Maintaining Diagnostic Consistency in Osteoporosis:

An Audit of DXA-Based Reclassification Practices in Princess Margaret Hospital

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Background

1. 2024 OSHK Guideline for Clinical Management of Postmenopausal Osteoporosis
   - **One in three women and one in five men over the age of 50** will suffer from an osteoporotic fracture in their lifetime
2. Hip fractures (most severe consequence of osteoporosis)
   - **High morbidity and mortality**
   - **20-24% of patients dying within the first year**
   - **40% unable to walk independently thereafter**
   - **33% become totally dependent or require nursing home care**
3. Vertebral fractures
   - often underdiagnosed (**only one-third come to clinical attention)**
   - **12.1% to 22% prevalence in older women** in Hong Kong
4. Early and accurate diagnosis of osteoporosis
   - Prevent fractures, reduce complications, and improve patient outcomes

T-Score

- Measurement used to assess bone mineral density (BMD)
- Compares BMD to that of a healthy young adult of the same sex
- Reflects standard deviations (SD) of BMD above or below the reference value

T-Score

- World Health Organization (WHO) criteria
  - Diagnostic classification : based on the lowest T-score at any of the recommended DXA regions
- **T-score of ≤ -2.5** : Osteoporosis
  - Postmenopausal women and men older than 50 years
    - Lumbar spine
    - One-third (33%) radius
    - Femoral neck
    - Total hip

T-Score

- **T-score between -2.5 and -1.0**
  - "Osteopenia," "Low bone mass," or "Low bone density"
- **T-score of ≥ -1.0**
  - Normal bone mineral density (BMD)

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REVIEW ARTICLE

Updated practice guideline for dual-energy X-ray absorptiometry (DXA)

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the change is solely due to measurement error in the absence of knowledge of the LSC. Finally, if a patient has a known diagnosis of osteoporosis based on prior imaging, a follow-up scan does not change the original diagnosis. Rather, the repeated imaging is used to monitor changes in BMD over time. Even if T-scores improve to > -2.5, the diagnosis of osteoporosis is durable. Preferable patients should return to the same DXA machine that was used to perform their most

Clinical Practice Guidelines

AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS/ AMERICAN COLLEGE OF ENDOCRINOLOGY CLINICAL PRACTICE GUIDELINES FOR THE DIAGNOSIS AND TREATMENT OF POSTMENOPAUSAL OSTEOPOROSIS— 2020 UPDATE

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(**Grade B; BEL 2**). Osteoporosis is also diagnosed based on a T-score of –2.5 or lower in the lumbar spine (antero-posterior), femoral neck, total hip, or 1/3 radius (33% radius), even in the absence of a prevalent fracture (**Grade B; BEL 4, upgraded by consensus**). When the initial diagnosis of osteoporosis is made according to a T-score of –2.5 or below, the diagnosis persists even when a subsequent dual-energy X-ray absorptiometry (DXA) measurement shows a T-score better than –2.5 (**Grade B; BEL 4, upgraded by consensus**)

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CONSENSUS STATEMENT

The clinician's guide to prevention and treatment of osteoporosis

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Diagnostic assessment recommendations

- Investigate any broken bone in adulthood as suspicious for osteoporosis, regardless of cause [4, 5].
- Measure height annually, preferably with a wall-mounted stadiometer (without shoes).
- Record history of falls.
- Perform BMD testing in the following:
  - Women aged ≥ 65 years and men aged ≥ 70 years.
  - Postmenopausal women and men aged 50–69 years, based on risk profile.
  - Postmenopausal women and men aged ≥ 50 years with history of adult-age fracture.
  - DXA facilities that employ accepted quality assurance measures.
  - The same facility and on the same densitometry device for each test whenever possible.
- Maintain diagnosis of osteoporosis in patient diagnosed by fracture in adulthood or T-score (− 2.5 or below), even if subsequent DXA T-score is above − 2.5.

Observation

- Serial DXA scans are routinely performed in our unit
- Patients with a prior diagnosis of osteoporosis
  - Sometimes commented as osteopenia based on subsequent improvements in BMD

Sample Case : 3 May 2021

Findings:
Height = 163 cm, Weight = 62.0 kg, BMI = 23.3 kg/m2

Site	BMD(g/cm2)	BMC(g)	T-score	Previous BMD, Change(g/cm2)
lumbar spine (L1, L2, L3, L4)	0.780		-2.8	0.901, -0.121 (-13.4%)*
left hip (femoral neck)	0.823		-0.9	
left hip (total hip)	1.018		+0.3	1.022, -0.004 (-0.4%)

* Denotes significance at 95% confidence level.

Impression:
The bone mineral density of this patient is consistent with the diagnosis of osteoporosis.
There has been significant interval decrease in lumbar spine BMD since last scan dated 11-Jun-19(left hip, lumbar spine) as stated above.

Sample Case : 12 Dec 2024

Findings:
Height = 163 cm, Weight = 57.0 kg, BMI = 21.5 kg/m2

Site	BMD(g/cm2)	BMC(g)	T-score	Previous BMD, Change(g/cm2)
lumbar spine (L1, L2, L3, L4)	0.906		-1.7	0.780, +0.126 (+16.2%)*
left hip (femoral neck)	0.871		-0.5	
left hip (total hip)	1.088		+0.9	1.018, +0.070 (+6.9%)*

* Denotes significance at 95% confidence level.

Impression:
The bone mineral density of this patient is consistent with the diagnosis of osteopenia.
There has been significant interval increase in lumbar spine and total hip BMD since last scan dated 03-May-21(left hip, lumbar spine) as stated above.

Aim

- Highlight potential principal diagnosis inconsistency
- Promote greater awareness to ensure the use of accurate and consistent medical terminology
- Subset of Princess Margaret Hospital (PMH) patients
  - Previously diagnosed with osteoporosis with imaging
  - Subsequently reclassified as osteopenia

Standards/Guidelines

- EANM endorsed imaging guideline
  - Updated practice guideline for DXA (published in September 2024)
- Clinical guidelines
  - AACE/ACE Clinical Practice Guidelines for the Diagnosis and Treatment of Postmenopausal Osteoporosis—2020 Update
  - NOF The clinician's guide to prevention and treatment of osteoporosis

Recommendations

- When the initial diagnosis of osteoporosis is made according to a T-score of −2.5 or below, the diagnosis should remain even when a subsequent DXA measurement shows a T-score better than −2.5
- **The rationale is that the diagnosis reflects the patient's lifetime increased risk of fracture and not just BMD at a single point in time**

Target

- 100% follow-up DXA scans retain the same diagnosis of osteoporosis
  - Previously established diagnosis of osteoporosis
  - Even if the T-score improves to > -2.5

Methodology

- Data collected retrospectively over a 6-month period (from 1 June to 31 December 2024)
- Through the Radiology information System (RIS) PMH.
- The search criteria
  1. ‘age 0-99’
  2. ‘exam code 9981 Bone Den Spine OR 9980 Bone Den Hip’
  3. ‘reported by all radiologists’
- Keywords ‘Consistent with the diagnosis of osteopenia’ AND ‘interval’

Methodology

- Interval follow-up DEXA reports with interpretation of “Consistent with the diagnosis of osteopenia” issued from 1 June to 31 December 2024 were reviewed on RIS system (Total 236 cases)
- Each of their previous DEXA reports done in PMH reviewed and analysed
- Only reports with previous imaging diagnosis of osteoporosis by DEXA done in PMH (Total 46 cases) were further analysed and included in this audit

Results

- Total of 46 cases included during the period from 1 June to 31 December 2024
- All of these 46 cases had prior imaging diagnosis of osteoporosis by DEXA done earlier in PMH
  - the DEXA report conclusions issued from June to Dec 2024 did not address the established diagnosis of osteoporosis based on prior imaging (0%)
  - Instead, DEXA report conclusions (100%) commented “Consistent with diagnosis of osteopenia”

Discussion

- Known diagnosis of osteoporosis based on prior imaging remains unchanged with subsequent follow-up scans
- Repeated imaging is primarily utilized to monitor changes in bone mineral density (BMD) over time
- Conclusion: "consistent with a diagnosis of osteopenia"
  - Give the false impression that the prior diagnosis of osteoporosis has been superseded by osteopenia
  - eHealth: patients may be falsely led to believe that their condition has reverted from osteoporosis to osteopenia
- Important to explicitly denote the established diagnosis of osteoporosis in reports

Recommendations

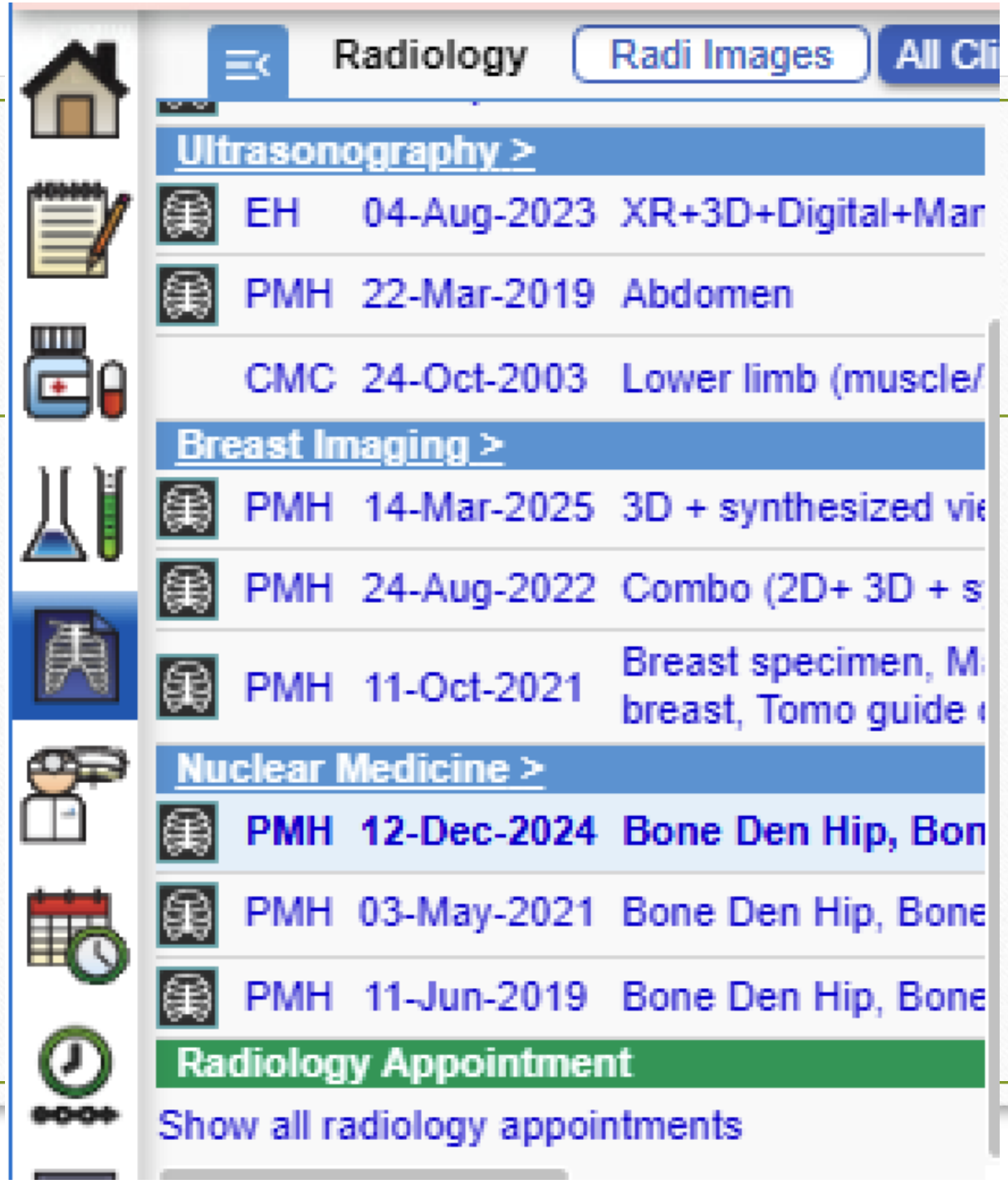
- In DEXA report conclusion, acknowledge an established diagnosis of osteoporosis, if any, based on prior imaging done in PMH. For follow-up studies, it is also important to comment on changes in BMD with reference to previous DEXA findings.

Sample Template :

Interpretation:

1. Known diagnosis of osteoporosis based on previous DEXA dated .

2. There has been no significant interval change/ significant increase/ significant decrease in lumbar spine, and no significant interval change/ significant increase/ significant decrease total hip BMD since previous study dated .


Radiology
Radi Images
All Cli
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EH 04-Aug-2023 XR+3D+Digital+Mar
PMH 22-Mar-2019 Abdomen
CMC 24-Oct-2003 Lower limb (muscle/
Breast Imaging >
PMH 14-Mar-2025 3D + synthesized vie
PMH 24-Aug-2022 Combo (2D+ 3D + s
PMH 11-Oct-2021 Breast specimen, M
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Nuclear Medicine >
PMH 12-Dec-2024 Bone Den Hip, Bon
PMH 03-May-2021 Bone Den Hip, Bone
PMH 11-Jun-2019 Bone Den Hip, Bone
Radiology Appointment
Show all radiology appointments

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Thank You