daily

Recommendation:

Daily supplements of 800 – 2000 UNITS vitamin D₃

Treatment recommendations for Mrs. Andrews

Suggestion:
Balance, strength and
functional training exercises
only when part of a
multifactorial intervention to
prevent falls

Exercise

- Conduct an individual physio assessment to determine whether she would benefit most from an individual or group exercise program, focusing on balance, strength and functional exercises



www.gerascentre.ca/ltcseries

www.osteoporosis.ca

Functional strength training







Sit to stand exercises



Worth watching...

Long Term Care Series

Videos targeted at Personal Support Workers, Physiotherapists, Group Exercise Instructors, and Restorative Care workers in LTC

			
Series 1: Personal Support Workers	Series 2: Physiotherapists & Physiotherapy Assistants	Series 3: Group Exercise Trainers & Exercise Professionals	Series 4: Restorative Care
<p>This 4-part series is for personal support workers who work in long term care. It demonstrates how to help residents transfer in and out of bed safely, sit properly in wheelchairs, and how to do sit to stands with residents to keep their legs strong</p>	<p>This series focuses on the role of physiotherapists and physiotherapy assistants for preventing falls and fractures in long term care by completing balance assessments and communicating with the team, doing balance and strength exercises with the resident, and involving their family members.</p>	<p>Group exercise providers have a huge role to play in providing exercise to help prevent falls and fractures. This video series gives ideas for how to modify exercises for residents who can't stand, working with residents with dementia or cognitive impairment, and incorporating postural exercises.</p>	<p>The restorative care team can help prevent falls and fractures through practising spine sparing strategies, incorporating simple balance and strength exercises into walking programs, and providing postural cues through range of motion exercises.</p>
WATCH >	WATCH >	WATCH >	WATCH >

<https://osteoporosis.ca/health-care-professionals/clinical-practice-guidelines/long-term-care/>

Treatment recommendations for Mrs. Andrews



Hip protectors

- Given that Mrs. Andrews spends much time wandering aimlessly around her home hip protectors are recommended

Recommendation:
For residents who are mobile and at high risk of fractures, hip protectors are recommended.

Can hip protectors prevent fractures?

Summary of evidence

- Moderate quality evidence from systematic review showed relative risk reduction in hip fractures = 18% (95% CI, 0 to 33%) among older persons wearing hip protectors in institutional settings
- Over 1 year, per 1000 residents:
 - 4 fewer hip fractures wearing hip protectors may be likely
 - 11 fewer fractures among those at higher risk
 - 1 more pelvic fracture for older persons not at high risk
 - 8 more pelvic fracture for older persons at high risk.
- Moderate evidence, probably little or no difference in frequency of falls or adverse events requiring medical attention. Minor adverse events, e.g. skin irritation, occurred in < 2% people wearing hip protectors.



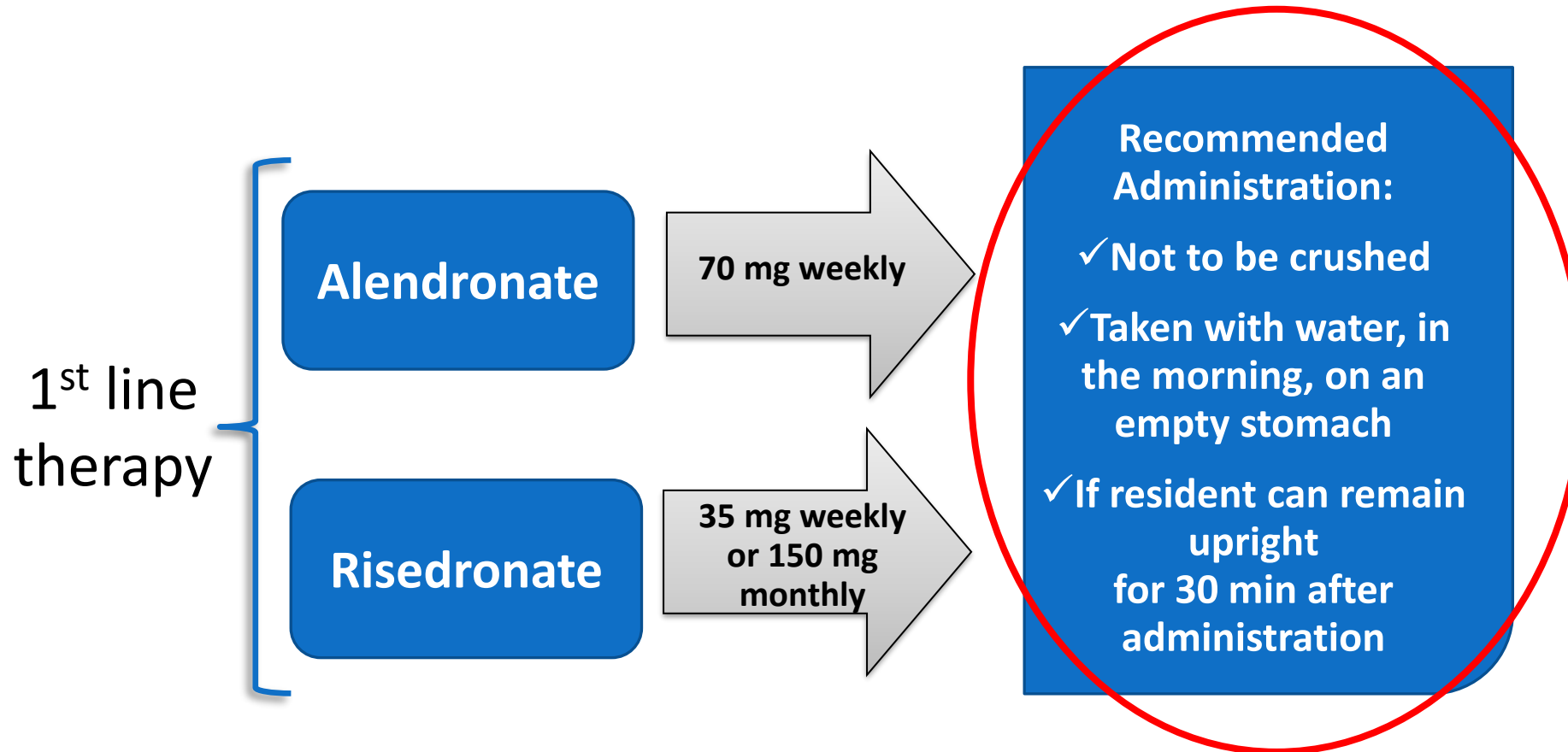
More about Mrs. Andrews

- She is able to swallow and has normal kidney function
- Despite her vertebral fractures and underlying dementia she is well.
- She has reasonable life expectancy (it would be a surprise if she died within the next 12-months)
- Goals of care are active treatment and her substitute decision maker wants therapy if it will help prevent future fractures.

Would she benefit from pharmacotherapy?



LTC recommendations for HIGH RISK residents...

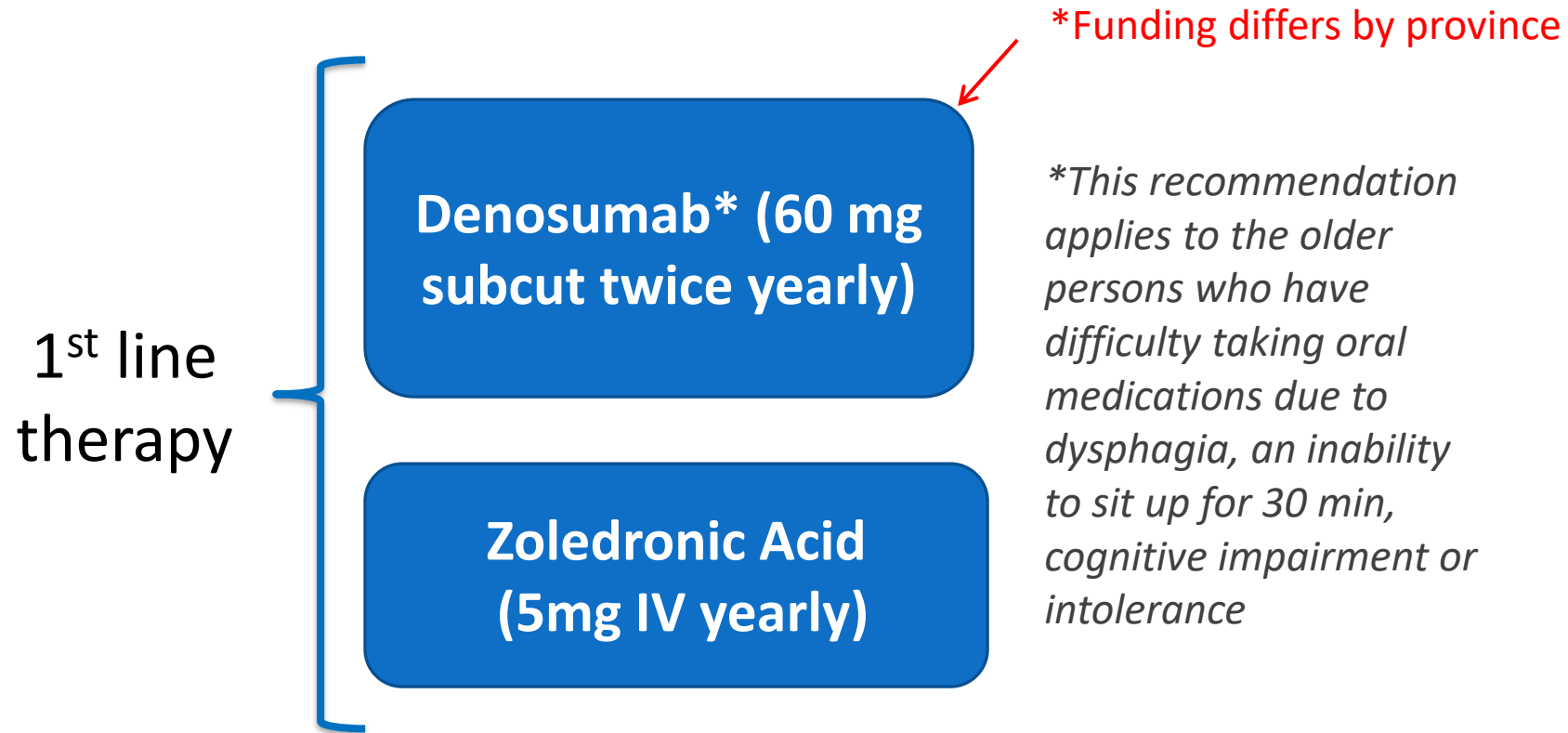


Contraindications

Alendronate and risedronate are not recommended for older persons with severe renal insufficiency (creatinine clearance <35 mL/min or <30 mL/min, respectively)



For HIGH RISK Residents + Difficulty Taking Oral Medications, we recommend..



Contraindications

Denosumab:

- While denosumab can be prescribed to residents with renal impairment, they are at higher risk of developing hypocalcemia
- Drug holidays not recommended as benefits are lost after discontinuation:
 - increased rate of vertebral fracture after one year, similar to those who never took the drug



Contraindications

Zoledronic Acid:

- Health Canada advises that caution is necessary for people who receive other medications that could affect renal function.
- Creatinine clearance should be monitored before and periodically after treatment.
- Appropriate hydration (500 mL of water) is necessary before and after treatment.
- This medication should not be administered in people with severe renal impairment (CrCl <30 mL/min).



Number Need to Treat (NNT)

First Line Drug Therapies to prevent fractures in older persons at High Risk of fractures in long-term care¹

	Bisphosphonates ²					Teriparatide ³
	Alendronate	Risedronate	Zoledronate	Denosumab ³		
Hip Fractures	Number of hip fractures prevented per 1000 treated	24 fewer	23 fewer	22 fewer	22 fewer	26 fewer
	Confidence interval	(14 - 32 fewer)	(15 - 31 fewer)	(12 - 29 fewer)	(6-32 fewer)	(40 fewer to 34 more)
	NNT to prevent one hip fracture	42 (71 - 31)	43 (67 - 32)	45 (83 - 34)	45 (167 - 31)	n/a
Vertebral Fractures	No. of vertebral fractures prevented per 1000 treated	89 fewer	97 fewer	120 fewer	124 fewer	130 fewer
	Confidence Interval	(35-124 fewer)	(55-128 fewer)	(62 - 152 fewer)	(60- 155 fewer)	(79 - 162 fewer)
	NNT to prevent one vertebral fracture	11 (29 - 8)	10 (18 - 8)	8 (16 - 7)	8 (17 - 6)	8 (13 - 6)

¹Quality of evidence was assessed as moderate. Estimated effects assumed baseline risk of hip fx at 6% and vertebral fx at 20%

²Primarily with at least 500 mg of calcium, and with/without vitamin D

³With calcium and vitamin D



Multifactorial interventions

- Any combination of interventions that are tailored to an individual's risk to reduce falls.
- Such interventions may include:
 - medication reviews, assessment of environmental hazards, use of assistive devices, exercise, management of urinary incontinence and educational interventions directed to staff

Suggestion: For all residents, multifactorial interventions that are individually tailored to reduce the risk of falls and fractures are suggested.

Web-based resources

FREE FRACTURE PREVENTION TOOLKIT

Developed for fracture prevention in long-term care.

www.gerascentre.ca/osteoporosis-strategy-for-long-term-care/

Fracture Prevention Toolkit



[Resources for Health Professionals](#)



[Resources for Residents & Families](#)

Video Gallery



[LTC Series: Personal Support Workers](#)

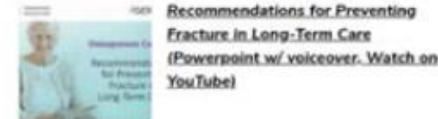


[LTC Series: Physiotherapists and Physiotherapy](#)

Fracture Prevention Guidelines



Presentations



OSTEOPOROSIS GERAS

Fracture Risk Scale

NEW

Why prevent fractures in LTC? Important! The Fracture Scale in LTC, which is high on the community, 7-8% of residents have a hip fracture each year. Fractures can be prevented, and thereby reduce the risk for further falls.

What is the Fracture Risk Scale (FRS)? A validated tool for assessing fractures risk for LTC residents. The FRS is the first tool developed and validated to predict hip fractures risk in LTC residents and is a 1-year tool used along with fall risk tools, including medication, mobility and falls. The FRS supports clinical decision making in identifying who is at risk. Available in English and Spanish. [www.gerascentre.ca/osteoporosis](#)

Benefits of FRS:

- Use preventive measures to reduce osteoporosis risk and reduce fracture risk
- Improve quality of life for residents as fractures can have life-changing and disabling consequences
- Reduce risk to reduce pain, disability and hospital charges
- No extra assessments to complete

Preventing fractures by building muscle at a hip fall:

- Using vitamin and D supplements to prevent hip injury during a fall through hip protector use
- Exercising to increase balance & strength
- Multifactorial interventions for fall prevention
- Osteoporosis medications for those at high risk of fracture

[www.gerascentre.ca/osteoporosis](#)
[www.osteoporosis.ca](#)

Fracture Risk Scale Quick Reference Guide

... and more!



Safe Administration Tool

SAFE ADMINISTRATION THERAPY TOOL FOR OSTEOPOROSIS

For residents who are at HIGH RISK of fractures, these medications are recommended as FIRST LINE Therapy, strong recommendation.

Therapies	Frequency	Safe Administration Guidance Life Expectancy > 1 year	Key Cautions*
Alendronate 70 mg	Weekly Oral	<ul style="list-style-type: none"> take tablet with 240ml water 30 min PRIOR to safe drink/medication and in the morning before breakfast. 	<p>For All Oral Bisphosphonates</p> <ul style="list-style-type: none"> Calcium, antacids, and some other oral medications may interfere with bisphosphonate absorption so should be administered at a different time of day. Bisphosphonates are NOT recommended for those with renal insufficiency. Obtain Creatinine Clearance, avoid Alendronate if CrCl<35mL/min; avoid Risedronate if CrCl<30mL/min. For residents who cannot either swallow or have swallowing difficulties, intravenous infusion and injectable therapies are recommended.
Risedronate Sodium 35 mg	Weekly Oral	<ul style="list-style-type: none"> except Risedronate Delayed Release (DR) can be taken immediately after breakfast and is not required to be taken first thing in the morning on an empty stomach. Do NOT crush or chew. 	
Risedronate DR 35 mg	Monthly Oral	<ul style="list-style-type: none"> Stay upright. Do not lie down for 30 min after taking the tablet. 	
Denosumab 60 mg/60 ml	Every 6 months subcutaneous injection	<ul style="list-style-type: none"> Subcutaneous (under the skin) injection. Consider use for residents who cannot sit for 30 minutes post IV treatment. Consider use for residents with difficulty swallowing or intolerance to oral bisphosphonates. Consider referral to specialist. 	<p>Renal Impairment</p> <ul style="list-style-type: none"> Residents with severe renal impairment (creatinine clearance <30 mL/min or receiving dialysis may be at greater risk of developing hypocalcaemia. Clinical monitoring of calcium levels is recommended.
Zoledronic Acid 5 mg/100 ml	Once yearly intravenous infusion (IV)	<ul style="list-style-type: none"> MUST drink 2 glasses of fluid / water before & after IV infusion. MUST keep the intravenous infusion intact. Stop during the entire IV infusion. Infusion rate: a minimum of 15 min. Consider 45 min for improved tolerance. 	<p>For zoledronic acid post-IV therapy, there may be flu-like, fever and myalgia symptoms:</p> <ul style="list-style-type: none"> flu-like, fever, myalgia symptoms can occur within 3 days post-IV and can last 7-14 days. Acetaminophen or ibuprofen can reduce the likelihood of post dose symptoms. IV bisphosphonates are NOT recommended for residents and caregiver.

SAFE ADMINISTRATION THERAPY TOOL FOR OSTEOPOROSIS

For residents who are at HIGH RISK of fractures, this medication is suggested, additional recommendation.

Therapies	Frequency	Safe Administration Guidance Life Expectancy > 1 year	Key Cautions
Tariparatide 20 mg/ subcut	Daily subcutaneous injection	<ul style="list-style-type: none"> injection 	<ul style="list-style-type: none"> REFER to pr for information Cost may be high

Always check cautions listed in product monographs provided in "COPS (Compendium of Pharmaceuticals and Similar Drugs)". Adequate calcium and vitamin D intake is necessary to maintain normal blood calcium levels in residents (see recommendations for calcium and vitamin D on page 2).

Permission is required to modify, adapt or translate this tool (Email: Papapanou@hsc.ca)

What does a strong/conditional recommendation mean?

Implications	Strong Recommendation (RECOMMEND)	Conditional Recommendation (SUGGEST)
For patients/residents	Most individuals in this situation would want the recommended course of action, and only a small proportion would not.	The majority of individuals in this situation would want the suggested course of action, but many would not.
For clinicians	Most individuals should receive the intervention.	Clinicians recognize that different choices will be appropriate for each individual and they must help each individual arrive at a management decision consistent with their values and preferences.

What do I need to know about Limited Use Codes? (Ontario)?

High Risk for Fracture* DENSUMAB
 LIMITED USE: Code 428 female \$15 males
 Failed Other Available Osteoporosis Therapy (fragility fracture or evidence of decline in bone mineral density below pre-treatment baseline levels despite adherence for one year).
 LIMITED USE: Code 429 female \$16 males
 For whom oral bisphosphonates are contraindicated due to hypersensitivity or abnormalities of the esophagus (esophageal stricture or achalasia) or inability to stand or sit upright for at least 30 minutes.

ZOLEDRONIC ACID
 LIMITED USE: Code 436
 For treatment of osteoporosis in postmenopausal women for whom bisphosphonates are contraindicated due to abnormalities of esophagus (esophageal stricture or achalasia) or inability to stand or sit upright for at least 30 minutes.

* High Risk defined as:
 • A prior fragility fracture and a moderate 10 year fracture risk (10-20%) or
 • A high 10 year fracture risk (>20%) or
 • Where a resident's 10 year fracture risk is less than the thresholds defined above, a high fracture risk based on evaluation of clinical risk factors for fracture.

*Papapanou A et al. CMAJ 2015; 187(9):1037-41
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 This document is only to be used as a support decision tool.
 May 2018

Order Set

LTC Fracture Prevention Order Set

The LTC Fracture Prevention Order Set is available for all new residents on admission.

RESIDENT NAME _____

HISTORY

- Prior fracture: Vertebral Hip
- Bone mass prior fracture (including history, sex, ethnic)
- Recently seen, signs of glucocorticoid and/or insulin plus factor therapy (as he, he, he, he)
- History of endocrine therapy (or resident or has received osteoporosis treatment prior to admission)
- Diabetes
- Resident at risk of falling
- Irradiated vertebra (other's criteria or STOD/STYD criteria - psychotropic, neuroleptic/psychotropic inhibitors (SSRI), antiemetic/emergence/emergence inhibitors (SSRI), proton pump inhibitors (PPI), NSAIDs, anti-epileptics)

INTAKE

- Chalk > They assess for combined features
- Thoracic > Lumbar Spine > they have) - risk of vertebral fracture
- OTC: Calcium, Creatinine, Albumin, Bilirubin, Phosphorus, TSH
- Screen prior osteoporosis (for residents with vertebral fracture)
- TSH > they have)

PHARMACOLOGY & MEDICATIONS

- Calcium > they are on
- Vitamin-D > they are on
- Amino acids > they are on
- Urinary calcium > they are on
- Vitamin-D > they are on
- Bisphosphonates > they are on
- Thiazides > they are on
- Loop diuretics > they are on
- Glucocorticoids > they are on
- Insulin > they are on
- Other > they are on

RECOMMENDATIONS

- Calcium supplement up to 1000 mg daily if needed
- Vitamin-D supplement up to 1000 IU daily if needed
- Amino acids supplement up to 10g daily if needed
- Urinary calcium supplement up to 10g daily if needed
- Thiazides supplement up to 10mg daily if needed
- Loop diuretics supplement up to 10mg daily if needed
- Glucocorticoids supplement up to 10mg daily if needed
- Insulin supplement up to 10mg daily if needed
- Other supplement up to 10mg daily if needed

OTHER INTERVENTIONS: FALLS & FRACTURE PREVENTION

- Assess, strength and functional training exercises - If at high risk of fracture. Consider other elements of a multifactorial intervention to reduce falls and fractures.
- Fall prevention
- Assessment of environmental hazards
- Medication review/adjustment (e.g. steroids, psychotropics)
- Supervision/energy conservation
- Hip protectors/energy conservation
- Hip protectors/energy conservation

Date: _____ MIDW: _____ Nurse: _____
 Time: _____ MIDW Signature: _____ Nurse Signature: _____

Quick Reference Guide

Fracture Prevention for Long-Term Care Residents

Fracture Risk Assessment on Admission

- Are you at high risk of fracture?
- Are you at low risk of fracture?

Fracture and Fall Prevention Strategies for All Residents

- RECOMMEND: Daily Calcium 1200mg/day
- SUGGEST:
 - Consider supplements 4000mg/day
 - 4000mg Calcium not met
 - Monitor 25(OH)D levels
 - Incorporate multifactorial prevention strategies (eg. exercises for those who are mobile)
 - Exercise guidance, strength and functional training
 - Medication review (check criteria of other drugs)
 - Assessment of environmental hazards
 - Use of assistive devices
 - Medication review (check criteria of other drugs)
 - Medication review (check criteria of other drugs)

Are you at high risk of fracture?

- Yes:
 - RECOMMEND: Daily Calcium 1200mg/day
 - SUGGEST:
 - Consider supplements 4000mg/day
 - 4000mg Calcium not met
 - Monitor 25(OH)D levels
 - Incorporate multifactorial prevention strategies (eg. exercises for those who are mobile)
 - Exercise guidance, strength and functional training
 - Medication review (check criteria of other drugs)
 - Assessment of environmental hazards
 - Use of assistive devices
 - Medication review (check criteria of other drugs)
 - Medication review (check criteria of other drugs)
- No:
 - RECOMMEND: Daily Calcium 1200mg/day
 - SUGGEST:
 - Consider supplements 4000mg/day
 - 4000mg Calcium not met
 - Monitor 25(OH)D levels
 - Incorporate multifactorial prevention strategies (eg. exercises for those who are mobile)
 - Exercise guidance, strength and functional training
 - Medication review (check criteria of other drugs)
 - Assessment of environmental hazards
 - Use of assistive devices
 - Medication review (check criteria of other drugs)
 - Medication review (check criteria of other drugs)

Do you have a fracture?

- Yes:
 - RECOMMEND: Daily Calcium 1200mg/day
 - SUGGEST:
 - Consider supplements 4000mg/day
 - 4000mg Calcium not met
 - Monitor 25(OH)D levels
 - Incorporate multifactorial prevention strategies (eg. exercises for those who are mobile)
 - Exercise guidance, strength and functional training
 - Medication review (check criteria of other drugs)
 - Assessment of environmental hazards
 - Use of assistive devices
 - Medication review (check criteria of other drugs)
 - Medication review (check criteria of other drugs)
- No:
 - RECOMMEND: Daily Calcium 1200mg/day
 - SUGGEST:
 - Consider supplements 4000mg/day
 - 4000mg Calcium not met
 - Monitor 25(OH)D levels
 - Incorporate multifactorial prevention strategies (eg. exercises for those who are mobile)
 - Exercise guidance, strength and functional training
 - Medication review (check criteria of other drugs)
 - Assessment of environmental hazards
 - Use of assistive devices
 - Medication review (check criteria of other drugs)
 - Medication review (check criteria of other drugs)

Summary of Recommendations

For ALL Elderly Residents in LTC

- STRONG RECOMMENDATIONS**
 - Order a prescription to increase total intake of calcium
 - The Recommended Daily Allowance for calcium is 1200mg
- CONDITIONAL RECOMMENDATIONS**
 - Multifactorial interventions that are necessary to reduce fractures in LTC residents

For Frail LTC Residents at HIGH RISK OF FRACTURE

- STRONG RECOMMENDATIONS**
 - Calcium supplementation up to 1000mg daily if they have a fracture
 - Vitamin D supplement up to 1000 IU daily if they have a fracture
 - High-protein diet for those who are frail
- CONDITIONAL RECOMMENDATIONS**
 - Multifactorial interventions that are necessary to reduce fractures in LTC residents
 - BALANCE, STRENGTH AND FUNCTIONAL TRAINING DECISIONS to reduce the risk of falls and fractures
 - PROVIDE EDUCATION to patients and families on how to prevent falls

For Frail LTC Residents NOT at High Risk OF FRACTURE

- CONDITIONAL RECOMMENDATIONS**
 - Fracture prevention strategies depending upon resources and residents or their caregiver's values and preferences
 - Calcium supplementation up to 1000mg daily if they have a fracture
 - Vitamin D supplement up to 1000 IU daily if they have a fracture
 - High-protein diet for those who are frail
 - Balance, strength and functional training interventions to prevent falls

Interpretation of Strong and Conditional Recommendation

Implications	Strong Recommendation (RECOMMEND)	Conditional Recommendation (SUGGEST)
For patients/residents	Most individuals in this situation would want the recommended course of action, and only a small proportion would not.	The majority of individuals in this situation would want the suggested course of action, but many would not.
For clinicians	Most individuals should receive the intervention.	Clinicians recognize that different choices will be appropriate for each individual and they must help each individual arrive at a management decision consistent with their values and preferences.

*Papapanou A et al. CMAJ 2015; 187(9):1037-41
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 May 2018



Awareness Raising Tools for Residents and Families

KEEPING IT TOGETHER!

Osteoporosis is a condition that causes bones to become thin, decreasing bone strength and leading to increased risk of breaking a bone. Osteoporosis is often called the 'silent thief' because bone loss occurs without symptoms. Surprisingly often, people find out they have osteoporosis after they have fractured a bone. The most common fractures are in the hip, spine, wrist and shoulder.

WHY? Fractures in Long-Term Care are very common. They can cause severe pain, disability and be fatal. If we can reduce serious falls and fractures, we can achieve reduced hospital transfers, immobility, pain and most importantly improve quality of life!

HOW? Start the conversation on how to reduce fractures! Know your risk, become aware of your treatment options and work together.

STARTING THE CONVERSATION ON OSTEOPOROSIS

ASK YOURSELF

- Have I ever broken a hip or bone since age 55?
- Has anyone in my family broken a bone or had osteoporosis?
- Has my back posture changed so I am more hunched over?
- Am I shorter than in my early adulthood?
- Do I take medications for osteoporosis?
- Have I been asked my goal of care?

ASK YOUR LEADERSHIP/ ADMINISTRATION

- How can we make sure residents have diets rich in calcium and vitamin D?
- How can we make sure residents benefit from vitamin D supplements?
- Are our staff trained to identify residents at risk for fractures?
- Do we have osteoporosis and fracture prevention as part of our falls program?
- What interventions do we have to prevent fractures and fractures from falls?

ASK YOUR PHYSICIAN/ CARE TEAM LEADS

- Am I on or should I be on osteoporosis medications?
- Am I on the appropriate Calcium and Vitamin D therapy?(older adults)
- Am I doing the right resistance and balance exercises to strengthen my muscles and improve my balance?
- Am I doing safe transfers to protect my spine and other bones?

Fracture Risk Factors for LTC Residents

44% of long-term care (LTC) residents are at high to very high risk for fracturing a bone (up to an 18% chance of fracturing per year), especially when a fall or sudden movement happens. Some residents may spontaneously have a fracture without having a fall due to the fragility of their bones, especially their back.

The following risk factors make a resident high to very high risk for a fracture in LTC. The more of these a resident has, it may move them from high to very high risk.

Produced by Family Councils of Ontario in partnership with GERAS and Osteoporosis Canada.

Source: Ontario Osteoporosis Strategy for Long-Term Care, GERAS Centre, Hamilton.

These risk factors are based on the Fracture Risk Scale for LTC and the 2015 Recommendations for Fracture Prevention in Long-Term Care.

Version 1.1 October 2016

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Recommendations for Preventing Fracture in Long-Term Care

1 Fracture Risk Assessment

All residents on admission should be assessed for fractures.

- All residents with osteoporosis should maintain treatments and interventions for their osteoporosis to help minimize the risk for future fractures
- Always assess for fracture when residents fall
- Always assess residents' fracture risk when they return to long-term care from a hospital following an admission for a fracture
- Always assess for fracture when there is sudden change in health or function that causes increased pain and loss of mobility

2 Calcium & Vitamin D

All residents can benefit from diets high in calcium and vitamin D and supplemental Vitamin D3.

For all residents in LTC	Other Adults: High Risk	Older Adults: Low Risk
1000 mg daily through diet (500 mg requirements daily through diet or supplement)	1500 mg requirements daily (requirements depending on resources and preferences)	1000 mg requirements daily (requirements depending on resources and preferences)
800-1000 IU of Vitamin D3	800-1000 IU of Vitamin D3	800-1000 IU of Vitamin D3

3 Exercise

Residents should be encouraged to participate in exercise programs that include balance training, muscle strengthening and a focus on good posture. Residents should be as active as possible practicing these exercises 2-3 times per week.

High Risk	Low Risk
Balance, strength and functional training exercises only when part of a multifactorial intervention to prevent falls.	Balance, strength and functional training exercises to prevent falls.

4 Multifactorial Interventions

All residents can benefit from multifactorial interventions that are individually tailored to reduce their risk for falls and fractures. Multifactorial interventions are any combination of interventions that are tailored to an individual's risk to reduce falls, such as: Medication Reviews | Assessment of Environmental Hazards | Assistive Devices | Exercise Management of Urinary Incontinence | Educational Interventions Directed to Staff

5 Hip Protectors

- For residents who are mobile and at high risk for fractures, hip protectors are recommended.
- For residents who are not at high risk for fracture but are mobile, hip protectors are recommended depending on resources available and the residents' values and preferences.

6 Pharmacological Therapy

Pharmacological interventions for those at high risk for fracture are most important. There are a number of effective therapies available to reduce the incidence of fractures in frail older adults. Talk to your doctor about osteoporosis medications, and whether these medications might be helpful to reduce your risk for fractures.

First line therapy recommended for individuals at high risk	For individuals at high risk and difficulty swallowing medications
Bisphosphonate 35 mg weekly or 90 mg monthly	Zoledronic acid 5 mg IV yearly

Produced by Family Councils of Ontario in partnership with GERAS and Osteoporosis Canada.

Source: The guidelines and recommendations were developed by the Scientific Advisory Council of Osteoporosis Canada, led by Dr. Alexandra Papaioannou, a Geriatrician with Hamilton Health Sciences and Professor, Department of Medicine at McMaster University in conjunction with a team of researchers and health care providers.

Source: <http://www.gerascentre.ca/osteoporosis-recommendations-overview>

Conclusions



The FRS:

- Builds on the 2015 recommendations for fracture prevention and supporting tools
- Does not require BMD testing
- Requires no additional documentation – automatic score calculation
- Is effective at discriminating and predicting hip fractures in LTC residents
- Has the potential to significantly increase fracture risk identification and management and reduce fractures
- Will reduce pain, suffering, disability, and reduced quality of life associated with fractures

Conclusions



Integration within the RAI-MDS:

- Minimizes the workload of LTC professionals
- Improves health planning
- Promotes teamwork and interprofessional practice
- Promotes resident safety

