EDITORIAL

The right position at the right time: mobility makes a difference

"Teach us to live that we may dread unnecessary time in bed. Get people up and we may save our patients from an early grave" (Asher, 1947). In a 1947 article published in the British Medical Journal, Dr Asher made that statement. However, it has taken a long time for the science of positioning to be seen as a treatment modality in caring for acute and critically ill patients. For a number of years, nurses have recognized that positioning prevents skin breakdown, mobilizes secretions and provides comfort without identifying the impact different types of positioning strategies have on pulmonary gas exchange, ventilator weaning outcomes and the prevention of de-conditioning in survivors of intensive care. The importance of positioning as a priority of practice is challenged in a high technology based environment. In a study looking at positioning of critically ill patients over an eight-hour time period only 2.70% achieved every two-hour position change and 49.5% never moved during an eight-hour period (Krishnagopalan et al., 2002). Critical care nursing has a problem and the solution rests in increasing awareness of the importance of positioning on short and long-term patient outcomes. If nursing does not pay attention to this care activity often it does not get done.

We know that the primary function of the lung is to perform gas exchange. In order for gas exchange to take place, the air distributed in the lungs has to match up with perfusion. Body position/gravity and lung injury influence this ventilation/perfusion match. Science has told us that if we aren’t standing upright, sitting straight up is the next best position to breathe if our lungs are in fairly good health (Bryan et al., 1964; West, 1985). When we are hospitalized, especially during the immediate phase of a critical illness our bodies cannot tolerate sitting upright because of the effect on our cardiovascular system. Often these patients have limited self-movement because of their disease, treatment or medications being administered. As a result, alternative strategies for body position must be used to benefit gas exchange and prevent the development of hospital-acquired pneumonia.

What impact does a stationary supine position have on the lung? In a supine position approximately 17% of the lung tissue rests under the compressive forces of the heart exerting pressure on the lung tissue. The effect is a more positive pleural pressure resulting in collapse of the alveoli. The amount of lung tissue susceptible to this force can increase up to 37% depending on the size of the heart (Malbouisson et al., 2000). Another factor contributing to lung mechanics while in the supine position are the abdominal contents and their relationship to the diaphragm. In spontaneous healthy breathing, in the supine position, the diaphragm will act as a shield against the pressure exerted by the abdominal contents preventing those contents from interfering with dependent air distribution. In individuals who are sedated and/or have lung injury and/or receiving mechanical ventilation in the supine position, a significant amount of pressure is exerted on the diaphragm by the abdomen. This causes the dependent sections of the lung not to expand the way they are supposed to resulting in less air in the lungs at end of expiration to match up with perfusion and exchange oxygen (Froese and Bryan, 1974). It appears that the larger the abdomen the greater the effect is on air exchange.

In a study design to determine the best position to facilitate breathing in patients with large abdomens, researchers discovered that sitting upright at a 90° angle, once thought to be the best position to breathe in while in bed, did not work well for patients with large abdomens. They discovered that patients with large abdomens actually breathe better when the head of the bed was at 45° and the
bed was placed in what is called the reverse tren-
delenburg or lowering of the leg and feet area. This
‘drop down’ of the abdomen results in less pres-
sure being exerted on the lungs (Burns et al., 1994).
It is clear that in the 21st century the equipment
we use in managing hospitalized patients must be
technically ill patient. Haemodynamic instability in critically
ill patients during turning may occur as a result
of spending prolonged lengths of time in a sta-
tionary position. A lessening of the carotid-cardiac
baro-reflex responsiveness is caused by prolonged
bed rest and correlates with orthostatic hypoten-
sion and syncope (Convertino et al., 1990). Head
motion alone can reduce baroreflex response by
30% causing a reduction in heart rate. When indi-
viduals change their gravitational reference from
a lying to sitting position the body goes through a
series of physiological adaptations to maintain car-
diovascular homeostasis (Convertino et al., 1997).
Critically ill patients may experience a similar
adaptation when turning laterally or moving into a
prone position. With changes in gravitational plane
(position change) the stretch receptors read the
shift in plasma volume and respond by sending in-
formation to the autonomic nervous system to con-
strict the vasculature (Doering, 1993). Astronauts,
as an example, must adapt to changes in gravity in
order to maintain an effective circulating volume.
Training is done to assure tolerance of gravitational
changes on baroreflex and vestibular response. This
assures the astronauts cardiovascular adaptation
in space. A similar mechanism may be important in
critically ill patients. If we train them to turn by
preventing prolonged gravitational equilibration in
a stationary position for extended lengths of time,
less instability with position changes may result.
Commonly, patients are unstable when turned fol-
lowing long intervals in a stationary position in the
Operating Room, Emergency Room, and CAT (Com-
puterized Axial Tomography) scan. Such patients
may benefit from training with rotational therapy.
In addition to the stretch receptors, the vestibular
system influences many components of the auto-
nomic nervous system. Important sympathetic and
parasympathetic stimuli regulate cardiovascular
function during movement and change in posture
(Convertino et al., 1997). A manual turn is usually
accomplished rapidly making vestibular adjust-
ment much more difficult. This is in contrast to the
slow rolling motion associated with rotational ther-
apy. This may serve as another reason to choose
rotational therapy as a method for training the
critically ill patient to tolerate turning so it is no
longer a barrier to position therapy.
So when is the correct time to discontinue CLRT
therapy? Would it be correct to leave patients ro-
tating until they are up on their feet again! A good rule of thumb for discontinuing the therapy is when the patient no longer meets the clinical criteria that resulted in the therapy being initiated. In addition, if a patient can be mobilized safely into an upright and/or chair position, they now have other mobility options to facilitate secretion removal and promote gas exchange. Florence Nightingale wrote in Notes on Nursing that "whatever a patient can do for themselves, it is better ... less anxiety" (Nightingale, 1992). Completely controlling a patient’s body position may be necessary in the critical phase of their illness but extending that beyond the appropriate time may result in feelings of powerlessness and ultimately delay healing because of a perceived lack of control. So how do we successfully progress our patients towards more independent function through mobility? We can combat the physical de-conditioning that occurs with bed rest by using a stepwise mobility progression program. Once the patient’s cardiovascular system is able to tolerate the head of bed higher than 45° we begin the program. The goal during all phases of the patient’s illness is to maintain a head elevation at 45° to reduce the risk of aspiration and help prevent ventilator associated pneumonia (Drakulovic et al., 1999). Some patients experience haemodynamic instability when the head of the bed is elevated in comparison to the supine position. The cause of this instability may be related to a reduction in cardiac output created by the position change (Dalyrpley et al., 1979; Russell, 1981). Another challenge to implementing the head of bed research occurs when practitioners must take into account the impact of significant shearing and friction on the skin that has been demonstrated with head elevations above 30° (WOCN, 2003). The risk benefit profile of decreasing the risk of pneumonia versus haemodynamic instability and/or decreasing the risk of skin breakdown must be considered. Once the patient is able to physiologically tolerate higher than 45°, the goal is to progress to stepwise increases in the head of the bed, followed by placing the legs in a dependent position. If this is tolerated, dangle the legs followed by weight bearing should begin as soon as possible. An increase in general muscle strength will ultimately help with liberating a patient from the ventilator. Methods and equipment that support this stepwise mobility progression are essential in order to meet the physiological demands of the healing process. This will allow nurses and physiotherapists to “do the right thing” with minimal use of manpower. Mobility is a fundamental nursing activity that requires in-depth knowledge and skill to effectively apply to critically ill patients. It does not require a physician’s order to initiate. When mobility is a core component of care it helps with secretion management, reducing feelings of powerlessness, preventing muscle wasting, improving gas exchanging and decreasing the incidence of atelectasis and ventilator associated pneumonia. Matching the right time of the illness to the right positioning strategy will help to achieve positive patient outcomes. We have a unique opportunity as nurses to non-invasively impact our patient’s outcome through the independent activity of “turning”.

References


