OSSTF-Target 1

Medical osteoporosis management

Jean Ouellet
Izzy Lieberman
Maarten Spruit
Invited endocrinology and bone health specialists

Neil Binkley  
University of Wisconsin

Angela Cheung  
University of Toronto

Kassim Javaid  
University of Oxford

Suzanne Morin  
McGill University

Online meetings

• May 13, 2021
• May 26, 2021
• Sept 17, 2021
Overarching objective

Optimize medical management of patients' bone health in the context of instrumented spine surgery in adults aged 50 or older.

The guidelines need to be widely applicable to promote adoption.
Defined specific objectives

1a. Which patients require evaluation for bone health in a preoperative setting?

1b. Which investigations need to be done to evaluate bone health?

2. Algorithm to categorize patients as low-moderate, high, or very high risk.

3. Which medical management is appropriate if major spine surgery is planned within the next 3 or 12 months?

4. Which medical management is appropriate after emergency spine surgery?
Patient aged ≥ 50 years considered for elective spine surgery

Risk factor assessment
- Prior fracture at or after age 50 years (hip, spine, pelvis, femur, humerus)
- Known osteopenia/osteoporosis
- Taking oral steroid >7.5 mg
- Radiographic osteopenia and/or old, asymptomatic compression fracture (as defined by orthopedic surgeon)
- Fracture risk assessment tool (FRAX) for major osteoporotic fracture (MOF) ± bone mineral density (BMD) ≥ 20%

* Refer for further investigations* with fracture liaison service / as per local guidelines

Yes

Low - moderate risk

High risk

Very high risk

No

Schedule surgery

Treat with antiresorptive** or anabolic** and consider surgical delay

Treat with anabolic** if possible and strongly consider surgical delay

* See Table 1
** See Table 2

Flowchart provided by Neil Binkley, University of Wisconsin, USA
## Risk classification and treatment

<table>
<thead>
<tr>
<th>Risk classification</th>
<th>Treatment approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal bone/low risk</td>
<td>Optimize calcium/vitamin D if needed and proceed with surgery</td>
</tr>
<tr>
<td>Osteopenia/intermediate risk</td>
<td>Optimize calcium/vitamin D if needed and proceed with surgery</td>
</tr>
<tr>
<td>Osteoporosis/high risk</td>
<td>Optimize calcium/vitamin D; antiresorptive or anabolic therapy and consider delay in surgery</td>
</tr>
<tr>
<td>Severe osteoporosis/very high risk</td>
<td>Optimize calcium/vitamin D; anabolic therapy if possible and suggest delay of surgery if possible. If anabolic therapy not feasible, use antiresorptive therapy</td>
</tr>
</tbody>
</table>

### Definitions
- Normal: FRAX w/out BMD < 10% or no fracture after age 50 years then no dual energy x-ray absorptiometry (DXA) & no bone health optimization (BHO) referral. For others after BHO evaluation; normal BMD, MOF < 20%, no prior fracture, normal trabecular bone score (TBS) and Hounsfield unit (HU) when available
- Osteopenia/intermediate risk: Lowest T-score -2.4 or better, no prior fracture, MOF risk < 10%
- Osteoporosis/high risk: Lowest T-score -2.5 to -3.4, recent fracture (within 2 years), MOF risk 20–30%
- Severe osteoporosis/very high risk: Lowest T-score ≤ -3.5 OR MOF risk > 30% OR recent fracture OR multiple prior fractures
Table 1
Recommended investigations for patients being assessed for osteoporosis (provided by Suzanne Morin, MD)

<table>
<thead>
<tr>
<th>Biochemical tests</th>
<th>Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>BMD measurement (hip and spine) by DXA</td>
</tr>
<tr>
<td>Creatinine</td>
<td>Lateral radiograph of the thoracic and lumbar spine or DXA-based vertebral fracture assessment</td>
</tr>
<tr>
<td>Alkaline phosphatase</td>
<td></td>
</tr>
<tr>
<td>Thyroid-stimulating hormone</td>
<td></td>
</tr>
<tr>
<td>25-hydroxyvitamin D</td>
<td></td>
</tr>
<tr>
<td>Serum protein electrophoresis in patients with vertebral fractures</td>
<td></td>
</tr>
</tbody>
</table>

NB: Most guidelines may recommend more advanced tests depending on the local context or type of clinic.
References (Table 1)


## Table 2
Anti-osteoporotic medication: summary of time to onset and scale of benefit at the spine (provided by Kassim Javaid, MD)

<table>
<thead>
<tr>
<th>Agent</th>
<th>Time to benefit as measured by nadir/peak bone turnover marker change</th>
<th>Benefit at spine as measured by spinal bone density at 1 year</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alendronate(1)</td>
<td>3-6 months (2)</td>
<td>4.5%</td>
<td>Weekly antiresorptive oral agent. Requires no swallowing issues and good adherence</td>
</tr>
<tr>
<td>Risedronate(3)</td>
<td>3-6 months (2)</td>
<td>4%</td>
<td>Weekly antiresorptive oral agent. Requires no swallowing issues and good adherence</td>
</tr>
<tr>
<td>Zoledronate(4)</td>
<td>&lt; 1 month (5)</td>
<td>3.9%</td>
<td>Annual antiresorptive infusion. Requires good renal function.</td>
</tr>
<tr>
<td>Denosumab(6)</td>
<td>&lt; 1 month</td>
<td>7.4%</td>
<td>6 monthly antiresorptive subcutaneous injection. Concerns about off-effect</td>
</tr>
<tr>
<td>Teriparatide(7)</td>
<td>&lt; 1 month</td>
<td>6.5%</td>
<td>Daily anabolic subcutaneous injection for up to 2 years then switch.</td>
</tr>
<tr>
<td>Denosumab and Teriparatide(7)</td>
<td>&lt; 1 month</td>
<td>8.4%</td>
<td></td>
</tr>
<tr>
<td>Romosozumab(8)</td>
<td>&lt; 1 month</td>
<td>14%</td>
<td>Monthly anabolic subcutaneous injection for 1 year then switch. Contraindicated if previous/recent myocardial infarction or stroke.</td>
</tr>
</tbody>
</table>
References (Table 2)


