The process of pressure relief in a healthy individual can be considered a continuous dynamic activity, with a recognised chain of events. Pressure leads to tissue ischaemia which in turn leads to pain, as a consequence of which the individual moves to relieve the pressure, blood supply is restored and the ischaemic pain disappears (Collins 1998). On average, a healthy individual will alter his or her posture during sleep every 11.6 minutes (Keane 1978). For dependent patients, this process of moving to relieve pressure is not possible; they are reliant on health professionals to perform this movement for them.

Traditionally this has been achieved with the two-hourly turn, but increasingly the use of devices such as alternating pressure air mattresses (APAMs) are fulfilling this movement requirement. Many papers stress how important it is to turn patients regularly for their pressure area care (Alexander et al 1992, Clarke 1997). Most healthcare professionals understand the benefits of two-hourly turns and could describe the physiological causes of pressure sores (Box 1). A paper by Helme (1994) shows that although staff had a high knowledge of turning protocols, they did not turn their patients as regularly as ‘prescribed’.

The main reasons cited for not turning patients regularly include lack of time, lack of staff (Bliss 1990, Helme 1994, James and Fong 1996) and may include lack of access to, or knowledge about, handling equipment. As Dealey (1994) points out: ‘Given the demands on their time, nurses are increasingly relying on pressure-relieving equipment instead of two-hourly turning to prevent pressure sores.’ Pressure sores develop as a result of two processes; occlusion of blood vessels by external pressure, and endothelial damage of arterioles and micro-circulation by application of friction and shearing forces (Collins 1998, McLeod 1997).

Traditionally, the relief of pressure and promotion of circulation has been achieved by regular two-hourly turning of patients (Maklebust and Sieggreen 1991). Now that we have a range of pressure-relieving mattresses, this dependence on turning for pressure area care has decreased. Some claim that APAMs take away the need to turn patients altogether (Collins 1998, Huntleigh Healthcare AIM 1995).

Is pressure area care the only reason patients should be turned? Several months ago a physiotherapist came into the staff room complaining about the nursing care received by a patient on an acute ward. The patient had suffered a cerebrovascular event (CVE) and had developed what the physiotherapist considered to be a preventable chest infection.

She discovered that the patient had been left lying supine for 24 hours a day since she had been admitted three days previously. When the physiotherapist enquired about the reasons for this, she was told: ‘The patient did not need...’

Box 1. Physiological causes of pressure sores

<table>
<thead>
<tr>
<th>INTRINSIC FACTORS</th>
<th>EXTRINSIC FACTORS</th>
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<tbody>
<tr>
<td>Malnutrition</td>
<td>Medication</td>
</tr>
<tr>
<td>Neurological deficit</td>
<td>Moisture</td>
</tr>
<tr>
<td>Reduced mobility/activity</td>
<td>Pressure</td>
</tr>
<tr>
<td>Increased age</td>
<td>Shear</td>
</tr>
<tr>
<td>Incontinence</td>
<td>Friction</td>
</tr>
<tr>
<td>Dehydration</td>
<td></td>
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<tr>
<td>Mental status</td>
<td></td>
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<tr>
<td>Skin condition</td>
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<tr>
<td>Sepsis</td>
<td></td>
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<tr>
<td>Medication</td>
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These key words are based on the subject headings from the British Nursing Index. This article has been subject to double-blind review.
turning because she was on an airflow mattress’. For 72 hours this very ill, dependent patient had been moved for personal care and bedding changes only. She had been assessed using the Waterlow scale (1985) and had been deemed at high risk of developing pressure sores because of her level of dependence and fluctuating consciousness. Thereafter she was nursed on an alternating pressure air mattress (APAM), and subsequently had rarely been moved.

This incident sparked debate among the physiotherapy staff from all specialties about the particular problems that they had encountered while treating patients who were nursed on APAMs. The various problems that were highlighted provoked us to take the issue further. A meeting was convened between nursing, therapy and tissue viability staff in the hospital, which led to stimulating, constructive, but ultimately non evidence-based discussion.

This article aims to open out and continue this discussion, and perhaps stimulate research into reasons for turning patients, other than solely for pressure area care. In the example described above, the nursing staff had anticipated one of the problems associated with a high level of dependency, pressure area care, but had not taken into account other possible complications.

### Neurological factors

Disease or damage to the central or peripheral nervous system can lead to temporary or even permanent physical, cognitive and psychological problems. If the person is unable to move, he or she is deprived of the physical benefits of movement including:
- Sensory-motor appreciation.
- Posture and balance control.
- Maintenance of joint and soft tissue range of movement (thus preventing contractures).
- Maximisation of functional independence.
- Minimisation of tonal changes, such as spasticity.

From a psychological perspective, dependency can lead to behavioural problems such as withdrawal, and there is a need for regular contact and interaction to provide opportunities for orientation, socialisation, and communication (Table 1). In the unconscious patient, regular contact and stimulation is recommended to increase the patient’s awareness of self and the environment. All healthcare professionals handling a dependent patient should, of course, explain their actions to them, so that an appropriate response can be stimulated.

Effective postural management in the acute stage of any disease that challenges motor or postural ability, can enhance and reinforce recovery of function in those with the potential for this (Pope 1996). From an holistic perspective, the patient will benefit from regular turning and careful positioning. This will not only prevent secondary complications developing, but will also promote recovery (Edwards 1996).

### Importance of positioning

Several papers caution against turning a patient to 90° because of the increased interface pressure that this puts onto the bony prominence of the greater trochanter (Colin et al 1996, Holmes 1997, Wind et al 1997). For many neurological patients, particularly those who have had a CVE, this is an important position for the control of muscle tone. If patients are well positioned, it allows them to feel support with their non-affected side and gives them visual cues from seeing themselves on a bed. It also gives them access to visual information about their upper limbs, as well as the ability to interact with visitors and to see what is happening on the ward around them.

If patients are positioned safely and comfortably, they should be able to move with minimal effort. This will limit the stress of movement that can contribute to the development of spasticity. The person in Figure 1 has been positioned in ‘forward lean side-lying’ which involves turning a patient to just forward of 90°. It requires careful attention to positioning, including weight forward off the greater trochanters and good supportive surfaces (for example pillows supporting anterior and posterior trunk, legs, and arms, as well as the head) to increase surface area in

### Alternating pressure air mattresses

APAMs work by temporarily removing compressive forces on the skin to restore perfusion. They reduce localised distortion of capillary beds by sequentially deflecting cells. They may also aid metabolite clearance by stimulating a myogenic response that causes dilation of the microvascular and lymphatic systems (McLeod 1997).

Evidence exists describing the effectiveness of these mattresses for both the prevention and treatment of pressure sores (Devine 1995, Exton-Smith et al 1982) and although there is little evidence assessing their cost effectiveness, they are now regularly used in the management of patients at risk of developing pressure sores (University of York and University of Leeds 1995).

### The literature

Little evidence or information could be found in the literature specifically discussing the other advantages of turning patients. Papers that described the importance of turning for pressure area management did not describe other physiological or psychological benefits. Lack of information in the literature about these other effects may in part be to blame for the lack of knowledge among staff of the value of turning patients. This might mean that patients are not receiving the best standards of care that should be offered to them. Outlined below are some reasons to turn different case-mix groups, but many of the themes are common to all.
As well as for the management of patients with neurological conditions, a regular change of position is essential for patients at risk of developing pulmonary complications, or those already suffering from chest complaints. Regular turning enhances the reduction of the incidence of pulmonary infection and the development of sepsis (Gentilello et al. 1988). The movement from the supine position to side-lying has numerous physiological advantages. Body position changes enhance oxygen transport due to the effect of gravity on the distribution of ventilation and perfusion throughout the lungs (Dean and Ross 1992). This alteration in the areas of dependent lung tissue has preventative and treatment advantages that help ensure that problematic lung areas do not develop. Altering chest position is thought to redistribute and mobilise mucus and interstitial fluid from dependent lung areas, which helps to prevent the development of atelectasis within these areas. Contact, thereby decreasing the interface pressure on the greater trochanter. This allows for the three main elements of positioning: safety, comfort and movement facilitation.

**Respiratory factors**

As well as for the management of patients with neurological conditions, a regular change of position is essential for patients at risk of developing pulmonary complications, or those already suffering from chest complaints. Regular turning enhances the reduction of the incidence of pulmonary infection and the development of sepsis (Gentilello et al. 1988). The movement from the supine position to side-lying has numerous physiological advantages. Body position changes enhance oxygen transport due to the effect of gravity on the distribution of ventilation and perfusion throughout the lungs (Dean and Ross 1992). This alteration in the areas of dependent lung tissue has preventative and treatment advantages that help ensure that problematic lung areas do not develop. Altering chest position is thought to redistribute and mobilise mucus and interstitial fluid from dependent lung areas, which helps to prevent the development of atelectasis within these areas. Contact, thereby decreasing the interface pressure on the greater trochanter. This allows for the three main elements of positioning: safety, comfort and movement facilitation.

**Table 1. Reasons to turn neurological patients**

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>REASONS TO TURN</th>
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<tbody>
<tr>
<td>Sensory disturbance</td>
<td>Promotes sensory awareness/appreciation including body image and perception (Grieve 1993, Langdon 1996, Siev and Freistat 1986)</td>
</tr>
<tr>
<td>Altered muscle tone</td>
<td>Minimises spasticity by frequent change of posture and support (Davies 1994, Edwards 1998)</td>
</tr>
<tr>
<td>Risk of aspiration</td>
<td>Promotes safer swallowing with specific positioning (Ray 1985) Minimises respiratory complications (Hough 1984)</td>
</tr>
<tr>
<td>Bladder and bowel dysfunction</td>
<td>Essential for incontinent patients to prevent moisture accumulation which is a major contribution to the development of pressure sores (Clarke 1997, Grundy and Swain 1996)</td>
</tr>
<tr>
<td>Perceptual problems</td>
<td>Stimulates orientation to the environment and body image awareness through the senses (Grieve 1993, Langdon 1996, Siev and Freistat 1986)</td>
</tr>
<tr>
<td>Behaviour and cognitive problems</td>
<td>Stimulates socialisation, memory, and appropriate behavioural responses (Grieve 1993, Langdon 1996, Siev and Freistat 1986)</td>
</tr>
</tbody>
</table>

**REFERENCES**

chest infection, which could also prevent a pressure sore.

Pape et al (1998) studied patients at risk of developing adult respiratory distress syndrome (ARDS) following traumatic injury. Those patients receiving early positional changes on a regular basis showed a reduced incidence in the development of ARDS, improved systemic oxygenation and overall improved survival.

The use of prone ventilation, where the patient is nursed face down, is a well known treatment in the management of ARDS. It has been shown to improve worsening hypoxia resulting from alveoli filled with watery exudate and increasingly non-compliant lungs. The alteration of body position allows the affected lung tissue to aerate because gravitational forces are altered. This has been demonstrated with CT scans before and after the initiation of prone ventilation (Gattinoni et al 1991). These findings reinforce the need for regular turning of dependent patients at risk of developing pulmonary complications.

The cardiovascular system is also influenced by the effects of regular turning. Positioning serves as a treatment adjunct if mobilisation is not possible. Changing body position has a greater effect on the cardiovascular activity than maintaining a static position (Dean and Ross 1992). This exercises the cardiovascular system to benefit the patient at a later stage in recovery.

**Musculoskeletal factors**

Orthopaedic patients, particularly those who go on to have an operation, are at high risk of developing pressure sores. Versluysen (1986) found that 66 out of 100 patients developed pressure damage following fractured femur. Particular problems exist for those on traction or for whom turning jeopardises their operation site. These patients are at risk of developing complications such as:

- Osteoporosis.
- Homeostasis and dependent oedema – which can lead to swollen limbs or deep vein thromboses.
- Deep vein thrombosis – which can lead to embolic CVEs or pulmonary embolism, with associated risk of death.

Other problems can include contractures and positional impairment, such as shortened Achilles tendons or joint fixed flexion deformities, which can lead to diminished proprioception and altered balance mechanisms (Nichols 1981).

Discussion will be required with the orthopaedic surgeons, but any permitted position change will help diminish these risk factors. The Guide to Handling of Patients; Introducing a Safer Handling Policy (Holmes 1997) gives recommendations on how these patients can be safely moved.

Pain is an important factor contributing to immobility in the post-operative period for patients allowed to mobilise. For these, effective analgesic management will enable early mobilisation, decrease risk factors and expedite discharge (Closs et al 1993, Hunt 1995). Patients immobilised following burns encounter similar problems.

**Vascular factors**

For patients with vascular problems, such as amputation, graft surgery or those confined to bed because of the pain of critical limb ischaemia, position changes are essential. They can prevent the development of contractures and assist in the control of oedema.

Oedema management is essential for amputees and graft surgery patients to prevent wound breakdown or delayed healing, which can impede rehabilitation. This may result in muscle weakness, decreased tolerance of the upright position, poor balance, delayed use of the pneumatic post-amputation mobility (PAM) aid and delayed fitting of the prosthesis. This delay may lead to an increased length of stay, possibly poorer outcomes or poorer prognosis, and possible decreased quality of life (Engstrom and Van de Ven 1985).

**Manual handling**

Over the last decade there has been a shift towards a safer handling policy with the introduction of the Manual Handling Operations Regulations (Richmond 1997) and Health and Safety Executive Guidelines (HSE 1992). The legislation asserts the obligations of both the employer and the employer to ensure safe lifting and handling tasks.

The Guide to the Handling of Patients (Holmes 1997) has a comprehensive approach to the manual handling of patients in bed, on differing mattress surfaces, and promotes regular turning of patients in the prevention of pressure sores. It explains that a risk assessment is required for all handling tasks and appropriate handling equipment, such as hoists and sliding aids, should be used to reduce the risk to the lowest level practicable.

Clarke (1997) reinforces this in her paper stating: ‘Accurate risk assessment, frequent repositioning and proper selection of equipment are essential in the prevention of pressure sore development’

The use of sliding sheets and low friction fabric rollers has revolutionised the way we handle dependent people. The technique allows the patient to be turned without any need to lift. They not only have the benefit of reducing risk of back injury, but have the significant effect of minimising friction and shearing – one of the commonest causes of pressure sore development (Young et al 1998).

Education and training in manual handling procedures and the use of equipment are essential.
Fig. 2. Spiral of dependence

Dependence

Increasing dependence

Delayed recovery or increased illness

Inability to move

Complications

- Respiratory, eg, chest infection
- Musculoskeletal, eg, DVT
- Vascular, eg, wound breakdown
- Neuro, eg, increased spasticity
- Pressure sores

Spiral of independence

Increasing independence or improved prognosis

Dependence

Inability to move

TURN

Decreased complications

- No chest infection
- No DVT
- Good wound healing
- Maximised physical function
- Decreased incidence of pressure sores

for all those involved in the management of dependent patients. This should include how to move the patient to minimise the extrinsic factors associated with movement, shearing and friction to aid in pressure sore prevention. Patients should, within their own capacity, be encouraged to assist with position changes. This reinforces independence and aids in the prevention of secondary complications resulting from dependency.

Conclusion

Sufficient resources (including available equipment and staff) and ongoing education are vital in implementing proactive evidence-based practice. By anticipating all potential problems and encouraging a dynamic patient-centred approach, turning should be seen as an integral part in the holistic care of patients, breaking the spiral of dependence and putting them onto the spiral to independence (fig. 2).

Pressure sores are a serious but largely preventable complication of illness or disability, causing significant morbidity and mortality (Clarke 1997). Pressure-relieving and pressure-reducing equipment has contributed extensively to the prevention of such complications. This has resulted in a reduction of regular turning of patients (Dealey 1994). This can potentially lead to the development of other, non-pressure related complications. This article has outlined some of these potential complications and hopefully stimulated thought about reinstating regular turning in the management of immobile or dependent patients.

Some evidence exists, from a variety of specialties, to encourage the use of regular changes of position for reasons beyond the prevention of pressure area problems. We possess the ability to prevent some of the respiratory, neurological and musculo-skeletal consequences of enforced immobility. The ultimate challenge for the carer is to prevent these secondary complications from occurring.