EVIDENCE BRIEF

Primary prevention &
Secondary prevention

(DCP4 ID: MSKD02)
Cluster: Musculoskeletal

FairChoices
DCP Analytic Tool

Osteoporosis

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Date modified: November 11, 2021

Description of condition and intervention

Osteoporosis is a skeletal disorder that affects quality or structure of the bone. This makes the bone more prone to fracture, more common in women than men in the elderly age-group. The associated fractures primarily occur in hip, vertebrae and forearm. Treatment of osteoporosis involves lifestyle changes like calcium and Vitamin D supplementation (in those with inadequate dietary intake), exercise, cessation of smoking. Those with highest risk of osteoporotic fractures are candidates for drug-therapy that includes bisphosphonates as the first line of treatment. Primary prevention of osteoporosis targets to prevent the bone loss and the secondary prevention aims to reduce the extent of bone-loss in those affected. Source: WHO 2003 and UpToDate accessed on August 30,2021.

Interventions included in this evidence brief for assessing effects and costs and being analysed in FairChoices:DCP Analytical tool are:

Primary prevention of osteoporosis in high-risk individuals (physical activity, calcium and vitamin D supplementation)

Secondary prevention of osteoporosis (calcium and vitamin D supplementation)

International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
World Health Organization 2013	Prevention and management of osteoporosis: report of a WHO scientific group.	Yes

Intervention attributes

Type of interventions

Preventive

Delivery platform

Primary prevention for osteoporosis is best delivered at health centre and secondary prevention at the level of first-level hospital.

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

Low level of urgency. Treatment outcomes not highly affected by some days of delay.

Population in need of interventions

Treated population: All the prevalent cases of other musculoskeletal disorders (females aged 60 to 99 years) are the treated population for receiving primary prevention of osteoporosis in

high-risk individuals (physical activity, calcium and vitamin D supplementation. The treated population for the secondary prevention of osteoporosis (calcium and vitamin D supplementation) are the prevalent cases of other musculoskeletal disorder cause and with osteoporosis in the age group of 50 to 99 years, both genders. The treated fraction is assumed 100% for females in selective age group (60 to 99 years) receiving primary prevention intervention. While the secondary prevention is only given to population with osteoporosis, both genders. The affected population and fraction are same as treated population and fraction for primary prevention of osteoporosis. However, in case of secondary prevention of osteoporosis, the affection population is those with the condition and in the age group of 50 to 99 years, both genders. The affected fraction is assumed as 0.2 (Watkins 2020).

Disease state addressed

This intervention targets other musculoskeletal disorders.

Intervention effectiveness and safety

Table 1: Effectiveness and safety of treatment for primary prevention and secondary prevention of osteoporosis

Effect of intervention		Certainty of evidence
Incidence	Calcium and Vitamin D supplementation in older individuals 65 years and above reduced bone loss, and relative risk of first nonvertebral fracture classified as osteoporotic was 0.4 (95 percent confidence interval, 0.2 to 1.1; P = 0.06) as compared to placebo (Dawson-Hughes et al 1997). 0.35 (RRR) assumed for secondary prevention	See appendix

Model assumptions

Table 2: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Model parameter	Notes
Intervention	Primary prevention	Secondary prevention	
Cost parameters			
Treated population	Based on prevalence of other musculoskeletal disorders	Based on prevalence of other musculoskeletal disorders	Global burden of Disease Study 2019
Gender	Female	Both male & female	
Age	60-99 years	50-99 years	
Treated fraction	0.2	Osteoporosis	
Effect parameters			
Affected population	Prevalent cases of other musculoskeletal disorders	Prevalent cases of other musculoskeletal disorders	
Affected gender	Female	Both male & female	
Affected fraction age	60 to 99 years	50 to 99 years	
Affected fraction	0.2	1	
Comparison	No intervention	No intervention	
Incidence Reduction (RRR)	0.4	0.35	

Intervention cost

The cost for primary prevention of osteoporosis in high-risk individuals (physical activity, calcium, and vitamin D supplementation) and secondary prevention of osteoporosis (calcium and vitamin D supplementation) is estimated at USD7.73 and USD 9.1 per person-year in specified population in LIC countries in 2016. The cost is estimated based on prices medicines 0.01/tab-cap (World Health Organization Essential Medicines and Health Products Information) and health provider visits cost (Serje J 2015).

References

WHO 2003: WHO Scientific Group on Prevention, Management of Osteoporosis, World Health Organization. Prevention and management of osteoporosis: report of a WHO scientific group. World Health Organization; 2003 Dec 31.

Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105.

Watkins 2020: Watkins DA, Qi J, Kawakatsu Y, Pickersgill SJ, Horton SE, Jamison DT. Resource requirements for essential universal health coverage: a modelling study based on findings from Disease Control Priorities, 3rd edition. Lancet Glob Health. 2020 Jun;8(6):e829-e839. doi: 10.1016/S2214-109X(20)30121-2. PMID: 32446348; PMCID: PMC7248571.

Dawson-Hughes et al 1997: Dawson-Hughes B, Harris SS, Krall EA, Dallal GE. Effect of calcium and vitamin D supplementation on bone density in men and women 65 years of age or older. N Engl J Med. 1997 Sep 4;337(10):670-6. doi: 10.1056/NEJM199709043371003. PMID: 9278463.

WHO Essential Medicines and Health Products available at https://digicollections.net/medicinedocs/#p/home

Serje J. 2015. "Estimates of Health Sector Salaries across Four Occupational Levels for UN Member States." Unpublished, WHO, Geneva.

Appendix

Literature Review for effectiveness & safety

This literature search is an example of Level 1 search for intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, metaanalysis, systematic review, clinical practice guidelines)