Osteoporosis management in residential care

How internal and family medicine resident physicians translate evidence into practice

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A recent encounter with Mrs B.—an 85-year-old long-term care (LTC) resident who sustained a vertebral fracture following a mechanical fall—resulted in an interesting conversation with our preceptor about the treatment of osteoporosis in residential care. It raised a common dilemma that many physicians face: translating current evidence into clinical practice, with a focus on quality of life and goals of care.

Undertreatment and variability

According to Osteoporosis Canada, Mrs B. has a 20% risk of a second spinal fracture within 1 year. In fact, 1 in 3 women will have an osteoporotic fracture during their lifetimes, and more than 80% of all fractures in Canada after age 50 are caused by osteoporosis, the "silent thief."[1] It is recognized that osteoporosis is highly prevalent in the LTC setting, and yet it appears to be undertreated.[2] There has been much variability in osteoporosis management among LTC facilities.[3] Goal-oriented interventions are needed to improve the quality of care for those with osteoporosis. Research on osteoporosis management has been largely conducted with adults who dwell in the community. Residents of LTC, however, have often been excluded from these studies, making the choice of osteoporosis treatment in nursing home residents challenging.[4]

Osteoporosis Canada recently published guidelines on the management of osteoporosis specifically for adults residing in LTC.[5] According to the guidelines, a dietary calcium target of 1200 mg per day should be instituted, and calcium supplementation should begin if intake from dietary sources is less than or equal to 500 mg per day. For adults who are at high risk of fractures (ie, those with previous hip or vertebral fractures, those with more than 1 previous fracture, those with recent glucocorticoid therapy who have had 1 previous fracture, those with vertebral fracture diagnosed on x-ray scan, or those previously identified as high risk) and whose expected lifespans are longer than 1 year, oral bisphosphonates are recommended as first-line therapy, followed by denosumab and zoledronic acid, with a few exceptions.

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Evidence for treatment

During a recent rheumatology rotation, our preceptor recommended zoledronic acid and denosumab over oral bisphosphonates for community-dwelling patients who have sustained previous vertebral fractures, which prompted an interesting discussion. But what is the evidence behind the pharmacologic treatment of osteoporosis for LTC residents?

A recent review published in the *Journal of Internal Medicine* concluded that calcium and vitamin D supplementation did not prevent hip fractures in community-dwelling adults. However, the combination of calcium and vitamin D has been shown to be effective in preventing hip fractures in elderly women residing in LTC who were vitamin D deficient.[6] This calls into question the common practice of vitamin D and calcium supplementation in the elderly, especially in older men, as there is currently insufficient evidence to suggest that this reduces fractures. However, given the estimated high prevalence of vitamin D deficiency in institutionalized adults, low-dose vitamin D supplementation (400 to 800 IU/d) is likely warranted, as it is not associated with substantial adverse events. On the other hand, excessive calcium intake has been implicated in gastrointestinal side effects, renal calculi, and cardiovascular events including myocardial infarction. In fact, evidence suggests that calcium intake of as little as 300 mg per day, in the absence of vitamin D deficiency, is unlikely to lead to clinically meaningful bone loss.[6] For this reason, clinicians might consider adopting a higher threshold for calcium supplementation, particularly in older adults in the LTC setting who have multiple medical comorbidities.

With regard to the choice of antiresorptive agents used to treat osteoporosis, an article published in *Nature Reviews* provides a comprehensive summary comparing the commonly used agents.[7] Oral and parenteral bisphosphonates and denosumab are the most commonly encountered medications in practice. First of all, there have been no head-to-head trials conducted to directly compare the efficacy and risk profiles of these medications. Denosumab, a monoclonal antibody that inhibits the receptor activator of nuclear factor-κB ligand, reduces the risks of vertebral, hip, and nonvertebral fractures by 68%, 40%, and 20%, respectively, when administered as a 60-mg subcutaneous injection every 6 months. Important side effects associated with denosumab include skin and urinary tract infections, and

dermatologic reactions such as dermatitis and eczema. When compared with placebo, there was no significant difference in the overall rate of adverse events among patients treated with denosumab in 36 months.

The above data come from the FREEDOM (Fracture Reduction Evaluation of Denosumab in Osteoporosis Every 6 Months) trial. The efficacy of zoledronic acid was similar (annual 5-mg infusion). It reduced the risk of vertebral, hip, and nonvertebral fractures by 70%, 41%, and 25%, respectively. According to a systematic review of 7 randomized controlled trials, oral risedronate reduced vertebral fractures by 39%, hip fractures by 26%, and nonvertebral fractures by 20%. The side effect profile of bisphosphonates is well known, and includes osteonecrosis of the jaw, atypical femoral fractures, and gastrointestinal disturbances. The risks of these side effects are low (1 case in 10 000 to 1 000 000 patient-years of treatment) and are roughly equal between oral and parenteral bisphosphonates. Of note, influenzalike symptoms, such as headache, fever, and myalgias, are common after infusion of parenteral bisphosphonate. The risk is highest after the first infusion (31.6%) and it decreases substantially with subsequent infusions.

Patient goals of care versus cost

Parenteral bisphosphonate (zoledronic acid) and denosumab appear to be more efficacious for preventing fractures in patients with osteoporosis compared with oral bisphosphonates. A researcher would argue that more studies are needed, including head-to-head trials to further quantify the comparative benefit of these agents. The scholarly clinician would conclude that if a patient resides in LTC and benefits from pharmacotherapy, the most suitable agent will likely depend on the patient's goals of care, experiences with past treatments, medical comorbidities, and functional status, as well as the burden of cost (**Table 1**).[8] In the end, among LTC residents, most of whom would be considered to have a low income, would the cost actually be the convincing argument?

Conclusion

What advice should Mrs B. receive? A resident physician would conclude that it is not easy to translate evidence into practice with a focus on quality of life and goals of care. And likely, the researcher, the scholarly clinician, and "most importantly" the resident physician's preceptor would agree with that conclusion.

Table 1. Sample osteoporosis medication costs in British Columbia

DRUG	APPROXIMATE DRUG COST PER YEAR[8]	COMMENT
Vitamin D3 and calcium	> $30	Based on 600 IU of vitamin D3 or up to 999 mg of calcium per day
Oral bisphosphonate (daily)	> $92	Daily oral medication with calcium
Oral bisphosphonate (weekly)	> $229	Weekly oral medication with vitamin D
Denosumab	> $660	Injection every 6 months
Zoledronic acid	> $671	Yearly injection

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Competing interests
None declared

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