Clinical Practice Guidelines on Management of Osteoporosis

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PREFACE

The incidence of osteoporosis-related fractures is expected to rise in Malaysia as it is doing in Asia. This seems to be an accompaniment to achieving developed country status, with the incidence of hip fractures in Hong Kong and Singapore approaching that of the United States of America. In the Asian Osteoporosis Study which we took part in; the incidence in Malaysia is about halfway there. There have been tremendous developments in the diagnostic and therapeutic aspect of osteoporosis. It is timely that a practice guidelines on the management of osteoporosis should come about to help medical practitioners in aspects of diagnosis, prevention and treatment of this important disorder.

Through the auspices of the Academy of Medicine of Malaysia and the Ministry of Health, it was possible to bring together a diverse group to form the expert panel. This is necessary as the problem of osteoporosis may present itself to family physician, orthopaedic surgeons as well as medical practitioners in the field of internal medicine, obstetrics and gynaecology. It was also appropriate that we have those in the diagnostic field as well as nutrition in this panel. I would like to thank the members of the panel who have given their time to many meetings – as imagined the different viewpoints makes for some exciting and heated discussions but we were able to use scientific evidence to formulate the final recommendation. Also we remain friends in this fight against osteoporosis and I hope many more will join in.

I would like to record a special thanks to the Secretariat for the services and support rendered.

Prof Amir S Khir (Chairperson)

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I. <u>INTRODUCTION</u>

Osteoporosis is defined as a systemic skeletal disease characterised by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture¹. The WHO working group² defines osteoporosis in women on the basis of the criteria shown in Table 1. Bone mineral density (BMD) peaks during the third decade of life and declines with advancing age. In women, this decline accelerates with menopause (Figure 1). Values of –2.5 SD below the mean for the young adult (T score) would identify 95% women at highest risk of fracture³.

Table 1. The World Health Organisation (WHO) working group

classification of osteoporosis²

Normal	Bone mineral density (BMD) within 1 SD of young adult reference range (T score > -1)	
Osteopenia	BMD more than 1 SD but less than 2.5 SD below the young adult mean (T score between -1 and -2.5)	
Osteoporosis	BMD value of 2.5 SD or more below the young adult mean (T score ≤ -2.5)	
Severe/ Established Osteoporosis	ablishedBMD value of 2.5 SD or more below the young adult meansiswith the presence of 1 or more fragility fractures	
* T score: comparison with young adult mean		



Figure 1. Bone Loss During Adult Life⁴

Osteoporosis related fractures have been recognised as a major health problem, particularly in the elderly. The common sites of fracture are the spine, wrist and hip. Hip fractures are associated with high morbidity and a mortality rate of up to 20% in the first year. Majority of those who survive are disabled and only 25% will resume normal activities^{5, 6}.

In 1997, the incidence of hip fracture in Malaysia among individuals above 50 years of age was 90 per 100,000. There was a marked increase in the incidence among the older age group. The incidence of hip fracture is consistently higher in women (Table 2).

Table 2: Incidence of Hip Fracture in Malaysia

by Age Grou	p 1997′
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	Incidence by Age Group (per 100,000)		
Age Group	Male	Female	Overall
50-54	10	10	10
55-59	20	30	20
60-64	40	50	40
65-69	60	100	80
70-74	100	230	170
<u>></u> 75	320	640	510

In our community, the Chinese had the highest incidence of hip fractures compared to the Malays and Indians. Chinese women accounted for 44.8% of hip fractures⁷.

The direct hospitalisation cost for hip fractures in 1997 is estimated at RM 22 million. This is a gross underestimate of the total economic burden, as it does not take into account the costs incurred in rehabilitation and long term nursing care. Therefore, in an ageing population this cost will escalate without appropriate intervention⁷.

II. CLASSIFICATION AND RISK FACTORS

A) Primary Osteoporosis

- Postmenopausal osteoporosis. Accelerated bone loss related to oestrogen deficiency.
- 2. Age-related osteoporosis. This occurs in both men and women.
- 3. Idiopathic (rare).

B) Secondary Osteoporosis

1. Endocrine

- Cushing's syndrome
- Hypogonadism
- Thyrotoxicosis
- Hyperparathyroidism

2. Drugs

- Glucocorticoids
- Heparin
- Anticonvulsants (phenytoin)
- Immunosuppressants

3. Chronic Diseases

- Renal impairment
- Liver cirrhosis
- Malabsorption/ post-gastrectomy
- Chronic inflammatory polyarthropathies (e.g. rheumatoid arthritis)

4. Others

- Nutritional
- Multiple myeloma and malignancy
- Osteogenesis imperfecta

Risk factors for Osteoporosis:

Osteoporosis is a silent disease without any symptoms in most patients until fractures have occurred. While screening is not cost effective, identification of risk factors will help in case finding.

Non- modifiable	Modifiable
1. Advancing age	1. Low calcium intake
2. Ethnic group (Oriental &	2. Sedentary lifestyle
Caucasian)	3. Cigarette smoking
3. Female gender	4. Excessive alcohol intake
4. Premature menopause (< 45 years)	5. Excessive caffeine intake
including surgical menopause	
5. Slender build	
6. Family history of osteoporosis	
in first degree relative	

III. **DIAGNOSIS**

Clinical Presentation

Most patients are asymptomatic and diagnosis is made only after a fracture. Common clinical presentations include:

- 1. Increasing dorsal kyphosis (Dowager's hump)
- 2. Low trauma fracture
- 3. Loss of height
- 4. Back pain

Diagnosis

The diagnosis of primary osteoporosis is made after excluding secondary causes of bone loss. A clinical evaluation, which includes a careful history, physical examination and appropriate laboratory investigations, is mandatory.

Although multiple risk factor assessment does not predict bone mass with sufficient precision⁸, it remains the mainstay in decision making to identify the 'at-risk' patient requiring further investigation.

When a patient presents with a low trauma fracture, osteoporosis is a presumptive diagnosis. BMD measurement with dual energy x-ray absorptiometry (DEXA) is advised. However, in the absence of this facility, treatment should still be initiated.

In the absence of fracture, the **gold standard** for diagnosis of osteoporosis remains measurement of BMD using DEXA.

Patients such as those over 65 years of age with multiple risk factors who are at sufficiently high risk for osteoporosis, can be started on treatment even without BMD measurement.

Investigations

The main aims of investigation are:

- 1. to confirm the diagnosis of osteoporosis
- 2. to assess fracture risk
- 3. to exclude secondary causes

Initial investigations include:

- 1. full blood count and ESR
- 2. serum calcium, phosphate, albumin
- 3. alkaline phosphatase
- 4. renal function
- plain X-rays*- lateral thoraco-lumbar spine or hip (as indicated)
 *Osteoporosis is apparent in plain X-rays only after 30% of bone loss has occurred.

Other investigations may be done as indicated (FT4, TSH, testosterone,

FSH, LH, urine Bence Jones protein, serum protein electrophoresis).

Specific Investigations

1. Densitometry

BMD measurement gives an accurate reflection of bone mass (Table 1). It is important to use race-specific reference ranges when available. BMD results are reported as T-scores (comparison with the young adult mean) and Z-scores (comparison with the mean of individuals of the same age) (Figure 2). The risk of fracture is increased 2 fold for each SD reduction in BMD⁹.

Currently available techniques in Malaysia for measuring BMD include:

- a) Dual energy X-ray absorptiometry (DEXA)
- b) Quantitative computed tomography (QCT)
- c) Single energy X-ray absorptiometry (SXA)



Figure 2. Expression of Bone Mineral Density as measured by DEXA

a) DEXA

The current recommended method is DEXA, which is measured at the hip and lumbar spine. The procedural standard for performing DEXA should be followed to ensure quality and consistency.

It must be stressed that the BMD measurement at the lumbar spine and proximal femur remain the **gold standard** and fracture prediction is sitespecific. When site-specific measurements are not available, other skeletal sites can be used to provide an adequate estimation of fracture risk.

Peripheral DEXA (phalanges/ distal radius/ calcaneum) is useful for sitespecific fracture risk prediction. Calcaneus and forearm BMD measurement can be used to predict fracture risk. However, the predictive capacity for hip fracture appears to be less than that of DEXA of the spine and hip.

The decision to measure BMD should be based on an individual's risk profile (Table 3) and is indicated if the results will influence management.

1. Presence of strong risk factors
Oestrogen deficiency
Premature menopause (< 45 years of age) including
surgical menopause
Prolonged secondary amenorrhoea
Hypogonadism
Glucocorticoid therapy (equivalent to \geq 7.5 mg prednisolone
daily for \geq 1 year)
Maternal family history of hip fracture
Low body mass index (<19 kg/m ²)
Other conditions associated with osteoporosis
Anorexia nervosa
Malabsorption
Hyperparathyroidism
Hyperthyroidism
Prolonged immobilisation
Cushing's syndrome
2. Radiological osteopenia and/or vertebral deformity
3. Previous low trauma fractures of hip, spine and/or wrist
4. Loss of height, thoracic kyphosis
5. Postmenopausal women who are considering treatment for
osteoporosis

Table 3. Indications for BMD Measurement

b) QCT

Quantitative computed tomography (QCT) is an alternative technique for measuring bone density in the axial skeleton¹⁰. The somewhat higher radiation dose limits its use but the main limitation is caused by problems of availability and expense. This technique is not widely available in Malaysia.

b) SXA

SXA is a technique for measuring bone mineral density of the peripheral skeleton (distal radius and calcaneum). Its predictive capacity for vertebral and hip fracture is less than that of DEXA.

2. Quantitative Ultrasound (QUS)

Presently, the role of QUS in the diagnosis and monitoring of treatment is not clearly defined and awaits further evaluation. Problems with this modality include the diversity of techniques, the lack of standardisation and comparable local normal ranges.

QUS can be used for future osteoporotic fracture prediction in the elderly, perimenopausal and immediate postmenopausal women^{11, 12, 13}. These QUS parameters are stronger predictors of low bone mass than currently recognised clinical risk factors.

Those who are found to have low QUS measurements should be referred for axial BMD measurement.

3. Biochemical Markers

Biochemical markers of bone formation and resorption are not useful in the diagnosis of osteoporosis. However, they may be useful in the monitoring of response to treatment.

Monitoring of Therapy

The aim of monitoring is to assess the response to treatment.

- 1. Patients should have regular clinical assessments
- DEXA (spine/hip) should be performed at 1-2 year intervals, preferably with the same machine
- Currently, monitoring of treatment using QUS and peripheral DEXA is not recommended
- 4. If biochemical markers are available, two baseline measurements need to be carried out followed by one repeat measurement 2-3 months after initiating therapy and yearly thereafter if indicated. These measurements should be taken at the same time of the day to minimise the effect of diurnal variation

Screening

Population-based screening is not recommended given the constraints of current methods of measurement and lack of cost effectiveness.

IV. <u>PREVENTION OF OSTEOPOROSIS</u>

Nutrition

A balanced diet is important to provide adequate nutrients that are required for skeletal health.

Calcium

Calcium intake is positively correlated to bone mass at all ages. A sustained high calcium intake in children and adolescents is associated with higher peak bone mass and hence, reducing the risk of osteoporosis occurring in later life. Increased calcium intake potentiates the effect of the other treatment of osteoporosis such as vitamin D and hormone replacement therapy (HRT).

The current calcium intake in the Malaysian diet is between 300-400 mg daily¹⁴. The recommended total daily calcium intake is shown in Table 4¹⁵.

Table 4.	Suggested	Daily Calcium	Intake ¹⁵
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	Age	Recommended Intake
Children	1-3	500 mg
	4-6	600 mg
	7-9	700 mg
Adolescents	10-18	1300 mg
Men	19-65	1000 mg
Women	19-50	1000 mg
Women (menopausal)	51-65	1300 mg
Older adults (men & women)	Over 65	1300 mg
Pregnant	Third trimester	1200 mg
Lactating		1500 mg

Adapted from joint FAO/ WHO Expert Consultation Panel 1998.

Attempts should be made to achieve these levels for maximum benefit for bone health.

The calcium content of some common foods is given in Table 5^{16} .

Food	Calcium content
1 glass of high calcium milk (200 ml)	••
1 glass of skimmed milk (200 ml)	• •
1 glass of full cream milk (200 ml)	•
1 cup of yoghurt (150 g)	•
1 cup of ice-cream (150 g)	•
1 piece of cheddar cheese (20 g)	•
1 cup of fortified breakfast cereal (30 g)	•
1 cup of mussels (160 g)	• •
1/2 cup of ikan bilis (dried without head & entrails)	•
1 piece of canned sardines (40 g)	•
½ cup of yellow dhal (100 g)	•
2 pieces of tempeh (140 g)	•
1 piece tofu (150 g)	•
2 cups of soyabean milk (400 ml)	•
1 cup of baked beans (240 g)	•
1/2 cup of almonds	•
1 cup of spinach or watercress (sai-yong choy)	•
1 cup of broccoli, mustard green (sawi), cekur	•
manis, kai lan or pucuk ubi	
Each \bullet is approximately 200 mg calcium	

Table 5: Calcium Content of Some Common Foods¹⁶

When the diet is calcium deficient, calcium may be given in the form of supplements. The absorption of calcium supplements is highly variable ranging from 20-40% depending on the formulation.

Vitamin D

Active individuals who are exposed to sufficient sunlight (> 15 minutes a day) should have adequate Vitamin D levels. Elderly who are institutionalised, immobile, lack outdoor activities and have a poor diet will benefit from 800 IU Vitamin D supplementation daily.

There is a concern that excessive intake of calcium and/or vitamin D supplementation may encourage the formation of renal stone disease. All those who are on such supplementation should consume adequate fluids.

Body Weight

Low body weight and excessive dieting is associated with low bone mineral status and increased fracture risk. Maintenance of a body mass index of not less than 19 kg/m² is recommended for prevention of osteoporosis.

Nutritional Status

Maintenance of an adequate protein and energy intake is important especially in children and the elderly.

Exercise

Regular physical activity, in particular weight-bearing exercise is encouraged in all age groups in order to maximise peak bone mass, decrease age-related bone loss, maintain muscle strength and balance. The individual's health status should be taken into consideration when recommending an exercise programme.

Pharmacological agents

HRT, selective estrogen receptor modulators (SERMs) and bisphosphonates have been shown to be effective in prevention of osteoporosis. For further details, please refer to Chapter V.

Prevention of falls

Most osteoporosis-related fractures, especially in the elderly, are a consequence of decreased BMD and falls. A variety of factors may lead to a fall, such as poor balance, reduced muscle strength, poor vision, diseases of nervous and musculoskeletal systems, excessive alcohol consumption, certain medications (e.g. sedatives, anti-hypertensives) and hazards in the home (e.g. steps, inadequate lighting, slippery floors).

Appropriate assessment and correction of risk factors for falls should be undertaken as well as protection of the hip by wearing hip protectors.

I. <u>MANAGEMENT</u>

Hormone Replacement Therapy (HRT)

Oestrogen therapy is beneficial in the prevention and treatment of postmenopausal osteoporosis.

The maximum benefit to the bone is achieved when oestrogen is started at menopause and continued for 10 years or more. Retrospective studies have shown a 30-50 % reduction in fracture risk in the spine and hip with long term use of oestrogen¹⁷.

Effective bone protective doses of oestrogen are as shown in Table 6.

Type of oestrogen	Dose
Conjugated Equine Oestrogen	0.625 mg
Oestradiol Valerate	2.0 mg
Transdermal oestradiol	50 ug to 100 ug
Micronised oestradiol	1.0 mg
Tibolone*	2.5 mg

Table 6. Effective Bone Protective Doses of Oestrogen

*Gonadomimetic

Oestrogen can be started at any time from the perimenopausal period till late postmenopausal.

Other benefits of HRT are relief of vasomotor symptoms, psychological problems, vaginal dryness and reduction in risk of primary cardiovascular disease. Emerging potential benefits include a decreased incidence of colonic cancer¹⁸, macular degeneration¹⁹, prevention and delay in Alzheimer's Disease²⁰ and a positive effect on alveolar dentition²¹.

A full gynaecological assessment is mandatory prior to starting HRT and at regular intervals while on HRT. A breast examination should be conducted annually and mammography at 1-3 yearly intervals. Patients should also be advised to perform monthly self-breast examination.

Absolute contraindications for oestrogen use are undiagnosed vaginal bleeding, severe liver disease and a history of venous thromboembolism within the past 12 months.

For women with an intact uterus, progestins for a minimum of 10-12 days monthly must be given together with oestrogen.

The association between HRT and breast cancer remains inconclusive. Epidemiological studies suggest that oestrogen use does not cause an increased risk of breast cancer in the first 5 years, but this risk may increase after 5 years or more of treatment^{22, 23}.

Selective Estrogen Receptor Modulators (SERMs)

Selective estrogen receptor modulators (SERMs, e.g. raloxifene at 60 mg daily) improves and preserves bone density at both the spine and hip²⁴ with a reduction in the risk of breast cancer²⁵. This is a suitable alternative for women who are unable or unwilling to take HRT.

Fracture reduction has been demonstrated in the vertebrae but not at the hip. Side effects include hot flushes and leg cramps. Both raloxifene and oestrogen are associated with a slightly increased risk of deep vein thrombosis²⁵.

Bisphosphonates

Bisphosphonates are potent inhibitors of bone resorption.

Alendronate

Alendronate at 10 mg daily for 3 years increases lumbar spine BMD by up to 8.8% and femoral neck BMD by 5.9% compared to placebo²⁶. The rate of new vertebral and hip fractures is reduced by 50% in women with²⁷ or without²⁸ prior fractures. Fracture reduction is seen after 1 year of treatment²⁹.

Alendronate at 5 mg daily has been shown to prevent postmenopausal bone loss with similar efficacy to HRT³⁰. Therefore, it is a useful alternative for women unable or unwilling to take HRT. However, in established osteoporosis, the recommended daily dose of alendronate is 10 mg.

The common side effects of the oral bisphosphonates are gastrointestinal, most commonly nausea although the actual incidence is very low. Proper administration of alendronate will reduce the small risk of oesophagitis or oesophageal ulceration. Continuous use of alendronate for up to 7 years produces a sustained increase in BMD with a good safety profile³¹.

Etidronate

Cyclical etidronate at 400 mg daily for 2 weeks out of every 3 months over 3 years will increase lumbar spine BMD between 5-8%^{32, 33} with a smaller increase at the femoral neck. Vertebral fractures are reduced especially in patients at high risk. An observational study has shown a small reduction in hip fracture³².

Currently, the use of cyclical etidronate for up to 7 years has been shown to be effective and safe. Continuous daily use of etidronate will result in demineralisation.

Risedronate

It is a new bisphosphonate that has been found to be useful in the treatment of osteoporosis^{34, 35}.

Bisphosphonates can be combined with other treatment modalities (e.g. HRT³⁶, calcitriol³⁷) if there is a lack of response to treatment.

Calcitonin

Calcitonin is an anti-resorptive agent. A daily intranasal dose of 200 IU, will increase lumbar spine BMD by 1% -1.5% over 5 years and reduce vertebral fracture rates by $36\%^{38}$.

Calcitonin has also been shown to have an analgesic effect for acute pain relief in osteoporosis related fractures.

Side effects of calcitonin include nausea, flushing, vomiting and nasal irritation.

Calcium

In established osteoporosis, calcium supplementation alone is not adequate. However, calcium supplementation has been shown to potentiate other treatment modalities.

Vitamin D

Vitamin D supplementation at 800 IU/day in combination with calcium has been shown to reduce fracture in elderly populations with vitamin D deficiency³⁹.

Activated Vitamin D

Activated Vitamin D (calcitriol, alfacalcidol) has been demonstrated to increase BMD in those with established osteoporosis^{39, 40} and reduce vertebral fractures⁴¹. The reduction in fracture risk is in the spine and in those with mild to moderate osteoporosis⁴².

All patients on activated Vitamin D should avoid taking excessive calcium supplements to reduce the risk of hypercalcemia and renal stone disease.

Serum and urinary calcium should be monitored periodically, 6 weeks after initiation of therapy and at 3 to 6 monthly intervals thereafter.



ALGORITHM FOR THE MANAGEMENT OF

VI. <u>MANAGEMENT OF OSTEOPOROTIC FRACTURES</u>

The goals of treatment are early mobilisation and a return to normal activities. Conservative management of hip fractures is discouraged because it places the patient at risk of respiratory problems, thromboembolic disease, pressure ulcers and further bone loss. These patients are best treated by early surgical intervention.

The vast majority of osteoporotic vertebral fractures are considered stable. Therefore, operative intervention is rarely required except for those that cause spinal cord or nerve root compression. Surgery may also be required for those with chronic backache and progressive spinal deformities.

Symptomatic relief of spinal pain is often difficult to achieve. Morphine and other potent analgesics may be required when simple analgesics fail to work. Calcitonin is a useful adjunctive analgesic agent. Significant relief may be achieved through physiotherapy, activity modification and bracing (e.g. lumbar corset).

Adequate calcium, vitamin D and protein intake aids fracture healing. All patients with osteoporotic fractures are at high risk for the development of further fractures. They should receive active management for osteoporosis and advised regarding prevention of falls.

VII. SECONDARY OSTEOPOROSIS

Glucocorticoid-Induced Osteoporosis (GIOP)

Osteoporosis is a major complication of glucocorticoid therapy. Patients on glucocorticoid therapy are at increased risk of sustaining fractures over and above that of the underlying disorder.

Bone loss occurs most rapidly in the first 6-12 months^{43, 44} of glucocorticoid therapy. Fractures may occur in patients with GIOP at a higher BMD compared to post-menopausal osteoporosis. Prednisolone \geq 7.5 mg daily or its equivalent, for more than 6 months is associated with osteoporosis. However, higher doses of glucocorticoid for a shorter duration may also carry the same risk.

Diagnosis

The use of BMD measurement for the diagnosis of GIOP is not crucial, but may be useful in the monitoring of therapy.

Management

General measures include:

- Prescribing the lowest effective dose of glucocorticoid for disease control⁴⁵
- The use of alternative route of administration⁴⁵ (e.g. inhaled steroids in asthma)
- Consider the use of steroid- sparing agents
- Modification of lifestyle- adequate calcium intake, adequate mobilisation, regular exercise and prevention of falls.

Specific measures:

In hypogonadal states, replacement therapy with sex steroids should be considered. Drugs found to be effective in reducing bone loss when given within 3 months of initiation of glucocorticoid therapy include:

Alendronate ⁴⁶ -	5 mg daily
Cyclical Etidronate47,48 -	400 mg daily for 2 weeks every 3 months
Calcitriol ⁴⁹ -	0.25 ug bd
Alfacalcidol ⁵⁰ -	1 ug daily

Drugs found to be effective in improving bone density following an osteoporotic fracture or use of glucocorticoid for longer than 1 year include:

Alendronate ⁵¹	-	10 mg daily
Cyclical etidronate ^{52, 53}	-	400 mg daily, for 2 weeks every 3 months
Calcitonin ⁵⁴	-	200 IU intranasal daily

Treatment should be continued as long as the patients are on glucocorticoids. Upon discontinuation of glucocorticoids, treatment should be continued as in non-glucocorticoid osteoporosis for those with established osteoporosis or other risk factors.

ALGORITHM FOR THE PREVENTION AND MANAGEMENT OF GLUCOCORTICOID INDUCED OSTEOPOROSIS (GIOP)



• immobility

Renal Osteodystrophy

Renal osteodystrophy is a common complication of renal disease particularly those on dialysis. The severity increases with duration of dialysis. The mainstay of treatment is to address the metabolic abnormalities associated with renal impairment, namely correction of acidosis, hyperphosphataemia and hypocalcaemia.

Amenorrhoea

Extreme physical activity, anorexia nervosa and hypogonadal disorders in young women may be associated with a low BMD. Bone loss in amenorrhoeic women show the same pattern as in postmenopausal women⁵⁵. Treatment is with hormone replacement.

Drugs

Drugs that can cause alteration in bone metabolism include anticonvulsants, cyclosporin, exchange resins and long-term heparin.

All patients should be encouraged to remain physically active and consume 800 IU vitamin D and 1500 mg calcium daily. If BMD is markedly low, anti-resorptive agents should be considered.

VIII. OSTEOPOROSIS IN MEN

Osteoporosis is increasingly recognised in older men, accounting for up to 30% of hip fractures and 20% of vertebral fractures⁵⁶. Fifty to sixty percent of the cases are due to secondary causes such as hypogonadism, hyperparathyroidism, intestinal disorders, malignancies, glucocorticoid therapy and immobilisation. For every 1 SD reduction in age- matched mean BMD (Z score), fracture risk increases by 2 fold.

Treatment

The management consists of identifying and treating underlying causes. Bisphosphonates have been shown to be effective in the treatment of osteoporosis in men⁵⁷. All other treatment modalities have not been adequately assessed.

Androgen treatment is beneficial in hypogonadal men. It may be of some benefit in eugonadal osteoporotic men.

ALGORITHM FOR THE MANAGEMENT OF

Low Trauma fracture Suspect Osteoporosis General measures: General measures: • Calcium intake • Calcium intake · Physical activity • Physical activity BMD of lumbar spine and femoral neck BMD of lumbar spine and femoral neck Exclude secondary causes: Exclude secondary causes: check serum testosterone, check serum testosterone, bone profile, full blood count, bone profile, full blood count, protein electrophoresis, TSH, ESR. protein electrophoresis, TSH, ESR. Osteopenia Osteoporosis Normal Borderline Low Z > 0Z 0 to -1 Z < -1 or T ∫ -2.5 or T < -2.5 Monitor Treat underlying 2⁰ cause where possible and/ or bisphosphonates Monitor BMD 1-2 years

MALE OSTEOPOROSIS

IX. KEY STATEMENTS AND RECOMMENDATIONS:

- Osteoporosis is defined by a WHO working group as a systemic skeletal disease characterised by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture.
- Classification is based on bone mineral density (BMD) osteoporosis defined by BMD of less than –2.5 SD and osteopenia when T score is between –1 and –2.5. Observational studies suggest that a similar cut-off point to that used in women can be taken for diagnosis in men.
- Bone loss increases after the menopause but occurs throughout life after the third decade.
- Clinical significance of osteoporosis lies in the resulting fracture. Exact magnitude in Malaysia is not known but hip fracture incidence in the over 50 years of age is 90/100,000 and is likely to increase with our ageing population.
- The main type is primary osteoporosis mainly post-menopausal and age-related, the latter also in men. It is important to consider secondary causes of osteoporosis including drugs.

- Risk factors are known and can help in identifying potential cases (casefinding).
- Prospective studies have shown that the risk of fractures increases progressively with decreasing BMD. Risk of fractures increases approximately two fold for each SD decrease in BMD (meta-analysis of cohort studies).
- The aim of diagnosis is to confirm osteoporosis, assess fracture risk and exclude secondary causes. Simple biochemical tests, ESR and X-rays may be necessary.
- In those with low trauma fracture, a BMD measurement, though advisable is not necessary before starting therapy.
- BMD measurement is recommended for various indications in Table 3 but especially where assessment would influence management. This may save more resources than undirected use of treatment in all patients.
- In the absence of fracture, the gold standard for measuring BMD is the DEXA. DEXA is also the recommended method in monitoring the effect of therapy.

- Other methods for measuring BMD such as QCT and QUS are not recommended for diagnosing osteoporosis but QUS may help in casefinding.
- Biochemical indices of skeletal turnover has the potential for aiding risk assessment and monitoring but utility in diagnosis not established.
- Strategies for prevention include population-based strategies nutrition including calcium intake, exercise and reducing the level of smoking, etc.
 Strategies should be targeted at those at risk.
- Recommendations concerning prevention is summarised in the following table:

Intervention	BMD	Vertebral #	Hip #
Exercise	А	В	В
Calcium and vit D	А	В	В
Dietary calcium	В	В	В
Smoking cessation	В	В	В
Reduced alcohol consumption	С	С	В
Oestrogen	А	В	В
Raloxifene	А	А	-
Etidronate	А	-	-
Alendronate	А	-	-

 Recommendations concerning interventions in the treatment of osteoporosis are shown in the following table:

Intervention	BMD	Vertebral #	Hip #
Calcium (<u>+</u> vit D)	А	А	В
Oestrogen	А	А	В
Alendronate	А	А	А
Etidronate	А	А	В
Calcitonin	А	А	-
Raloxifene	А	А	-
Anabolic steroids	А	-	В
Calcitriol/ Alfacalcidol	А	А	С
Risedronate	А	А	А

- Choice of drug for established osteoporosis especially those with previous fracture must be an agent shown not just to increase BMD but also shown to reduce fracture both at the spine and hips.
- Use of vitamin D is recommended for the elderly with poor diet or institutionalised individuals.
- Fracture prevention can also be effected by preventing falls.
- Hip fractures should be treated early consider the presence of other medical conditions in the elderly.

- Spinal fractures rarely need operative intervention but the possibility of underlying osteoporosis should be considered.
- Glucocorticoid-induced osteoporosis (GIOP) occurs rapidly in the initial period of steroid dose equivalent to 7.5 mg prednisolone for more than 6 months. Fractures occurs at a higher BMD.
- In GIOP, measures to reduce glucocorticoid dosage are important.
 Bisphosphonates and calcitonin have been shown to reduce fracture risk.
- Osteoporosis in older men is important. Secondary causes must be excluded. Bisphosphonates have been shown to be effective, and androgen is useful in hypogonadal men.

Appendix

Grades of evidence and recommendations:

Levels of evidence are defined as follows:

- la from meta-analysis of randomised controlled trials (RCTs)
- Ib from at least one RCT
- IIa from at least one well designed controlled study without randomisation
- lib from at least one other type of well-designed quasi-experimental study
- III from well-designed non-experimental descriptive studies e.g. comparative studies, correlation studies, case-control studies
- IV from expert committee reports or opinions and/or clinical

This serves only as a guide to the validity and relevance of evidence.

The quality of the guideline recommendations is graded to indicate the level of evidence on which they are based:

- Grade A evidence levels la and lb
- Grade B evidence levels IIa, IIb and III
- Grade C evidence level IV

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