Singapore

Overview
In Singapore, as in the rest of Asia, osteoporosis will become an increasingly important public health problem. The age-adjusted hip fractures rates among women over the age of 50 years are about 450/100,000 females. Fracture of the lower limb ranked fourth in terms of the number of hospital inpatient discharges and direct hospital cost per year in Singapore.

The Osteoporosis Society Singapore (OSS) conducts public and professional talks on falls prevention, exercise and nutrition. The Singapore Health Promotion Board (HPB) disseminates information on calcium nutrition and physical activity to schools and the public. Collaborations exist between OSS and HPB in bringing education services to the community centers.

However, among postmenopausal women, about half had not heard of osteoporosis. The problem is particularly acute in females above 65 years old, as many of them are illiterate and speak in dialects.

Clinical Practice Guidelines from the OSS in collaboration with the Ministry of Health (MOH), and Continuous Medical Education programs, have helped to improve the knowledge of osteoporosis among health care professionals in Singapore.

There are more than 14 DXA machines serving a population of 3.6 million. There are chronic disease management programs for osteoporosis in Singapore. Patients who have previous fragility fractures are given diet, exercise and subsidized osteoporosis treatment to prevent recurrent fractures. These programs aim to improve acceptance and adherence of interventions to prevent recurrent fractures.

Key findings
The present population for Singapore is 4.6 million and is expected to increase to 4.8 million by 2010 of which 16% (0.7 million) will be aged over 60 years.

It is estimated that the total population will increase to 5.2 million by 2020. The population over the age of 60 years will increase from 26.5% (1.3 million) in 2020 to 39.6% (2.1 million) in 2050 (figure 1).

Figure 1 Population projections for Singapore until 2050

Figure 2 Progression of hip fracture rates between 1958 and 1998
In the year 2006, a hip BMD measurement study estimated that there were about 55,000 female Singaporeans above the age of 50 who are suffering from osteoporosis. The statistics indicate osteoporosis is likely to increase as the population of Singapore is aging rapidly.

It is also observed in Singapore men and women above the age of 50 years, that hip fracture incidence rates have risen 1.5-fold and 5-fold respectively since the 1960s. The age-adjusted rates among women over the age of 50 years are currently among the highest in Asia, and approaching those of the West.

The numbers of hip fractures per year in Singapore are projected to increase from 1300 in 1998 to 9000 in 2050 because of the aging of the population (figure 3).

In women, vertebral fracture continues to increase. As the definition of a vertebral fracture differs between studies the true incidence of vertebral fractures is difficult to assess.

The direct costs of fractures are high: about 7920 USD for the immediate hospital care and 5940 USD in total costs for the first year (calculated at non-subsidized rates in a restructured hospital). As the population ages, the total immediate hospital cost of these fractures was 10 million USD in 1998 and is estimated to rise to 83 million USD by 2050. If indirect cost is included, the total cost of managing hip fracture within the first year after fracture in Singapore is 145 million USD in 2050.

Table 1 Hip fracture treatment and cost

<table>
<thead>
<tr>
<th>% hip fracture</th>
<th>average hospital stay (nights)</th>
<th>direct hospital cost (USD)</th>
<th>total cost for the first year (USD)</th>
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<td>100</td>
<td>18.7</td>
<td>7920</td>
<td>5940</td>
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The average number of days of stay in hospital for hip fracture is 18.7 days.

Other than the large financial burden of osteoporotic fractures, the social dependence is also high. An analysis of patients who sustained osteoporotic hip fractures in Singapore demonstrated a mortality of 20% at two years. Of the survivors, 20% became semi- or fully dependent, and 42% became less or non-ambulant. Only 8% were cared for by chronic health care facilities suggesting that the main social and economic burden was borne by the families of those affected.

There are a total of 14 DXA machines available. With the total population aged 50 years and above being 918,600 there is availability of 1 scanner per 65,614 (0.15 per 10,000). The use of ultrasound machines is generally not encouraged. There are no charges for ultrasound machine but a DXA costs 52.8-79.2 USD.

Table 2 Diagnostic tools and costs

<table>
<thead>
<tr>
<th>total DXA machine</th>
<th>14</th>
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<tr>
<td>DXA machine/10,000 over 50</td>
<td>0.15</td>
</tr>
<tr>
<td>cost of DXA scan (USD)</td>
<td>53-79</td>
</tr>
<tr>
<td>average income per capita per month (USD)</td>
<td>3608</td>
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</tbody>
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Reimbursement under a government health plan occurs when a patient is referred to hospital (50% subsidy) for DXA. These patients generally have to wait for 2 to 3 months. The full paying patients need to wait 1 to 2 weeks and at the private hospitals DXA is done in 1 to 2 days.

DXA facility is widely available in Singapore and no one is more than 30 minutes away from a centre providing this facility.

Public vitamin D and calcium supplements are readily available plus fortified foods. The Osteoporosis Society for Singapore (OSS) also provides talks on Falls Pre-
vention, Exercise and Nutrition. The Singapore Health Promotion Board (HPB) disseminates information on calcium nutrition and physical activity to schools and the public. Collaborations exist between OSS and HPB in bringing education services to community centres. All the US Food and Drug Administration (FDA) approved drugs for osteoporosis treatment are available in Singapore. There is no reimbursement available by government health plan but are available under private health plans depending on the insurance company. These drugs are licensed as branded drugs and are available only on physician prescription.

Osteoporosis is recognized as a major health problem. The major recent achievement has been the Health Service Development Project (HSDP) osteoporosis program. This is a chronic disease management program for osteoporosis. Here patients who have previous fragility fractures are given diet, exercise and subsidized osteoporosis treatment to prevent recurrent fractures. Activities by Osteoporosis Society (Singapore), Health Promotion Board, hospital and numerous community based programs are conducted. Clinical Practice Guidelines (CPG 1998, 2002 and 2009) from the Osteoporosis Society(Singapore) in collaboration with the Ministry of Health is available as physician guidelines. Government supports this by giving scholarships to clinicians to do further training in osteoporosis and also Health Manpower Development Programs for further training in metabolic bone disease and osteoporosis.

Since the Osteoporosis Society (Singapore) was founded in 1996, it has been actively involved in education and dissemination of updated and accurate information on osteoporosis to health care professionals and the public, including patients and caregivers. The society also conducts various activities which are for health care professionals, patient societies, the needy osteoporotic individuals and community awareness. The specific awareness campaigns that have been conducted include the OSS Awareness-and-Action Program and OSS Community Outreach Program. The public has availability of services such as telephone and web based help lines, patient support groups, information on the Internet and through public lectures. In spite of all the educational activities that have occurred in Singapore, in a population-based survey among 1376 Chinese women aged 45 years and above (mean age 57 years) in 2001, 42% had not heard of osteoporosis⁷. This study indicates that awareness is still suboptimal. However awareness of osteoporosis is generally high among health professionals although some gaps remain in various professional groups. The endocrinologist, geriatric specialist and rheumatologist are well aware compared to the general practitioner and orthopaedic surgeons. The level of awareness is above average among the allied health professionals. The important setbacks are that osteoporosis is under-diagnosed and under-treated and the high cost of treatment. An effective prevention strategy will have to advocate building up sufficient bone reserves during youth years and making lifestyle adjustments to minimize bone loss.

References

1. U.S. Census Bureau, International Data Base

The need for public awareness campaigns in Singapore was underlined by a 2001 survey which showed that 42% of women over the age of 45 had not heard of osteoporosis.

One in three women over 50 years old suffers from osteoporosis.