and immobility is foot drop contracture deformity, which results in the inability to place the heel on the ground, or to raise the foot at the ankle. The commonest cause is entrapment of the common peroneal nerve at the neck of the fibula at the top of the calf. Improper positioning, infrequent passive exercise or inadequate support produce a shortening of the Achilles tendon (Springhouse, 2006). The condition presents a limp-like, weak foot that causes difficulty in walking. Once a patient regains mobility, the shortening of the Achilles tendon can be put under undue strain and may rupture.

Contractures may be prevented through proper positioning and body alignment, and the use of straps and supports. Carrying each joint through its full range of motion at least once every eight hours is the key to prevention.

**BONE**

The primary function of bone is mechanical support for body tissues and muscles, and to maintain mineral homeostasis by providing a reservoir of calcium, phosphorus and magnesium salts (Marieb, 2008). In the skeleton, most of the calcium and phosphorus are present as crystals of hydroxyapatite, the deposition and orientation of which are influenced by mechanical stresses on the bone (Montague et al, 2005). When there is little force acting on the body for any length of time, a drastic reduction in the mineral content of bone tissue is seen, leading to a fall in bone density and reduced strength. This is known as disuse osteoporosis.

Maintaining normal bone function depends on two types of cells: osteoblasts, which are responsible for building the osseous matrix of bone, and osteoclasts, which break down existing bone matrix. Bone is a dynamic tissue, and, in normal levels of health and activity, a constant equilibrium of bone formation and reabsorption is reached.

Osteoblasts rely on the stress of mobility and weight bearing to perform their function. During immobility and bedrest, the process of building new bone stops, but the osteoclasts still break down bone, resulting in a loss of bone density, leaving the bone structure soft and weak. Even ordinary forces such as those encountered during wheelchair transfers, physical therapy activities or minor falls may cause fractures (Corcoran, 1991).

Alarming, the mineral content of bone tissue can change so that the rate of calcium loss from bone begins to exceed the rest of deposition (Corcoran, 1991). Within just a few days of bedrest, plasma calcium levels rise and, by the third day, there are measurable increases in urinary losses of calcium. If immobility continues, this can lead to the formation of calcium-containing kidney stones (ureolithiasis).

A diet high in calcium will not improve bone uptake of calcium — instead, it will add to the excess calcium already excreted in the urine. In some, calcium will be deposited in soft tissues (a condition called heterotropic calcification or myositis ossificans). This can occur in muscles, vessel walls or cardiac valves, where it may interfere with joint or muscle function, or even affect cardiovascular function.

Calcium clearance is 4–6 times higher than normal within three weeks of total immobilisation. Hypercalcaemia can develop, affecting neurons and smooth muscle. Anorexia, nausea and vomiting may occur. Bone is generally classified into two types: cortical bone, also known as compact bone; and trabecular bone, also known as spongy bone. Cortical bone is dense and is found in the shaft of long bones. Trabecular bone is much more porous and is found in the end of long bones, in vertebrae and in flat bones such as the pelvis.

During immobility, both cortical and trabecular bone are lost. Since the loss is predominantly of trabecular bone, it occurs mainly in weight-bearing bones such as the vertebrae, the long bones of the legs, the heels and wrists. Bone mineral density of the vertebral column decreases by about 1% per week of bedrest, nearly 50 times the rate of normal age-related bone loss.

With bedrest, patients develop soft spongy bones that can easily compress, become deformed or fracture. People with disuse osteoporosis experience pain when they begin weight-bearing activities again. Between 24% and 40% of the mass of the heel bone is lost during 36 weeks of bedrest (Bortz, 1984). Lost bone mass is not regained for some weeks after muscle mass and strength have returned to normal, and this adds to the risk of fracture (Bloomfield, 1997).

Early mobility and physiotherapy are essential to prevent disuse osteoporosis. In postmenopausal women, bone loss is particularly rapid in the femoral neck, increasing the risk of fracture (Milton and Riggs, 1983).

**SKIN**

The skin protects underlying muscles, bones and internal organs, as well as being involved in temperature regulation and sensation. Immobility is the factor most likely to put an individual at risk of altered skin integrity (Wilkinson, 2000).

Normally, to relieve discomfort, individuals automatically shift their weight off pressure areas every few minutes, even during sleep. However, immobile patients or those with decreased sensation cannot do this, resulting in prolonged pressure on skin capillaries and, ultimately, the death of skin tissue.

The only areas of skin designed to bear...