Contribution of distal radius bone density to the osteoporosis diagnosis and its correlation with fracture risk assessment in elderly

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Arrow project by David Kowal
Mean Total hip T-score minus 1.4
Lumbar spine  T-score plus 0.6
BMD by DXA
Dual-energy X-ray absorptiometry

X-ray Source
(produces 2 photon energies with different attenuation profiles)

Collimator
(pinhole for pencil beam, slit for fan beam)

Patient

Detector
(detects 2 tissue types - bone and soft tissue)

Very low radiation to patient.

Very little scatter radiation to technologist.
T score and Z score

![Graph showing BMD (Bone Mineral Density) measurements and T and Z scores for the Spine: L1-L4 with age ranges and corresponding scores.](Image)
T-score correlates with fracture risk
But.....

Over 80 %

Number of fractures
Risk for fracture

Figure 1. Fracture Rate and the Number of Women with Fractures According to Peripheral Bone Mineral Density (BMD).
Data are from Siris et al.10
Rachel - Fractured T12 a year later
Which Skeletal Sites Should Be Measured by DXA (ISCD)?

**Every Patient**
- Spine
  - L1-L4
- Hip
  - Total Hip
  - Femoral Neck

**Some Patients**
- Forearm (33% radius, 1/3 radius)
- Hyperparathyroidism
- Very obese
- If hip or spine cannot be measured .......

*Use lowest T-score of these skeletal sites*
Distal Radius T-score minus 3.4
Could have we predicted this fracture in any other way?

Hip, Vertebra, Shoulder, Arm

http://www.shef.ac.uk/FRAX
Please answer the questions below to calculate the ten year probability of fracture with BMD.

**Questionnaire:**

1. Age (between 40 and 90 years) or Date of Birth
   - Age: 78
   - Date of Birth: Y: _ M: _ D: _

2. Sex
   - Male
   - Female

3. Weight (kg)
   - 63

4. Height (cm)
   - 150

5. Previous Fracture
   - No
   - Yes

6. Parent Fractured Hip
   - No
   - Yes

7. Current Smoking
   - No
   - Yes

8. Glucocorticoids
   - No
   - Yes

9. Rheumatoid arthritis
   - No
   - Yes

10. Secondary osteoporosis
    - No
    - Yes

11. Alcohol 3 or more units/day
    - No
    - Yes

12. Femoral neck BMD (g/cm²)
    - T-Score: -1.7

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**BMI: 28.0**

The ten year probability of fracture (%) with BMD:

- Major osteoporotic: 11
- Hip Fracture: 3.9

If you have a TBS value, click here: Adjust with TBS
Problems:

- Although FRAX is readily available, physicians (mainly FPs) seldom use it and rather rely on BMD result while deciding on treatment initiation.
- Even if everybody would use it, the health basket does not reimburse OP medication based on high FRAX score.
- So, back to BMD....
BMD database in CSMC

- All BMD results, anthropometric and risk factors relevant to the FRAX from 2013 onwards – over 6000 tests.

- From 2014 it had been decided to include a routine forearm measurement for all adult patients.
The project: Contribution of distal radius bone density to the osteoporosis diagnosis and its correlation with fracture risk assessment in elderly
by David Kowal

- What proportion of patients are diagnosed with osteoporosis only by the DR test (normal or osteopenic in other sites) and the determinants of this group (age, prevalent fractures, etc)

- Is there a correlation of DR bone density with the fracture risk estimated by FRAX

- We aim to define a subgroup, who might benefit from addition of DR to the routine measurement (high risk and OP diagnosis missed by hip and spine).
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