Hip fractures are a common and serious condition associated with significant morbidity and mortality (Smith et al, 2013). The risk of hip fracture can be reduced by identifying and managing modifiable risk factors, and nurses play an important part in this. This article, the first in a two-part series, explains nurses' role in hip fracture prevention; part 2 discusses caring for patients with hip fracture.  

Causes  
Hip fractures, also known as proximal femoral fractures, are defined as a fracture between the femoral head and 5cm below the trochanter (National Institute for Health and Care Excellence, 2015) (Fig 1). In younger patients, hip fractures are typically caused by high-energy or high-velocity trauma (such as from motor vehicle accidents or falls from a significant height). In more than 50% of patients, they are associated with other injuries (Davidovich et al, 2010), such as fractures of the femoral shaft. In older patients, fractures also occur from mechanical forces that would not result in fracture in a younger person, such as low-level trauma or low-velocity impact. These fractures are referred to as fragility fractures, defined as fractures that occur from a level of impact or force equivalent to a fall from a standing height or lower (National Institute for Health and Care Excellence, 2016). The most common sites for fragility fractures are the:  
- Proximal femur;  
- Distal radius;  

The burden of hip fracture  
Approximately half of all hip fractures occur after a previous fragility fracture (NICE, 2018), and incidence rates increase from 65 years of age in women and 75 years in men (NICE, 2012). Women aged 55-64 years who have a hip fracture are at greater risk of sustaining a further fracture than the general population of the same age (Lawrence et al, 2010). An elevated fracture risk in both women and men continues for up to 10 years after the initial

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Fig 1. Femoral neck fracture

Pelvis
Articular cartilage
Femoral head
Femoral neck fracture

fracture and is greatest during the first year (Cooper et al, 2011).

Due to the ageing of the population, it is estimated that the number of hip fractures in the UK will increase from approximately 91,500 in 2015 to 101,000 in 2020 (Smith et al, 2013). Hospital costs for hip fractures are approximately £1.1bn per year and this is expected to increase to approximately £1.5bn by 2025 (Leal et al, 2016).

Many older people who sustain a hip fracture are frail, have multiple comorbidities and some functional deterioration (Prestmo et al, 2015). As a result, hip fractures are associated with high rates of morbidity and mortality; most deaths are associated with comorbidities rather than the fracture itself (National Clinical Guideline Centre, 2011). The latest annual report of the National Hip Fracture Database cites a 6.7% mortality rate within 30 days of presentation with hip fracture (Royal College of Physicians, 2017).

Based on patient admission characteristics, the Nottingham Hip Fracture Score can be used to predict 30-day and one-year mortality (Moppett et al, 2012). This can be used, in turn, to assist with pre-emptive discharge planning for a patient admitted to hospital. Many people are unable to return home after hospitalisation for a hip fracture. In a Canadian study, Nikitovic et al (2013) estimated that approximately 24% of women and 19% of men who were living in the community had to move to a long-term care facility after sustaining a hip fracture. Smith et al (2013) noted that people living in deprived areas who sustained a hip fracture were more likely to be re-admitted to hospital and that their subsequent survival rates were worse than those for people in more affluent areas.

These studies highlight the significant health and economic burden of hip fractures – and, therefore, the need to identify cost-effective ways of reducing the likelihood of hip fractures occurring.

Underlying pathologies

Hip fracture after low-intensity trauma is likely to have occurred because bones have been altered by underlying pathological processes. The most common bone pathology associated with hip fracture is osteoporosis, a long-term condition characterised by low bone mass and changes in the trabecular structure of the bone. Thinning of the trabeculae occurs because the rate of bone resorption exceeds the rate of bone formation; over time, this results in increased fragility and therefore increased risk of fracture (NICE, 2012).

Other pathologies that may affect bone structure include:

- Paget’s disease of bone (disorganised bone remodelling);
- Osteomalacia (vitamin D deficiency);
- Metastatic disease (NICE, 2016).

While primary bone tumours are an infrequent cause of hip fracture, metastatic bone disease is a much more common cause of pathological fracture. Cancers that commonly metastasise to bone include:

- Breast cancer;
- Prostate cancer;
- Kidney cancer;
- Lung cancer.

Osteomyelitis (infection of the bone) may disrupt the bone structure, but it remains a rare cause of hip fracture.

Support with underlying diagnosis

Hip fractures may be the presenting feature of an underlying medical condition such as osteoporosis, myeloma (blood cancer) or metastatic bone disease. Although the immediate focus will be on managing the fracture, it is important to:

- Assess what the patient may already know about their health condition;
- Consider what support they may need to be able to understand and come to terms with their diagnosis.

Nurses are often ideally placed to provide both psychological support and education to help patients cope with their diagnosis, as well as to advise on how to optimise bone health to reduce the risk of further fractures. It can be helpful to ask patients about their ideas, concerns and expectations regarding their health and management plan. This can facilitate open discussions focused on their needs and wishes.

Preventing falls

The incidence of hip fracture increases with age due both to the increasing prevalence of osteoporosis and the increased incidence of falls (Leal et al, 2016); a history of falls in the past year is a key predictor of further falls (NICE, 2015). It is important, however, to differentiate between a collapse that may be due to an acute medical problem and ‘simple’ falls, trips or slips.

Falls are a significant risk factor for hip fracture, so it is important that nurses are vigilant for predisposing factors and reduce the risk of falls by using enhanced supervision and the expertise of the multi-disciplinary team. Many older people do not seek medical advice after a fall that has not resulted in a fracture, so it is helpful to enquire about falls during nursing assessments. The information can be used to:

- Enquire about falls during nursing assessments.
- Support with underlying diagnosis.
Clinical Practice Review

- Identify modifiable risk factors;
- Identify patients who may benefit from a comprehensive falls assessment.

A falls assessment requires a collaborative approach with input from the specialist multidisciplinary team aimed at assessing and addressing factors that may increase the likelihood of falls. It includes:
- A medical assessment;
- A review of medication (such as sedatives and antihypertensives) that can increase the risk of falls;
- Advice on exercise programmes that will improve balance, mobility and confidence.

“A history of falls should prompt a structured assessment of fracture risk”

Understanding individuals’ risk of falls enables nurses to implement tailored interventions designed to reduce that risk. It is important to consider:
- The circumstances of previous falls;
- Environmental hazards, such as poor lighting, unstable furniture, loose carpets or rugs;
- Lack of safety equipment, such as grab rails.

This applies not only to the home setting, but also to healthcare settings that represent an unfamiliar environment for patients.

During falls assessments it is useful to explore cardiovascular function to check for postural hypotension; there is a strong possibility that this may be evident in patients who:
- Are acutely unwell;
- Have been on prolonged bed rest;
- Are dehydrated.

### Assessing fracture risk

A risk assessment can be performed for anyone considered to be at risk of hip fracture; identifying at-risk patients in a consistent and systematic way could prevent up to 25% of hip fractures (NICE, 2018). It is vital that nurses are aware of common predisposing factors so patients are assessed and treated appropriately.

As falls are a significant risk in frail, older people, a history of falls should prompt a structured assessment of fracture risk (NICE, 2012). It is not necessary to routinely assess fracture risk in people aged under 50 years unless specific risk factors have been identified. Box 1 lists the key risk factors for fragility fracture.

The risk of fracture increases progressively as bone mineral density (BMD) decreases (National Osteoporosis Guideline Group, 2017). BMD and bone turnover are affected by numerous factors, so health professionals need to be vigilant for those that predispose to osteoporosis. This will help them identify people at risk of hip fracture and enable timely screening and intervention. Box 2 lists risk factors for osteoporosis.

Dual-energy X-ray absorptiometry (DXA) can be used to measure BMD and diagnose osteoporosis. The risk of fracture doubles for each standard deviation below the mean peak bone mass (although the World Health Organization defines osteoporosis as a BMD of 2.5 standard deviations below the mean peak mass) (NOGG, 2017). However, measuring BMD in isolation does not effectively identify fracture risk because of the large number of conditions that can act as additional risk factors (Marques et al, 2015). To assess fracture risk, risk assessment tools have therefore been developed that take into consideration various factors predisposing to fragility fracture. NICE (2012) currently recommends using either FRAX or QFracture (Box 3).

Risk assessment tools can be used to guide treatment, although results should be used with caution in people over 80 years of age, as their predicted 10-year fracture risk may underestimate their short-term risk (NICE, 2012). Tools may not take into account all risk factors, such as immobility or medication, that may impair bone metabolism (for example, anticonvulsants, proton pump inhibitors and antiretrovirals). A 10-year fracture risk of 10% should be considered the threshold for arranging a DXA scan (NICE, 2016).

### Diet, exercise and lifestyle

As hip fractures can significantly impair people’s ability to undertake activities of daily living and reduce their quality of life, nurses need to:
- Actively promote bone health as part of health promotion;
- Use any spontaneous teaching opportunities to advise patients about healthy eating, suitable exercise and appropriate exposure to sunlight to ensure they have adequate levels of vitamin D.

Raising awareness of bone health is valuable in all age groups but particularly in children and young adults, as educating them about the importance of diet, exercise and lifestyle for bone health may help to reduce the impact of osteoporosis later in life.

Lifestyle measures to improve bone health include:
- Stopping smoking;
- Ensuring alcohol intake does not exceed units per day;
- Ensuring adequate calcium intake and vitamin D status (NOGG, 2017).

Regular exercise is encouraged to

### Risk factors for osteoporosis

- Untreated premature menopause (menopause before 40 years of age)
- Hyperthyroidism
- Hyperparathyroidism
- Malabsorption conditions (for example, inflammatory bowel disease, coeliac disease)
- Rheumatoid arthritis and other inflammatory arthropathies
- Chronic liver failure
- Chronic kidney disease

Source: NICE (2016)
Box 3. Recommended risk assessment tools

FRAX (www.sheffield.ac.uk/FRAX)
A clinical assessment tool that can be used for people aged 40-99 years, with or without bone mineral density results, to estimate the 10-year predictive fracture risk. FRAX assessment considers factors such as age, sex, fracture history, smoking, use of glucocorticoids and BMD to identify a 10-year probability of hip fracture and the probability of a major osteoporotic fracture of either the spine, forearm, hip or shoulder.

QFracture (qfracture.org)
A clinical assessment tool that can be used to predict the risk of fracture over the next 10 years in people aged 30-99 years. QFracture has been validated in the UK and takes into consideration comorbidities and risk factors such as dementia, cancer, epilepsy and chronic renal disease, as well as whether the person lives in a nursing or care home.

Pharmacological treatment
Many drugs can have a positive effect on BMD and reduce the incidence of fractures. Initially patients can be prescribed bisphosphonates to slow down bone turnover and improve bone density; NICE (2017) has produced a useful decision support tool that helps patients discuss treatment options with health professionals [Bit.ly/NICEBisphosphonatesTool]. It:
- Highlights the benefits of bisphosphonates;
- Outlines their potential adverse effects (for example, gastrointestinal symptoms, headaches and musculoskeletal pain);
- Identifies how they should be taken.

Patients may stop taking bisphosphonates because of adverse effects, so regular reviews are essential to assess their adherence to treatment and need for support (NICE, 2018). This relies on effective person-centred communication and consideration of their needs and preferences.

“Regular exercise is encouraged to improve muscle strength as this reduces the rate of falls and risk of fracture”

Nurses in all settings are ideally placed to support patients with their decision-making and adherence to medication in the long term. It may be necessary to consider different medications or regimens to increase adherence to treatment. Referral to specialist services may be beneficial, as this will allow patients to access expert individualised care.

People with limited mobility may find it difficult to venture outside and therefore may not achieve adequate exposure to sunlight; ideally, they should be encouraged to go outside between March and September for short periods (about 10 minutes) and expose their arms and face to the sun [Bit.ly/NOSVItD]. For people in institutional care, this should be planned as part of resident activities during warmer months, while those who are unable to maintain recommended levels of vitamin D through dietary intake or exposure to sunlight may need vitamin D supplements.

Conclusion
Hip fractures are common injuries that are associated with significant morbidity and mortality. The main predisposing factors are osteoporosis and a history of falls. To minimise the risk of hip fracture, it is essential that nurses identify risk factors and actively seek to reduce the potential for harm. Bone health assessment and falls prevention are important aspects of hip fracture prevention (NICE, 2018).

Nurses in all settings are ideally placed to identify people at risk of hip fracture and facilitate collaboration with multidisciplinary and specialist teams. They contribute greatly to risk assessment, education and health promotion, and some initiate and monitor medical and lifestyle interventions. NT

References