Osteoporosis is a prevalent disease among older people causing low bone mineral density (BMD) with associated increased fracture risk. The majority of osteoporotic fractures occur as a result of a fall. Falls-related injuries pose a major health issue worldwide, challenging healthcare professionals to address the growing needs of an ever-aging population.

Falls can result in injury, both physical and psychological, and even death. Falls are common among older people over 65 years of age and are associated with significant morbidity and mortality. In the recent years, healthcare professionals have started to look at the problem of falls and osteoporosis in order to identify potential risk factors and to explore ways of reducing the problem. Once seen as an inevitable part of the ageing process, fortunately the current thinking now sees both of these issues as largely preventative and treatable.

**Osteoporosis**

The World Health Organisation (WHO) defines osteoporosis as a systemic skeletal disease characterised by low bone mineral density (BMD) and micro architectural deterioration of bone tissue with a consequent increase in bone fragility and a consequent increase in fracture risk (2003). Furthermore, osteoporosis in post-menopausal women is defined by the WHO as a T-score of BMD 2.5 or more standard deviation (SD) below peak bone mass, osteopaenia as bone mass between 1.0 and 2.5 SD below peak, and normal as 1.0 SD below normal peak bone mass or higher. BMD is measured by dual-energy x-ray absorptiometry (DXA) and is the ‘gold standard’ in the diagnosis of osteoporosis.

Osteoporosis is the most common metabolic bone disease in Ireland. It is estimated that one in three women and one in five men over the age of fifty years will develop osteoporosis. Of the total population over 50 years of age, 55% have low BMD greatly increasing the risk of low trauma (fragility) fractures (HSE 2008).
hip fracture will regain their former level of function (Legge 2003). It is anticipated that there will be a 4-fold increase in the global fracture rate over the next 50 years according to Riggs and Melton (1995). With predictions that the Irish population over the age of 65 years will double by 2031 (Department of Health and Children 2001), this will exert mounting pressure on resources in the health system and it is essential to plan and utilise resources efficiently and effectively.

A history of any kind of bone fracture as an adult (after the age of 45 years) increases the risk of osteoporosis.

Screening
Osteoporosis is regarded as a ‘silent’ disease, where a fracture is frequently the first sign of low BMD. Therefore it is important that people over the age of 50 years who suffer a fragility fracture should be screened for osteoporosis. Several studies have highlighted the deficit in diagnosing and treating osteoporosis in patients following an osteoporotic (fragility) fracture which can place them at an increased risk of further fracture (Friedman et al 2001, Kiebzak et al 2002, Follin et al 2003, Kamel 2005). A history of any kind of bone fracture as an adult (after the age of 45 years) increases the risk of osteoporosis. Primary care health professionals are ideally placed to identify those at risk and initiate preventative measures and treatment as necessary. In order to address this problem, A Strategy to Prevent Falls and Fractures in Ireland’s Ageing Population (HSE 2008) was published to inform practice and guide healthcare professionals to provide appropriate intervention.

Risk factors
Osteoporosis is usually a disease of older age, although it can affect people of any age. Risk factors for osteoporosis may be categorised as modifiable or non-modifiable.

Modifiable risk factors include:
- low calcium intake
- low vitamin D level/ lack of sunlight exposure
- smoking
- low body weight
- sedentary lifestyle, lack of exercise
- hormone deficiency/ hypogonadism
- alcohol intake >2 units per day
- other medications detrimental to bones include heparin, anti convulsants and cancer treating drugs such as methotrexate.

Non-modifiable risk factors include:
- advancing age
- female gender
- family history of osteoporosis and/or hip fracture
- malignancy such as myeloma or lymphoma
- malabsorption disorders such as coeliac disease, crohn’s disease or ulcerative colitis
- early menopause (<45 years of age)
- rheumatoid arthritis
- medical conditions such as hyperthyroidism and Cushings syndrome

A diagnosis of osteoporosis can be confirmed by a DXA scan. However in the absence of a BMD measurement, it is reasonable to determine if intervention is required based on clinical risk. The FRAX tool was developed by the WHO in 2008 to evaluate fracture risk based on clinical risk factors with or without BMD measurement. It can be completed in a few minutes and the individual’s 10 year risk of hip and other major osteoporotic fracture is calculated to provide general clinical guidance for treatment options.

Screening for risk factors should form part of a detailed medical and fracture history as well as assessing falls risk factors. Where possible, it is useful to perform blood tests to check, thyroid, liver and renal function, bone biochemistry, a coeliac screen, hormone levels, vitamin D level, a myeloma screen, parathyroid level and bone markers of bone formation and bone resorption.

Prevention and treatment
Any osteoporosis prevention or treatment programme should include encouraging weight bearing exercise, fall prevention strategies, moderate alcohol intake, smoking cessation and advice on diet especially calcium and vitamin D intake. Vitamin D is essential for ensuring dietary calcium absorption, normal mineralization of bone and prevention of secondary hyperparathyroidism (Holick 1999). Oral calcium and vitamin D supplementation may be recommended.

Pharmacological preparations used to treat osteoporosis are categorised as anti-resorptive or anabolic agents. Anti-resorptives include bisphosphonates, Selective oestrogen receptor modulators (SERMs), Hormone replacement therapy (HRT) and calcitonin which prevent further bone loss. Anabolic agents include recombinant PTH therapy which stimulate bone formation and increase BMD. Denosumab (Prolia) is a monoclonal antibody which inhibits bone remodelling, resulting in increased BMD. Medication adherence and managing side effects are crucial elements in planning care and people with low BMD may need counselling and support in order to optimise treatment.

Falls
In Ireland, approximately 8000 people over the age of 65 years are admitted to an acute hospitals each year due to falls (Laffoyand Fitzpatrick 1997). Ziegler (1998) reports that people who sustain a fall-related fracture have a four times higher risk of further fracture. This is perceived to be due to lower bone mineral density combined with a high risk of further falls. Therefore, effective secondary osteoporosis prevention ought to incorporate falls risk. Falls are multi-factorial in nature consisting of intrinsic and extrinsic risk factors (Tinetti et al 1994, Cannard 1996, Kinn and Hood 2001, Perdue 2003). Intrinsic factors include poor muscle strength, balance and gait disorders, visual impairment, co-morbidities such as stroke, arthritis and
Parkinson’s disease, postural hypotension, and polypharmacy. Extrinsic factors include a cluttered environment, poor lighting, slippery flooring and inappropriate footwear (Fan and Cunningham 2004, Legge 2003).

Once risk factors have been identified, the role of the nurse ought to be education on reducing falls and preventing injuries. This may mean taking extra care when walking, use of grab rails and external hip protectors (Skelton 2006, Gillespie 2004, Williams et al 2007). All members of the multidisciplinary team have a role in falls and injury prevention. Identification of intrinsic and extrinsic factors should underscore all falls prevention programmes. All health professionals ought to seek to reduce or eliminate modifiable factors where possible. This may include treating postural hypotension, correcting poor eyesight, addressing functional impairment and reviewing medications. Drugs that cause suppression of the central nervous system, diuretics and antihypertensives may contribute to falls (Fan and Cunningham 2004, Lutxon and Riglin 2003). Exercise prescribed by a physiotherapist may improve muscle strength, balance and gait. It is imperative to raise the awareness of staff to the importance of providing a clutter-free environment (Perdue 2003). An occupational therapist can advise on alterations that may be necessary to make an older person’s environment safer, such as adequate lighting, well-placed furniture and removal of mats and rugs.

Conclusion
Identifying and treating risk factors for osteoporosis should form part of all healthcare planning especially for older people. Timely assessment and intervention may reduce the risk of falls and fractures, thus reducing the potential for injury-related pain and suffering and subsequent savings in terms of resources. Simple measures to reduce falls and fractures as well as optimising bone health may greatly improve the quality of life among older people.

References
• Strategy to prevent falls and fractures in Irelands Ageing Population: June 2008