SharedCare
Partners for Patients

YOU DECIDE

EVIDENCE SUMMARY

Osteoporosis Drugs in the Frail Elderly in Residential Care

CONTEXT FOR FRACTURES-RELATIONSHIP TO OSTEOPOROSIS AND TO FALLS

Concerns have been raised about overtreatment with osteoporosis medications.[1] Fewer than one in three hip fractures are attributable to bone fragility. Fractures are traumatic events induced by falls, mostly in frail older adults. Falls prevention is therefore an important strategy for fracture prevention.

EVIDENCE FOR USE

BENEFITS OF BISPHOSPHONATES[2]

There is a lack of elderly (>80 yo) in the studies and evidence profiled relates to postmenopausal, community-dwelling, mobile women.[2,3]

Secondary Prevention:
~90% see no benefit
6% avoid a vertebral fracture
4.6% avoid a hip fracture
1% avoid death

In more detail…

		Placebo	Alendronate 10mg/day		
	Outcome	EVENT RATES – 1-4 years (%)		Risk Diff (%)	NNT
All primary prevention studies	Vertebral fracture**	5.3	2.9	2.4	42
	Hip Fracture	No Statistically Significant Difference			
Secondary studies: 11 trials. 12,068 women High risk*	Vertebral fracture	11.2	6.2	6	17
	Hip Fracture	8.7	4.1	4.6	22
	Overall Mortality	12	11	1	100

*Previous fractures or evidence of osteoporosis (T-score <2 Standard Deviations from the Mean)
** Includes both radiologically defined (not causing clinical symptoms) and clinically symptomatic

RISKS OF BISPHOSPHONATES

The main risk of bisphosphonates is "mild upper GI side effects" (there is a wide range of reported rates).[4] However, there may be increased GI side-effects, potentially serious such as esophageal erosions, if the administration guidelines are not followed correctly (see practice points below). There have also been reports of bone, joint and muscle pain associated with the bisphosphonates.

For the rarer risks associated with bisphosphonates, the incidence of osteonecrosis of the jaw (ONJ) has been estimated to be 3-430/10,000 patients, with the higher numbers more likely in the frail elderly with poor oral hygiene and those who have been on bisphosphonates for longer time periods (dose-response relationship).[4,5] The incidence of atypical femur fractures (AFF), sub-trochanteric and shaft fractures, is estimated to be 2-100/100,00 patients, dependent on the length of treatment and may be increased in people also taking PPIs.[4,5]

Practice Points-Bisphosphonates

- Initiation- Consider whether to initiate alendronate in the frail elderly, even after a fracture in the care home population, given that the time to onset of a positive effect is 6 months for clinical vertebral fractures and 18 months for hip fractures.[6] Also consider that falls are the main contributor to fractures rather than bone fragility[1], and that there are significant administration issues.

- Administration- Oral bisphosphonates, the commonest being Alendronate, have poor bioavailability and potential for irritating the esophagus and therefore need to be taken alone, on an empty stomach, first thing in the morning, with at least 240 mL of water, with the resident maintained in an upright position for at least 30 minutes and being able to swallow adequately (concern with history of upper GI disorders or dysphagia).[7] Long acting formulations should not be crushed. Is this being followed in your care home?

- Bisphosphonates are contraindicated in people with eGFR < 35ml/min.[5,7]

- OJN: For residents requiring extensive dental work, consult with the dentist and/or this may be another reason to consider discontinuing the bisphosphonate.

- AFF- Look for prodromal groin/upper thigh pain-there may be micro-fractures initially.

- Duration of treatment- No consensus exists. US FDA recommends discontinuation after 3-5 years due to risk of AFF. Some experts recommend a risk-based approach, continuing treatment for those at high risk (previous recent fracture, fallers), especially for recurrent symptomatic vertebral fractures.[5]

BENEFITS OF Ca^{2+} & Vit D_3 over 2 to 3 years

~97% see no benefit
2.7% avoid a fracture

In more detail…

		Placebo	Ca^{2+} + Vit D_3		
	Outcome	EVENT RATES – 2-3 years (%)		Risk Diff (%)	NNT
Residential Pop'n[8]	New Hip Fracture	10.9	8.1	2.8	36

- There have been multiple meta-analyses done on Vitamin D and Vitamin D/Ca supplementation studies in community-dwelling adults and the evidence is generally felt to be inconclusive for both fracture and falls prevention and for any positive effect on mobility and function.[9]
- In the care home population, Vit D (daily dosing) does not significantly reduce the absolute risk of falls but may reduce the rate (number) of falls[10]
- Vitamin D supplementation alone, without Calcium, is not felt to be effective for fracture prevention.[8,9]
- Avanell[8] does a subgroup analysis for residential populations, which shows a small benefit on "any new fractures" for calcium and vitamin D supplements in this population (however, based on only 2 studies, same centre in France, mobile elderly in residential care or 'apartment homes for the elderly').
- Any potential (small) positive effect of Vit D/Ca on fractures may be related to treating osteomalacia in the care home population, (Vit D3-800 iu/day).[9] However, the time to benefit may be a limiting factor.

RISKS OF VITAMIN D AND CALCIUM

- Vitamin D and Ca combination: Small increased risk of hypercalcemia, renal impairment, kidney stones.[8]
- Calcium supplementation
    - Every effort should be made to get Ca from dietary sources to avoid or limit supplementation-target 1200mg/day
    - Calcium, in the most commonly administered carbonate formulation, is known to contribute to constipation, a significant side effect in care homes. Unfortunately, no reviews quantified the risks. Dyspepsia is also a concern.
    - There is debate about whether supplementation is associated with negative cardiovascular events, particularly MI. A recent meta-analysis has not found a significant association.[11]
    - Calcium tablets are large pills and hard to swallow, creating administration issues.

Falls Prevention- The Main Strategy for Fracture Prevention

- Interventions targeting multiple risk factors may be effective, particularly doing a medication review targeting psychotropic meds and meds affecting blood pressure[10]
- Combining frequent and long-term exercise programs, and including balance re-training, may be effective to prevent falls[12]

References

1. Jarvinen, T et al. Overdiagnosis of bone fragility in the quest to prevent hip fracture. BMJ 2015;350:h2088 doi: 10.1136/bmj.h2088 (Published 26 May 2015)

2. Wells, G. A. et al. Alendronate for the primary and secondary prevention of osteoporotic fractures in postmenopausal women. Cochrane Database Syst. Rev. CD001155 (2008). doi:10.1002/14651858.CD001155.pub2

3. Bischoff-Ferrari, HA., Meyer, O. Editorial- Comparative effectiveness of pharmacologic treatments to prevent fractures: Is that all we need to know? Ann Intern Med. 2014;161:755-756

4. Crandall, C. J. et al. Comparative effectiveness of pharmacologic treatments to prevent fractures: an updated systematic review. Ann. Intern. Med. 161, 711–723 (2014)

5. Brown, JP et al. Clinical review-Bisphosphonates for treatment of osteoporosis. Canadian Family Physician 2014;60:324-333

6. Inderjeeth CA et al. Time to onset of efficacy in fracture reduction with current anti-osteoporosis treatments. J Bone Miner Metab (2012) 30:493–503

7. https://www.uptodate.com/contents/the-use-of-bisphosphonates-in-postmenopausal-women-with-osteoporosis

8. Avenell, A., Mak, J. C. S. & O'Connell, D. Vitamin D and vitamin D analogues for preventing fractures in post-menopausal women and older men. Cochrane Database Syst. Rev. CD000227 (2014). doi:10.1002/14651858.CD000227.pub4

9. Bolland, MJ, Avenell, A, Grey, A. Should adults take Vitamin D supplements to prevent disease? BMJ 2016;355:i6201 doi: 10.1136/bmj.i6201 (Published 23 November 2016)

10. Cameron, I. D. et al. Interventions for preventing falls in older people in care facilities and hospitals. Cochrane Database Syst. Rev. 12, CD005465 (2012).

11. Chung, M et al. Calcium Intake and Cardiovascular Disease Risk An Updated Systematic Review and Meta-analysis. Ann Int Med. 2016;165:856-866

12. Silva RB et al. Exercise for Falls and Fracture Prevention in Long Term Care Facilities: A Systematic Review and Meta-Analysis. JAMDA 2013;14:685-689