PHOENIX-f Clinical Decision Tree part 1

Initial steps

1. Retrieve and visually inspect CT images for any vertebral fractures with AP and lateral localiser views (using Mindways QCT PRO SlicePick for 6-point morphometry).

2. Measure CTXA Hip and/or Spine BMD with QCT PRO, noting Femoral neck & Hip BMD results (g/cm²) and/or Average L1-L3 Spine BMD results (mg/cm³).

3. Recalculate FRAX online using the Mindways Femoral neck/Hip BMD (g/cm²) value & change ‘Previous Fracture’ to ‘Yes’ if a Grade 2 or 3 fracture is found at step 1.

4. If only one (Hip or Spine) result is available, follow the GP Advice Clinical Decision Tree here to generate automatic GP Advice text.

5. If both Hip BMD and Spine BMD results are available, CTXA Femoral neck/Hip results usually dominate, and the following generic Spine QCT GP advice box text is automatically added, “See CTXA Hip Bone Mineral Densitometry report for clinical interpretation.” In GP Advice box add the Spine BMD value and definitions of Normal/Osteopenia/Osteoporosis.

6. If Spine BMD value is <80mg/cm³ AND NOGG advice is GREEN (after entering Femoral neck/Hip BMD into FRAX) does a Spine result dominate. In this case, the following generic CTXA Hip GP advice box text is automatically added. “Both hip and spine results are available. For this patients’ clinical interpretation, please see their associated Spine 3D QCT BMD result.”

GP advice text using Mindways QCT Pro Spine L1-3 BMD value + initial FRAX score/NOGG

<table>
<thead>
<tr>
<th>Abnormal High</th>
<th>Normal</th>
<th>Osteopenia</th>
<th>Osteoporosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMD &gt; 200mg/cm³</td>
<td>Initial FRAX Major osteoporotic fracture risk ≤ 20%</td>
<td>Initial FRAX Major osteoporotic fracture risk &gt;20%</td>
<td>Initial FRAX Major osteoporotic fracture risk &gt;20%</td>
</tr>
</tbody>
</table>

This patient had a FRAX score high enough to warrant a BMD assessment which was done using the clinical CT scan. Their BMD of [**X** mg/cm³ (*) is higher than expected. High density can be due to degenerative/ genetic effects or for other reasons.

If grade 2 or 3 vertebral # identified. Include: Please note that a vertebral fracture was identified. Unless this was traumatic/already known, you may wish to investigate further.

**Vertebral analyser**

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**American College of Radiology**
**PHOENIX-f Clinical Decision Tree part 2**

**GP advice text using Mindways QCT Pro CTXA Femoral neck BMD value + BMD-Adjusted FRAX/NOGG**

### WHO BMD T-Score Criteria

<table>
<thead>
<tr>
<th>Abnormal High T-Score &gt; 2</th>
<th>Normal T-Score &gt; -1</th>
<th>Osteopenia -1 ≥ T-Score &gt; -2.5</th>
<th>Osteoporosis T-Score ≤ -2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any FRAX/NOGG Threshold</td>
<td>Below FRAX/NOGG Treatment Threshold</td>
<td>Below FRAX/NOGG Treatment Threshold AND &lt;75yrs with prior fragility/vert #</td>
<td>Either i) Below FRAX/NOGG Treatment Threshold OR ii) Below treatment threshold with a prior fracture aged ≥75</td>
</tr>
</tbody>
</table>

This patient had a FRAX score high enough to warrant a BMD assessment using the clinical CT scan. Their femoral neck/totai hip T-score was >-1 which is defined as normal hip bone density by WHO guidelines (FRAX score **%). Please note National Guidelines recommend bisphosphonate treatment in the majority of elderly people with a prior fragility fracture regardless of calculated risk. If relevant to patient, recommend avoid smoking, excess alcohol intake, & maintain weightbearing exercise.

This patient had a FRAX score high enough to warrant a BMD assessment using the clinical CT scan. Their femoral neck/totai hip T-score was >-1 which is defined as normal hip bone density by WHO guidelines (FRAX score **%). Please note National Guidelines recommend bisphosphonate treatment in the majority of elderly people with a prior fragility fracture regardless of calculated risk. If relevant to patient, recommend avoid smoking, excess alcohol intake, & maintain weightbearing exercise.

This patient had a FRAX score high enough to warrant a BMD assessment using the clinical CT scan. Their femoral neck/totai hip T-score was >-1 which is defined as osteoporosis, or low normal bone density, by WHO guidelines (FRAX score **%). There is no current indication for bone active therapy, but the patient may wish to follow the lifestyle advice to maintain bone density & maintain weightbearing exercise. Please use the online WHO FRAX tool to determine if a standard DXA scan is needed in 3 years.

This patient had a FRAX score high enough to warrant a BMD assessment using the clinical CT scan. Their femoral neck/totai hip T-score was between -1 and -2.5 which is defined as osteoporosis, or low normal bone density, by WHO guidelines (FRAX score **%). Please note National Guidelines recommend bisphosphonate treatment in the majority of older people with a prior fragility fracture regardless of calculated risk. If relevant to patient, recommend avoid smoking, excess alcohol intake, & maintain weightbearing exercise.

This patient had a FRAX score high enough to warrant a BMD assessment using the clinical CT scan. Their femoral neck/totai hip T-score was between -1 and -2.5 which is defined as osteoporosis, or low normal bone density, by WHO guidelines (FRAX score **%). Please note National Guidelines recommend bisphosphonate treatment in the majority of older people with a prior fragility fracture regardless of calculated risk. If relevant to patient, recommend avoid smoking, excess alcohol intake, & maintain weightbearing exercise.

This patient's FRAX score was >-1 which is defined as osteoporosis at the hip, indicates osteoporosis at the hip, & suggest investigations to rule out secondary causes (e.g. renal/liver/bone function, occasionally TTG, paraprotein screen). Then, unless contraindicated, consider oral or intravenous bisphosphonates as first line therapy with sufficient vitamin D & calcium. Follow up: Please re-assess fracture risk & indication for treatment after 3-5 years.

**Abnormal High T-Score > 2**

- If grade 2 or 3 vertebral # identified
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

**Normal T-Score > -1**

- If grade 2 or 3 vertebral # identified, <75y/o only
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

- If grade 2 or 3 vertebral # identified, <75y/o only
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

- If grade 2 or 3 vertebral # identified, <75y/o only
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

**Osteopenia -1 ≥ T-Score > -2.5**

- If grade 2 or 3 vertebral # identified
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

- If grade 2 or 3 vertebral # identified
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

**Osteoporosis T-Score ≤ -2.5**

- If grade 2 or 3 vertebral # identified
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

- If grade 2 or 3 vertebral # identified
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

**Abnormal High T-Score > 2**

- If grade 2 or 3 vertebral # identified, <75y/o only
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

**Normal T-Score > -1**

- If grade 2 or 3 vertebral # identified
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

**Osteopenia -1 ≥ T-Score > -2.5**

- If grade 2 or 3 vertebral # identified
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.

**Osteoporosis T-Score ≤ -2.5**

- If grade 2 or 3 vertebral # identified
  - Include: Please note that a vertebral fracture was identified, unless this was traumatic/already known, you may wish to order a spine only DXA scan.