weight are the soles of the feet. However, during bedrest, a large surface area of skin bears weight and is in constant contact with the bed.

Areas where skin is stretched tautly over bony prominences are at the highest risk of breakdown. Here, the possibility of ischaemia is at its greatest because skin capillaries are compressed between the bone and a hard surface such as a bed or chair (Gulanick and Myers, 2006). Impaired flow of lymph and blood causes ischaemic lesions commonly known as pressure ulcers.

Prolonged pressure (greater than capillary pressure of 32mmHg) can result in ischaemia and necrosis of underlying tissues. The longer the duration and the greater the magnitude of pressure, the higher the chance of developing a pressure ulcer. Microscopic changes to skin tissue have been observed with pressures of 70mmHg after only two hours.

Repositioning a recumbent patient in bed will cause additional forces of friction and shear, pulling weakened skin over muscles and bony ridges. Also, skin next to bed sheets perspires, leading to moist bed linen and creating an ideal environment for bacterial reproduction (Rubin, 1988).

Pressure ulcers occur most in immobilised older patients, people in critical care settings and those with spinal cord injuries. One study reported pressure ulcers in 25–80% of patients with spinal cord injuries, with resulting complications accounting for up to 8% of deaths in this group (Dittmer and Teasell, 1993). The prevalence of pressure ulcers increases significantly with age – 70% occur in patients older than 70, who can acquire them within two weeks of admission to hospital (Dittmer and Teasell, 1993).

About 95% of all pressure ulcers occur at five sites: the sacrum, ischial tuberosity, greater trochanters, heels and ankles (Fig 1). They tend to occur mainly on the sacrum and heels in supine patients, and on the ischial tuberosity in sitting or reclining patients. Other areas can be affected (Fig 2).

Prevention is better than cure for pressure ulcers and can be done by frequent position change, meticulous skin care, early assessment of risk factors, and careful, continuous observation.

To alleviate pressure, relieving devices and interventions such as air-fluidised beds or alternating pressure air mattresses may help, but turning the patient every two hours is a safe and simple measure. Egg-crate foam mattresses and protective foot cradles provide additional protection, but getting the patient out of bed and mobile as soon as possible is the best prevention for pressure ulcers.

**THE IMMUNE SYSTEM**

Changes in immune responses have been reported after bedrest, and, although most studies have focused on conditions facing astronauts during space flight, there is an overlap in the immune response of astronauts and that of patients exposed to prolonged bedrest.

One of the most significant findings concerns the reactivation of latent viruses. A study by Sonnenfeld et al (2007) found that the Epstein-Barr virus was reactivated in subjects exposed to a 60-day bedrest, with a dramatically increased viral load.

Maintenance of viral latency is largely determined by the patient’s immune status, and numerous studies relate viral reactivation to an immunocompromised or immunosuppressed state. The other major effect of bedrest on the immune system appears to be on the production of cytokines. These chemical messengers regulate the immune response in various ways, including stimulating the production of immune cells (leucocytes) or mediating inflammation.

The production of interleukins (IL) seems to be most affected by bedrest. A decrease in the production of IL-2 (responsible for growth, proliferation and activation of T and B lymphocytes and natural killer cells) has been found in patients confined to bed, which may contribute to lower levels of immunity. Increased levels of IL-1β have also been reported. This is a pro-inflammatory messenger and it may also be involved in bone mineral loss.

Also, there are some reports of a significant decrease in the level of circulating plasma antibodies (Craven and Hirnle, 2008; Shearer et al, 2009).

If prolonged bedrest itself is a major cause of reduced immunity, this has yet to be scientifically determined. There is still a considerable lack of research on this area.

**THE PERCEPTION OF ‘SELF’**

Immobility and the associated changes in body composition described above can also affect the self-concept of patients. The self is one of the central concepts in psychology and self-concept is described as a stable set of beliefs about one’s qualities and attributes (Taylor, 1999).

Related to this is self-esteem, which refers to the feeling of self-worth, and is a central component of psychological well-being (Walker et al, 2007).

Self-concept and self-esteem are made up of a person’s body image, achievement, social functioning and self-identification. Although levels of self-esteem and self-concept are relatively stable within people, particular events such as sudden or chronic illness can produce drastic changes.