How would you rate your level of knowledge in diagnosing and managing patients with osteoporosis or at risk of osteoporotic fracture?

☐

☐ Expert
`☐ Very knowledgeable
☐ Knowledgeable
☐ Somewhat knowledgeable
☐Not knowledgeable

How would you rate your level of confidence in identifying individuals at risk of osteoporosis or osteoporotic fracture?

☐ Expert
☐Very confident
☐Confident
☐Somewhat confident
☐Not confident

1. **Mrs. X is a 71 years old female patient, known to have medical history of hypertension, hypercholesterolemia, and osteoarthritis, was referred to you with acute back pain and the possibility of osteoporotic vertebral fracture was raised, what assessment tool would you order to assess Mrs. X's BMD?**

☐Quantitative CT of the hip and spine

☐Quantitative ultrasound densitometry of the hip and spine

☐ Peripheral dual-energy x-ray absorptiometry (DXA) of the tibia

☐DXA of the hip and spine

2. **Assume that prior to referring Mrs. X to you she had an X-ray of the back arranged by her GP. This showed an osteoporotic vertebral fracture. On reviewing her in your clinic, do you think DXA scan is still indicated ? If your answer is "yes" what would be the a reason for ordering DXA scan at this time?**

☐To make a diagnosis of osteoporosis

☐DXA scan is not indicated.

☐To assess disease severity and have a baseline for monitoring efficacy of medication

☐To obtain T-scores and employ the FRAX tool to determine whether treatment is necessary

3. **Mrs. X's DXA scan revealed osteopenia at both hip and spine (T-score - 2.3 and -2.4 respectively) , whereas vertebral morphometry did not show significant loss of vertebral height. Mrs. X is currently smoking and in her visit she noted that she sustained a fracture of her left wrist 16 years ago and that her mother had hip fracture at the age of 78 years. Along with recommendations regarding life style and ensuring adequate calcium and vitamin D intake, what would be the most appropriate next step in the management of this patient?**

☐Recommend a bisphosphonate and repeat BMD testing in 2 years

☐Recommend parathyroid hormone injections and repeat BMD testing in 2 years

☐Employ the FRAX® (the WHO Fracture Risk Assessment Tool) to determine whether to initiate medical treatment

☐Employ FRAX to obtain a baseline assessment and repeat BMD testing in 2 years

4. **Which of the following statements about the fracture risk assessment tool (FRAX) is incorrect?**

☐ The FRAX® tool is used to determine an individual's fracture risk based on BMD and other risk factors such as age, personal or parental history of fracture, and low body mass index.

☐The FRAX® tool can help determine which patients with T-scores between -1.0 and -2.5 are most likely to benefit from pharmacotherapy for osteoporosis.

☐ The FRAX® tool can be used in patients receiving osteoporosis treatment to determine the effectiveness of the therapy.

☐ The FRAX® tool is intended for use in treatment-naïve postmenopausal women and men age 50 and older.

5. **Which of the following FRAX results would be an indication for treatment to prevent**

osteoporotic fractures?

☐ 10-year probability of hip fracture ≥ 3%

☐ 10-year probability of major osteoporotic fracture ≥15%

☐ 10-year probability of hip fracture ≥ 2%

☐ 10-year probability of major osteoporotic fracture ≥ 10%

6. **Medical treatment is recommended for patients with a 10-year probability of major osteoporotic fracture ≥ 20% or a 10-year probability of hip fracture ≥ 3%.**

On the basis of Mrs. X's 10-year probability of a hip fracture was (4.6%), (in addition to calcium and vitamin D supplementation) and according to NICE guidelines, which of the following osteoporosis medications would be the most appropriate choice?

☐ Denosumab injections
☐ Parathyroid hormone
☐ Strontium sachets
☐ Oral Bisphosphonate

7. **Would you consider a follow up DXA scan for Mrs. X, if Yes, When ?**

☐ Not required
☐ In 6 months
☐ In 1-2 years
☐ In 3-5 years

Though there is no general agreement on when exactly to re-measure bone mineral density, published reports recommend follow-up DXA 1-2 years after initiating medical therapy. The International Society for Clinical Densitometry (ISCD) Official Positions recommend repeat BMD testing "1 year after initiation or change in therapy." The NOF recommends repeat DXA every 2 years for patients on medical therapy.

8. **Which of the following bisphosphonates side effects would you discuss with Mrs. X?**

☐ Potential for development of complete heart block
☐ Decreased need for calcium supplementation
☐ Potential for development of ONJ
☐ Improvement of esophageal functioning

9. **Mrs. X had another similar episode of back pain after 1-year of oral bisphosphonate therapy. Plain X-ray now showed multiple vertebral fractures. Repeat DXA scan (carried out on the same machine) revealed T-score of –2.5 at the hip and -2.7 at the spine; what would be the next appropriate step in management of this patient given her new T-scores?**

☐ Determine whether the change is greater than the most significant difference of the DXA machine used for the first test

☐ Obtain laboratory studies to rule out hypoparathyroidism.

☐ Recheck the patient's bone mineral density on a second DXA machine to confirm

☐ Inquire about medication adherence

10. How do we assess the efficacy a current osteoporosis therapy? Tick the incorrect answer:

☐ Improve bone strength: Prevention of further low trauma fracture.

☐ Prevent further bone loss.

☐ Improve BMD

☐ Formation of bone of normal quality

☐ Does not get corporated in the bone matrix after long term use.

☐ Works well on cortical and trabecular bone.

☐ Does not inhibit collagen breakdown

11. Mrs. X falls risk score was high, she noted also that her muscle got weaker which made her gait speed got slower, she put that down to her Osteoarthritis hip and knee joints, what will you do?

☐ Arrange for a blood check for CK enzyme level.

☐ Measure serum Magnesium level.

☐ Measure serum vitamin D

☐ Arrange for X-ray Pelvis and knee joints

12. True or false: In a patient with osteoporosis, the initial laboratory workup may include complete blood cell count, serum calcium, 25 (OH) vitamin D, EGFR and 24-hour urine for calcium.

☐ True

☐ False

13. True or false: Frequent dosing and fear of adverse events are major reasons for patient nonadherence with osteoporosis medications.

☐ **True**

☐ **False**

* International Osteoporosis Foundation. The Adherence Gap: Why Osteoporosis Patients Don't Continue With Treatment. 2005

** Penning-van Beest et al. Determinants of persistence with bisphosphonates: a study in women with postmenopausal osteoporosis. Clin Ther. 2006;28:236-242.

Correct answers:

Q1. DXA of the hip and spine

Q2. Correct answer: to assess disease severity and have a baseline for monitoring therapy.

Comment: A fragility fracture is considered osteoporosis, and treatment should be recommended regardless of the DXA results. DXA is recommended for all patients with low-impact fractures to assess the severity of osteoporosis and to obtain a baseline to monitor the efficacy of medications. In patients with fragility fractures, Z-scores from the DXA scan can also be used to identify patients at a higher risk for secondary causes of bone loss.

Q3. Employ FRAX to determine whether to initiate medical treatment

Comment: The WHO recommends risk assessment with FRAX for patients with low bone mass (osteopenia) before initiating medical therapy.

Q4. The FRAX tool can be used in patients receiving osteoporosis treatment to determine the effectiveness of the therapy.

Q5. 10-year probability of hip fracture > 3%

Q6. Oral bisphosphonate (NICE guidelines)

Q7. 1-2 years

Q8. Potential for development of ONJ.

Comment: Side effects are similar for all oral bisphosphonates. Oesophageal irritation have been reported with the use of their use, and instructions on how to take bisphosphonates should be given to all patients. There have been reports of ONJ with the use of intravenous bisphosphonates and to less extent with oral bisphophonate. Checking the dental history and any plans in the near future for dental surgery should be carried out before starting bisphosphonate therapy. Advice regarding discussing the patient's current bisphosphonate therapy with their dentist is important. Atrial fibrillation has been reported in patients taking zoledronic acid. The patient should continue taking calcium and vitamin D supplementation, so

long they are taking osteoporosis therapy in order to maximize the benefit of the bisphosphonate.

Q9, Correct answer: Inquire about medication adherence

Comment: To determine whether a significant change in BMD exists, the same machine should be used to perform serial bone densities on patients and the least significant difference of the machine should be determined. A significant change in BMD is one that is greater than the least significant difference of the machine used.

Q10. Correct answer: Does not inhibit collagen breakdown

Comment: A new fracture while on treatment is considered treatment failure. If there was no significant change in the patient's bone mineral density or a new fracture has occurred, the patient should be questioned about adherence and laboratory studies conducted to rule out secondary causes of osteoporosis including hyperparathyroidism. Also, calcium and vitamin D levels should be checked to ensure that they are sufficient. There is a growing interest now in the effect of osteoporosis therapy medications on both trabecular as well as cortical bones with implication on prevention of fractures.

Q11. Correct Answer: Measure serum Vitamin D level.

Comment: Vitamin D deficiency symptoms include: Osteomalacia (spontaneous Fr.), Fibromyaliga like symptoms, Muscle weakness and falls, Bone Pains as well as cognitive impairment in older adults.

Q12. True

Q13. True

Comment: Studies revealed that the patients become less adherent to therapy when they take their medicine on daily bases. Data show that 80% of daily bisphosphonate and strontium users as well as 60% of weekly bisphosphonate users discontinue therapy within a year*. Adverse effects is another reason for the patients' non-compliance