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Algorithm of the National Guideline on Osteoporosis Diagnosis, Prevention and Treatment

1. Patients at risk
   • Presence of strong risk factors*
   • Radiographic evidence of bone loss &/or vertebral compression deformity
   • Previous fragility fracture
   • Loss of height, (at least 1.5 cm)

2. Central Bone Mineral Density test
   WHO Classification of Bone Mass

3. Normal? (T-score > -1.0)
   Y

4. Prevention:
   • Good nutrition
   • Encourage regular physical activities
   • Modify lifestyle risk factors
   • Calcium/Vitamin D supplement based on FNRI RDA**
   • Follow-up BMD test after 24-36 months if T-Score

5. Osteopenia? (T-score between -1.0 to -2.5)
   Y
   Go to #4

6. Osteoporosis (T-score ≤ -2.5)
   N

7. Treatment:
   • Good nutrition
   • Encourage regular weight bearing activities
   • Modify lifestyle risk factors
   • Calcium/Vitamin D supplement based on FNRI RDA**
   • Anti-resorptive/anabolic agents: biphosphonates, SERMS, PTH
   • Follow-up BMD test after 24-36 months

* • Estrogen deficiency
  • Parenteral history of hip fracture
  • Low body weight <57.2 kg for Caucasians, or BMI <19 for Asians
  • Use of corticosteroids longer than 3 months
  • Other disorders associated with increased fracture risk, i.e., malabsorption or hyperthyroidism

** Recommended Energy and Nutrient Intakes Philippines (RENI), 2002 Edition

Figure 1
Abstract

Osteoporosis is considered a major worldwide health problem. Once thought to be part of aging, current evidences have considered significant causal relationship between several life style risk factors to its occurrence. Data worldwide has confirmed the considerable increase in occurrence of fragility fractures among patients with osteoporosis. Paucity of national data should not preclude the healthcare policy makers in considering this to cause huge economic burden. The impact of local institutional data to the incidence of the disease should indeed heed a call that something needs to be done at this time to halt the progression of this epidemic.

Currently there is no accurate method of measuring overall bone strength. Since measurement of bone mineral density, considered a surrogate marker accounting for almost 70% of bone strength, is not widely available nationwide, it is deemed prudent that there should be some sensible ways of identifying high-risk individuals for BMD measurement.

The Osteoporosis Society of the Philippines Foundation, Inc. (OSPFI), a non-stock, non-profit organization and one of the founding members of the Asia Pacific Osteoporosis Foundation (APOF) presents a set of guidelines intended to help clinicians determine when a bone mass measurement maybe useful in the care of their patient. In areas where central bone mass measurement is not readily available, the use of Osteoporosis Screening Tool for Asians (OSTA) risk index validated in Asian as well as other Caucasian populations using only age and body weight maybe used to determine if a low, medium, or high probability of low bone density exists among postmenopausal women.

The goal for the evaluation of patients at risk for osteoporosis focuses not only on establishment of diagnosis but also to establish fracture risk to be able to make decisions regarding the need for instituting therapy. Should patients need anti-resorptive or anabolic agents, there is a need to further monitor changes in bone density, primarily to assess therapeutic efficacy of these agents. An increase in bone density, or stabilization of bone density is considered an appropriate surrogate for efficacy of the agent in reducing fracture risk.

Emphasis on preventive efforts at forestalling the development of the disease (primary prevention) as well as early detection and treatment or efforts to retard or prevent progression or recurrence of disease (secondary prevention) should be done.

Introduction

Osteoporosis is a systemic skeletal disease of compromised bone strength leading to an increased risk of fracture. It is considered a global health problem being a major cause of morbidity in the elderly. The fractures associated with osteoporosis cause considerable disability and loss of quality of life and can be fatal. The annual cost of treating osteoporotic fractures has been estimated to be around $1.2 billion (UK) to $13.8 billion (US). Up to half the bone loss experienced by women is attributable to loss of estrogen. Currently, one in every three women is suffering from this silent disease. Osteoporosis is defined by bone mineral density measurement according to the World Health Organization criteria:

- Normal bone density: T-score* more than and equal to –1
- Osteopenia (low bone mass): T-score between –1 & –2.5
- Osteoporosis: T-score less than and equal to –2.5
- Severe osteoporosis: T-score less than and equal to –2.5 with fragility fracture

Impact of Osteoporotic Fractures in the Philippines

In 1995, Department of Health estimated the Filipino elderly population, increasing at the rate of 5.45% per year, is now more than 4 million. In effect, there will definitely be a substantial increase in the incidence of osteoporotic fragility fractures. Among 19,920 patients age 50 years and above admitted at Philippine Orthopedic Center (POC) from 1995-1997, majority of them (41%) suffered from femoral fractures, 31% forearm, and 22% had vertebral fractures. Of the 11,354 female patients, 58% of them were reported to have hip fractures. A similar observation in 1997 disclosed femoral fractures accounted for 53% of all observed fractures. In a fracture registry done among patients 50 years and

* T-score is the number of standard deviation of BMD below the young normal mean. Another way of expressing BMD is using the Z-score, which is the number of standard deviation reduction by which a patient’s BMD differs from the mean of subjects of the same age and sex.
above in POC on year 2001, there was an increase in the prevalence of fractures seen on all sites (vertebral, femur, and forearm) compared to years 1999 and 2000. A separate trauma registry compiled from 18 orthopedic training centers all over the Philippines by the Philippine Orthopedic Association (POA) from 2002-2003 reported that a little more than 10% of more than 5000 patients 50 years and above admitted to these hospitals were enlisted to have mixed fractures with more than 70% of them disclosing that these events were precipitated by a fall.

**Epidemiology in Asia**

**Hip Fractures**

By the year 2050, it is estimated that 6.4 million people will suffer from hip fracture, with 51% of hip fractures occurring in Asia. There is no doubt that certain variations on hip and possibly vertebral fracture incidences occur between different ethnic as well as racial groups, with the highest rate seen among Caucasians, intermediate among Asians, and lowest among Blacks. It was noted by Lau et al in 1985 that hip fracture incidence in Hong Kong women was 4/1000 compared to Caucasian women at 6/1000. There is an actual gradient of hip fracture incidence in Asia, with the incidence being highest in urbanized countries such as Hong Kong and Singapore (see Table 1), where incidence of hip fractures rapidly approach those observed in Caucasian populations.

In Hong Kong, as the city underwent urbanization and economic development from 1966 to 1985, the incidence of hip fracture increased by 2.5 fold in women and 1.7 fold in men. If similar increases occur in other countries in Asia, including the Philippines, the burden of hip fracture will be tremendous, with the incidence rapidly approaching or even surpassing the Caucasian figures.

**Vertebral Fractures**

Vertebral fractures are associated with height loss, back pain, functional impairment, kyphosis, and reduced quality of life. The risk of new vertebral fracture increases with age and is elevated in patients with existing vertebral fractures or low bone mass. Elevations in fracture risk in patients with prevalent vertebral fractures are apparent within 1 year after the first incident fracture and increase with the number of prevalent fractures.

Prevalence of vertebral fracture varies according to population sampled as well as diagnostic criteria used. Some large scale studies have actually pointed out that the frequency of vertebral fractures might actually be higher in Asians than in Caucasians (30% in Hong Kong Chinese women as compared to 26% in American Caucasians). The high prevalence of vertebral fracture was subsequently collaborated in studies conducted in Beijing, China and in Taiwan. Though no further epidemiologic studies were conducted in other parts of Asia, it is still considered a prevalent health problem that will likely increase exponentially as the Asian population ages.

**Risk Factors**

Established risk factors for osteoporosis are grouped into major categories: age, or age-related; genetic; environmental; estrogen/androgen deficiency and chronic diseases; and physical characteristics of bone. These risk factors cannot, however, replace BMD measurements in predicting fractures, but rather identify high risk group of individuals who should undergo dual x-ray absorptiometry (DXA) examination and screening. Of the different determinants of bone strength, only BMD and bone turnover can be measured in patients with or at risk for osteoporosis. There is good correlation between BMD and fracture risk among Caucasians as well as study done in Hong Kong Chinese. Each standard deviation reduction in femoral neck BMD increases the age-adjusted risk of hip fracture by a factor of 2.

**Diagnosis**

**Techniques for Measuring BMD**

Since bone strength reflects bone density and bone quality, bone mineral density (BMD) has been the standard measurement for diagnosing osteoporosis. Central DXA is currently considered the “gold standard” for the diagnosis of osteoporosis. Skeletal sites for BMD measurement to include the regions of interest are the spine (preferably L1 to L4), the hip (total, neck, or trochanter), or the forearm (33% radius or one-third radius). Precision varies in different centers worldwide, with

<table>
<thead>
<tr>
<th>Table 1. Incidence of hip fracture in 5 Asian countries (adjusted to and presented with US Caucasian figure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Women</td>
</tr>
<tr>
<td>Men</td>
</tr>
</tbody>
</table>

Results were from the Asian Osteoporosis Study and were adjusted to the 1989 US white population.
Peripheral Bone Densitometry

Peripheral devices are useful for assessment of fracture risk. However, clinical utility of peripheral bone densitometers in the diagnosis of osteoporosis needs to be carefully studied further. Based on the International Society for Clinical Densitometry Position Statement, the World Health Organization (WHO) criteria for diagnosis of osteoporosis and osteopenia should not be used with peripheral BMD measurement other than 33% radius. Different technologies as well as acquisition techniques and reference databases were used in the manufacture of peripheral densitometers limiting their use in the diagnosis as well as monitoring. They cannot be applied in clinical practice until device-specific cut-points are established.

Bone Turnover Markers

Measurements of bone turnover markers (BTM) can predict future fracture risk. The following biochemical markers of bone turnover can be measured in serum and urine, namely: markers of bone formation, i.e., bone specific alkaline phosphatase, procollagen type I propeptides, osteocalcin and markers of bone resorption, i.e. deoxypyridinoline cross-links (in urine) and C and N telopeptides of type I collagen cross-link (in both serum and urine).

Both BMD and BTM measurement are related to fracture risk and at the same time, correlate very well with fracture protection. There is a nonlinear relationship between the magnitude of BMD change and the magnitude of fracture protection. Biochemical markers can be used to complement BMD testing for assessment of fracture risk.

The Osteoporosis Society of the Philippines Foundation, Inc. (OSPFI), a member society of the International Osteoporosis Foundation (IOF) and a founding member of Asia Pacific Osteoporosis Foundation (APOF) recommends the following clinical guidelines on the indications for bone densitometry:

- all postmenopausal women >65 years of age regardless of risk factors
- all postmenopausal women ≤65 years, in the presence of 1 or more risk factors for osteoporosis
- all postmenopausal women who are considering therapy for osteoporosis if BMD test would facilitate such a decision
- all postmenopausal women on prolonged hormonal replacement therapy
- all postmenopausal women and men who have had a fracture of any type as an adult after 45 years of age
- all men ≥70 years of age
- maternal history of hip fracture after 45 years of age
- loss of height (at least 1.5 inches), thoracic kyphosis
- low body weight (<120 lbs)
- radiographic evidence of low bone mass &/or vertebral compression deformity
- conditions associated with low bone mass

Because of paucity of data, indications for bone densitometry is not routinely recommended for premenopausal women, children between 5-12 years and adolescents 13-19 years of age. The diagnosis of osteoporosis on these groups of individuals should not be made solely on densitometric criteria alone. Every effort should be done to optimize the lifestyle modification of these individuals in order to attain a good quality peak bone mass.

In a developing country like ours where access to central BMD measurements is limited, simple questionnaires have been designed to help target high-risk women for BMD measurements, thereby avoiding the cost of measuring women at low risk. Numerous risk factors were collected from postmenopausal women in eight Asian countries evaluating their ability to identify women with osteoporosis defined by femoral neck BMD T-scores ≤2.5. The Osteoporosis Screening Tool for Asians (OSTA) risk index had a sensitivity of 87%-91% and specificity of 45%-67% which was similarly validated in Japan, Korea, and other Caucasian populations. This tool, based only on age and body weight, performed well for classifying the risk of osteoporosis among postmenopausal Asian women and applying it would result in more prudent use of BMD technology.

Prevention and Treatment

Preventing the first fracture is critical to maintaining skeletal health and integrity and avoiding the cascade of further bone loss and fractures that characterize advanced disease. Prompt identification and treatment of patients at risk for osteoporosis can prevent fractures and their accompanying pain, disability, and financial
Primary Prevention of Osteoporosis

The following are considered main components for the primary prevention of osteoporosis:

1. Maintain an adequate calcium and vitamin D intake

Calcium is the nutrient most important for attaining peak bone mass and for preventing and treating postmenopausal osteoporosis. The Food and Nutrition Research Institute (FNRI-DOST) of the Philippines recommends 800 mg/day of calcium and 10-15 µg/day of vitamin D for men and women over the age of 50. Clinicians should advise patients to maintain an adequate intake of calcium and to enjoy moderate sun exposure to promote the synthesis of vitamin D.

2. Perform regular load-bearing activity

Exercise and activity program are only one component of a comprehensive program for the prevention of osteoporosis. Exercise benefits include: decreased risk of falling, improved bone mass and strength, enhanced muscle strength, improved balance, better posture, increased flexibility of soft tissues and better range of motion, improved cardiovascular fitness, improved depression, and generally, a better overall quality of life.

3. Smoking cessation

Excessive bone loss occurs in smokers. Smoking has been reported to impair osteoblast or bone forming cells function, resulting to early menopause, lower body weight, and lower estrogen levels. Poor calcium absorption found in postmenopausal women who smoke is caused by decrease in serum PTH leading to decreased renal hydroxylation of 25(OH)D to calcitriol.

4. Avoid alcoholism

Alcohol consumption has also been associated with osteoporosis. There has been reports on the dose-response relationship demonstrated between the average number of drinks per day and age-adjusted bone density in premenopausal women.

5. Fall prevention

Walking aids, such as canes and walkers, allow continued independent mobility in many elderly patients, but must be used to avoid falls during use. Hip strengthening exercises and the slow movement martial arts exercise, Tai Chi, have been shown to improve several physical performance measures and psychosocial indicators as well as lowering the risk of falls by 40%.

6. Hip protectors

Hip protective pads, worn in side pockets of stretchy undergarments, protect against hip fractures in an elderly nursing home (average 81 years old) population. While regular use and compliance is another issue, these devices are considered for elderly individuals at risk for hip fracture.

Pharmacologic Agents

Osteoporosis can be treated with antiresorptive and anabolic agents, which are effective in reducing fracture risk. Pharmacologic agents work by preventing further bone loss or increasing bone mass. Antiresorptive therapies are important aid in treating and preventing osteoporosis because of their low incidence of side effects, good safety profile, and proven efficacy.

It is recommended that women and men who sustained hip fracture, incident vertebral fracture, or other established osteoporotic fractures, postmenopausal women with BMD T-score ≤ - 2.0 with or without risk factors, those with T-score ≤ -1.5 in the presence of one or more risk factors, and those who belong to the high risk category using OSTA should receive drug treatment.

Bisphosphonates

Bisphosphonates offer excellent tolerability and protection from both spine and hip fractures in patients with osteoporosis. These agents, which include alendronate and risedronate, significantly reduce bone loss, and their effects can be observed quickly. Bisphosphonates are the only agents in prospective clinical trials that have been shown to reduce the risk of hip and other nonvertebral fractures. Alendronate and risedronate should be considered as first line drugs for preventing fractures in osteoporotic patients. In patients with prior vertebral fractures, alendronate (10 mg daily for 3 years) and risedronate (5 mg daily for 3 years) have shown reduction in risk of new vertebral fractures by 20% and 65% respectively and hip fracture by 55%. Ten year administration of alendronate data shows continued increases in BMD, 13.8% at the spine and between 5-6% at the hip. New generation of bisphosphonates are currently undergoing intensive studies which may provide different options, such as route of administration and tolerability profiles. (see Table 2)

Selective Estrogen Receptor Modulators

In randomized controlled trials (RCT), raloxifene (60 mg oral daily for 2 years) has been shown to increase BMD in postmenopausal women, but less than those reported for bisphosphonates and estrogen. It is associated with a significant reduction in the risk of vertebral fractures. However, non-vertebral fractures were not
measured in these studies. Though there is a risk reduction in breast cancer and reduction in total cholesterol with the use of raloxifene, there is an associated increase in hot flushes and deep venous thrombosis.

**Hormonal Replacement Therapy**

Estrogen therapy reduces bone loss for 10-15 years after menopause, with increase in BMD averaging 5% over 3 years. The Women’s Health Initiative report found that 5 years of HRT reduced the risk of clinical vertebral fractures and hip fractures by 34%, with an associated increase in risk of myocardial infarction, invasive breast cancer, pulmonary emboli, and deep vein thrombosis. Non-estrogen drug treatments are preferable to estrogen therapy, if drug treatment is considered solely for the prevention of osteoporosis.

**Tibolone**

Tibolone is a synthetic progesterin that does not stimulate the endometrium in contrast to conventional HRT preparations. It is a tissue specific regimen that exerts beneficial effects on the bone, as well as on climacteric symptoms, via direct activation of estrogen receptor. In a 10-year non-randomized prospective study, tibolone had significantly increased the mean bone mineral density in the lumbar spine and femoral neck by 4.8% and 3.7% respectively, compared with baseline. In a separate observational study done, there was a mean increase of 4.1% in spinal BMD and 1.6% in hip BMD at 8 years compared to baseline measurements.

**Calcitonin**

Thus far, only one large trial has been conducted which showed that calcitonin at 200IU intranasal daily for 5 years could lower vertebral fracture risk by 21%. However, there is no evidence that calcitonin decreases other non-vertebral fracture rate, hence, it should not be considered as first line drug for the treatment of osteoporosis. On the other hand, calcitonin has a well-documented analgesic effects which is particularly interesting in the weeks following the occurrence of a vertebral fracture.

**Vitamin D**

Vitamin D₃ (cholecalciferol) supplementation with calcium administered orally for 18 months resulted to 50% reduction in non-vertebral fracture rates and a 25% reduction in non-vertebral and hip fracture rates. The indicator for determining adequacy of vitamin D intake is serum 25(OH)D which sums up the total production of cutaneous vitamin D and the ingested oral vitamin D₂ or D₃. To date, there are no studies on serum concentration of 25(OH)D among Filipinos. In the absence of concrete data on which adequate intakes of vitamin D for Filipinos can be based, the 2002 Recommended Energy and Nutrient Intakes (RENI) Committee adopts the recommendations from World Health Organization and international advisory bodies.

**Calcium**

Calcium has been used as adjunctive therapy in most clinical trials on antiresorptive agents; and calcium supplementation should be prescribed with such thera-

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### Table 2. Major fracture prevention randomized controlled trials with anti-resorptive agents in post-menopausal women with osteoporosis

<table>
<thead>
<tr>
<th>Trial</th>
<th>Drug</th>
<th>Prior vertebral fractures (% reduction)</th>
<th>Duration (years)</th>
<th>Vertebral fracture reduction</th>
<th>Hip fracture reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberman²³ 1995</td>
<td>ALN</td>
<td>&gt;50%</td>
<td>3</td>
<td>48%</td>
<td>—**</td>
</tr>
<tr>
<td>Black²⁶ 1996</td>
<td>ALN</td>
<td>100%</td>
<td>3</td>
<td>47%</td>
<td>51%</td>
</tr>
<tr>
<td>Cummings²⁷ 1998</td>
<td>ALN</td>
<td>0</td>
<td>4.2</td>
<td>44%</td>
<td>21%</td>
</tr>
<tr>
<td>Bone²⁸ 2004</td>
<td>ALN</td>
<td>17.5-30.8%</td>
<td>10</td>
<td>similar to Liberman</td>
<td>—**</td>
</tr>
<tr>
<td>Harris²⁹ 1999</td>
<td>RIS</td>
<td>65%</td>
<td>3</td>
<td>41%</td>
<td>—**</td>
</tr>
<tr>
<td>Reginster³⁰ 2000</td>
<td>RIS</td>
<td>100% (all had at least 2 fractures)</td>
<td>3</td>
<td>49%</td>
<td>—**</td>
</tr>
<tr>
<td>McClung³¹ 2001</td>
<td>RIS</td>
<td>38%</td>
<td>3</td>
<td>40%*</td>
<td>30%</td>
</tr>
<tr>
<td>Watts³² 2003</td>
<td>RIS</td>
<td>68%</td>
<td>1</td>
<td>62%</td>
<td>—**</td>
</tr>
</tbody>
</table>

* not assessed in all patients
** not measured
pies. Its use as a monotherapy is insufficient to prevent fractures in osteoporotic patients. Results of controlled trials demonstrated that calcium as a monotherapy increased BMD by 1-2% over 2-3 years, this produced small though statistically significant reduction in fracture incidence.

**Bone Forming Agents: Parathyroid Hormone (PTH), Strontium Ranelate**

PTH is an anabolic agent which substantially increases bone density and reduces the incidence of vertebral and non-vertebral fractures. A recent large clinical trial showed that PTH (20 μg SQ per day for 18 months) increased the vertebral BMD by 9% and femoral neck BMD by 3%. Such therapy likewise reduced vertebral fracture risk by 65% and non-vertebral fracture risk by 55% after 18 months of therapy47. Recent study on its administration with bisphosphonate (alendronate) did not show additional benefit over PTH alone48,49.

The effect of 2 g/day of strontium ranelate on non-vertebral fracture showed a significant reduction in relative risk of experiencing a first non-vertebral fracture when compared to placebo in an intention to treat population. A 41% reduction in the relative risk of experiencing hip fracture was demonstrated in the population having regularly taken strontium ranelate for the first 18 months of the study50,51.

**Drug Therapy for Osteoporosis in Men**

*A. Alendronate*52

Results in 2 studies in men showed that the alendronate (10 mg orally daily for 2 years) increased lumbar spine BMD by approximately 5.3% with significant reduction in incidence of vertebral fracture observed in both studies.

*B. Testosterone*53,54

Results of clinical trials showed that testosterone therapy increased BMD by a range of 1-5% in men with or without hypogonadism. Larger and well designed trials on the effects of testosterone are still lacking.

**Glucocorticoid Induced Osteoporosis (GIOP)**

Corticosteroids are widely used since they are considered effective agents for control of many systemic inflammatory disorders. Hypercalciuria develops and bone loss occurs quickly within the first 6-12 months of initiation of corticosteroid therapy, thereafter, the rate of bone loss slows to 2-3 times that of normal. The risk of corticosteroid-induced osteoporosis increases as the cumulative corticosteroid dose increases. Assessment of fracture risk with corticosteroid (CS) is currently best performed by measurement of bone mineral density, preferably when subjects are commencing CS treatment or soon after. From a clinical standpoint, the optimal approach is primary prevention in patients commencing CS who have not yet lost bone, however, treatment (or secondary prevention) in patients on chronic CS, who will almost certainly have some significant degree of existing bone loss, will also reduce fracture risk. Important approaches to GIOP include: Use the lowest CS dose possible since bone loss is dose dependent, use of agents that prevent or reverse bone loss. Agents that have been investigated in several large double-blind randomized trials include calcium, vitamin D and its metabolites, calcitonin, hormone therapy, bisphosphonates55,56,57, and PTH.

**Monitoring**

Changes in bone density account for only a fraction of the fracture protection afforded by antiresorptive therapy. For various antiresorptive drugs13,58,59, the proportion of fracture risk reduction explained by changes in BMD in response to therapy varies. The amount of increase in bone density in response to therapy is not indicative of the amount of fracture protection gained. Comparisons of anti-fracture effectiveness between agents cannot be based on differences in response to BMD or BTM across clinical trials.

Measurement of BTM maybe a helpful tool in monitoring response to therapy. In elderly patients, high bone turnover marker levels have been shown to predict hip fracture in an independent and complementary way to bone mineral density. The rapid reduction in bone turnover that occurs when antiresorptive therapy is begun corresponds in time with the rapid reduction in spine fracture risk seen with treatment. Risedronate therapy reduces bone forming marker by approximately 22% and bone resorbing marker by 44% after 24 months of treatment60 while alendronate decreases BTM by 40-50% after 3 to 6 months of treatment61.

A clinician tasked to monitor response of patients with osteoporosis to treatment should be able to focus on three (3) important objectives: 1st, to evaluate efficacy of therapy in relation to fracture prediction since the primary goal of therapy is to reduce fracture risk; 2nd, to identify non-responders because these patients will require a change in treatment course; 3rd, to enhance adherence to long-term treatment program for maximum benefit.

One important purpose of monitoring therapy is to identify non-responders—patients who display a deterioration of skeletal health while on treatment. No change in BMD or BTM while on treatment does not equate to
non-response. A definite loss in BMD, as seen in BMD changes greater than the least significant change, is a signal to review dosing and compliance and to look for other contributory factors that would undermine or minimize therapeutic effect (eg. vitamin D deficiency). Typically one year after initiation or change of therapy is appropriate, with longer intervals once therapeutic effect is established. In conditions where there is an associated rapid bone loss, more frequent monitoring will be appropriate. Intervals between BMD test should therefore be determined according to each patient’s clinical status as well as cost-benefit analysis of doing one.

**Recommendations on when to repeat BMD measurement**

- **Postmenopausal women or elderly men with normal baseline BMD:** repeat at least after 2-3 years
- **Postmenopausal women or elderly men on treatment:** repeat at least after 1-2 years
- **Patients on corticosteroid therapy (>7.5 mg/day for at least 3 months):** repeat every 6 months

**Summary**

In summary, the OSPFI strongly recommends individualized approach to screening for osteoporosis. Though there is a universal recognition on high-risk patient profile for osteoporosis, clinicians need to be aware of the importance of bone density test in screening asymptomatic individuals and utilizing central bone mineral density measurement as a valid way of evaluating patients with fragility fracture or have a disease, condition, or medication associated with osteoporosis. Also, general care practitioners as well as specialists should fully utilize the OSTA as part of their initial evaluation in identifying patients who are at low, intermediate, or high risk for osteoporosis, and measure BMD when appropriate, before fractures occur. Lastly, primary prevention should still be the forefront of our general medical care in the community, focusing on measures to build good quality bone mass. Patients who are identified to be osteoporotic deserve secondary and tertiary preventive measures to prevent fractures and its complications.

**References:**

2. Dela Rosa M. Philippine Orthopedic Hospital 1995-1997: Personal Communication
40. Writing group for the PEPI trial. Effects of hormone therapy on bone mineral density. JAMA 1996;276:1389-1396
42. Rymer J, Robinson J, Fogelman I. Ten years treatment of tibolone 2.5 mg daily: effects on bone loss in postmenopausal women. Climacteric 2002;5:390-398
Appendix

• If you are in the yellow or red region of the chart above, your risk of osteoporosis may be increased.
• If you have broken any bones after menopause, your risk is increased regardless of your current age and weight.
• Other factors can also increase your risk, such as corticosteroid use (losses increase with dose and duration), hypogonadism, immobilization (bed-ridden, casted fractures, wheelchair-bound, etc.) low body weight, poor nutrition especially calcium, smoking, sedentary lifestyle, endocrine disorders (hyperthyroidism, hypercortisolism, hyperparathyroidism) and caffeine use.
• A bone density test can help your doctor confirm a diagnosis of osteoporosis, even before broken bones happen. Most methods for measuring bone mineral density are fast, safe and painless.

Medical conditions that maybe associated with an increased risk of osteoporosis (NOF Guidelines)

<table>
<thead>
<tr>
<th>AIDS/HIV</th>
<th>Hemophilia</th>
<th>Multiple myeloma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amyloidosis</td>
<td>Hyperparathyroidism</td>
<td>Multiple sclerosis</td>
</tr>
<tr>
<td>Ankylosing spondylitis</td>
<td>Hypogonadism, 1º and 2º</td>
<td>Pernicious anemia</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>(eg. amenorrhea)</td>
<td>Rheumatoid arthritis</td>
</tr>
<tr>
<td>Congenital porphyria</td>
<td>Hypophosphatasia</td>
<td>Severe liver disease, esp. PBC</td>
</tr>
<tr>
<td>Cushing’s syndrome</td>
<td>Idiopathic scoliosis</td>
<td>Spinal cord transsection</td>
</tr>
<tr>
<td>Eating disorders</td>
<td>Inadequate diet</td>
<td>Sprue</td>
</tr>
<tr>
<td>(eg. anorexia nervosa)</td>
<td>Inflammatory Bowel Disease</td>
<td>Stroke (CVA)</td>
</tr>
<tr>
<td>Female athlete triad</td>
<td>Insulin-dependent</td>
<td>Thalassemia</td>
</tr>
<tr>
<td>Gastrectomy</td>
<td>Diabetes Mellitus</td>
<td>Thyrotoxicosis</td>
</tr>
<tr>
<td>Gaucher’s disease</td>
<td>Lymphoma and leukemia</td>
<td>Tumor secretion of PTHrP</td>
</tr>
<tr>
<td>Hemochromatosis</td>
<td>Malabsorption syndromes</td>
<td>Weight loss</td>
</tr>
</tbody>
</table>

Laboratory tests useful in ruling out secondary causes of osteoporosis, as reflected by high Z-scores on BMD

CBC, TSH, testosterone in men, serum calcium, alkaline phosphatase, serum and urine protein electrophoresis, liver function tests, creatinine, 24-hour urinary calcium
Recommended Therapeutics
( Drugs Mentioned in the Treatment Guideline)

The following index lists therapeutic classifications as recommended by the treatment guideline. For the prescriber’s reference, available drugs are listed under each therapeutic class.

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### Biphosphonates

**Alendronate**
- Fosamax

**Alendronate/Cholecalciferol**
- Fosavance

**Ibandronic acid**
- Bonviva

**Risedronate**
- Actonel
  - Actonel 35 mg

### Calcium-Regulating Drugs

**Teriparatide**
- Forteo

**Synthetic salmon Calcitonin**
- Miacalcic

### Calcium with Vitamins

- Agre-Calvit
  - (Reformulated)
- B. Braun 10% w/v Calcium Gluconate
- Calebone
- Calc-i-aid
- Calcium Sandoz
- Calcium-D Redoxon
- Calsan
- Caltrate Plus
- Calvit
- Drugmaker’s Biotech Calcium Carbonate
- Esvical forte
- Miracal
- Osteo-4
- Rhea Calcium Lactate
- Tridin
- United Home Calactate

### Nutritional Products

- Anchor Shape-up Non-fat Milk Powder
- Anlene Active Hi-Calcium Non-fat Milk Powder
- Anlene Active Hi-Calcium Reduced Fat Milk Powder
- Chocolate Flavour
- Anlene Active Hi-Calcium

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### Testosterone

**Testosterone undecanoate**
- Andriol
- Andriol Testocaps

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### Estrogens, Progesterones & Related Synthetic Drugs

**Estradiol**
- Estrofem
- Progynova

**Estradiol/Cyproterone acetate**
- Climen

**Estradiol/Dydrogesterone**
- Femoston

**Estradiol/Norethisterone**
- Kliogest/Kilogest Mite
- Trisequens

**Estriol**
- Ovestin

**Estrogen-Conjugated**
- Premarin

**Estrogen-Conjugated/ Medroxyprogesterone acetate**
- Premelle 2.5/Premelle 5
- Premelle Cycle 5

**Tibolone**
- Livial

### Selective-estrogen receptor modulator

**Raloxifene**
- Evista

### Vitamin D & Derivatives

- Rhea Vitamin A and D

**Calcitriol**
- Rocaltrol