G4	Standard	ICU / HDU moving and handling (M&H)

Systems are in place to cover all reasonably foreseeable handling situations in **ICU and HDU.**

Justification

Rationale

In ICU the constraints of the environment and the status of the patient impose unique challenges for patient handling that need to be addressed to protect both patient and staff and facilitate best practice.

In HDU space is usually more restricted around the beds, which present an increased risk to staff when moving patients.

Risk of injury to staff is minimized by ensuring that a thorough assessment is carried out prior to movement and that correct techniques and equipment are used.

Authorising Evidence

HSWA (1974); LOLER (1998); MHSWR (2000); MHOR (2004); PUWER (1998)

Links to other published standards & guidance

ANA (2006); BACCN (2010); DH (1996); ICS (1997); ICS (2002) NICE (2009) CG83 ; NMC (2002); NPSA (2008); RCN (1995); Ruszala et al (2010)

Cross reference to other standards in this document

G 6,7,9,15,16

Appendices

4,9-11,16,20,25,27,28

Verification Evidence

- requirements for compliance to achieve and maintain this standard

- An agreed approach, informed by evidence-based best practice, documented in the M&H policy, disseminated to all staff and embedded within ICU/ HDU
- Risk assessments (for M&H) that are 'suitable and sufficient', robust and balanced
- Safe systems of work and standard operating procedures
- Individual person assessments where necessary – readily accessible and regularly reviewed
- Ergonomics is integral
- Information and communication systems – including documentation
- Competent, healthy staff, in sufficient numbers
- Training (theoretical and practical) and supervision
- Link workers are appointed, supported and active
- An environment conducive to good care (space, layout, etc.)
- Handling and other equipment that is suitable (fit for purpose) and readily available
- Investigation of and learning from adverse events, using root cause analysis to locate the cause and prevent a recurrence SFAIRP
- Monitoring, audit and review of the verification evidence
- Points learnt from audit, and accident/ incident investigations and reports are disseminated and discussed with staff, with subsequent learning
- Reporting of the status (level of compliance) to the organisation
- Action plans to correct any lack of compliance
- The culture is one of learning rather than 'blame and shame'
- Staff work within protocols and record as necessary

G4 Protocol – ICU/ HDU (M&H)

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1. Introduction and Background

A multidisciplinary approach is required to plan the M&H/ positioning of patients in intensive care units. (ICUs). This should be evidence based, regularly assessed and reviewed as the patient's condition changes. It is frequently nurse-led. Patients admitted to an ICU will have multiple system failure and are frequently immobile for long periods of time. During periods of prolonged immobility, patients are at risk of developing decubitus ulcers caused by ischaemia of skin and subcutaneous tissues. This risk is increased in critically ill patients because of poor peripheral circulation, reduced blood oxygenation, sedation during ventilation, poor nutritional status and excessive moisture to the skin through sweating (Beare and Myers, 1998).

High risks of work-related musculoskeletal disorders (WMSDs) are to be expected due to the condition of the patient and the type of handling involved. This is compounded by the psychological stress of this type of work.

Intensive Care Unit (ICU)
The ICU is a designated area offering facilities for the diagnosis and management of patients with one or more organ system failure, the prevention of further deterioration and restoration to health where possible. These patients are characterized by the presence, or potential, for life-threatening illness. The critical care environment is an environment specifically staffed and equipped for the continuous monitoring, observation and care of individuals with a critical illness (Pilcher and Odell, 2000).

High Dependency Unit (HDU)
High dependency care is the provision of a level of care between that available on a general ward and that on an ICU. A high dependency unit (HDU) should be able to provide monitoring and support to patients with, or at risk of developing, acute or acute-on-chronic single organ failure. It should not manage patients requiring multiple organ support or mechanical ventilation. Whilst some hospitals have HDUs, they may also be called step-down, progressive or intermediate care units.

The critical care modernisation plan (DoH) announced in May 2000 introduced the notion that adult acute care should be seen as a spectrum, classified across four levels, much as paediatric critical care is organised. The four levels are:
Level 0 – normal acute ward care
Level 1 – acute ward care, with additional advice and support from the critical care team
Level 2 – more detailed observation or intervention
Level 3 – advanced respiratory support alone, or basic respiratory support together with support of at least two organ systems. (Cronin et al, 2010).

2. Management, organisation, supervision and support

Due to the frequency and difficulty of repositioning and the critical condition of the patient there can be high levels of physical stress for staff. This is likely to lead to WMSDs (see Section 8 – M&H tasks). Sufficient equipment must be available to enable staff to work as comfortably and safely as possible. Provision must be made for any peaks in demand which have been noticed during past years (MHSWR, 2000). All specialist areas need to be managed and organised properly, from a safety point of view (MHSWR, 2000), and from a clinical point of view according to recognised best practice for that speciality. Due to the critical condition of the patient, Novices and Advanced Beginners will require supervision. Any member of staff could require psychosocial support. Sufficient supervision and support is also essential.

3. Staffing levels

ICU
1 member of staff: 1 patient
The one nurse to one patient ratio has been the gold standard in ICU since the British Medical Association (1967) first advocated it. Subsequent publications have continued to endorse this view (DoH, 1996; Intensive Care Society (ICS), 1997; Mackinnon et al, 1998).

In analysing the appropriateness of identifying optimal nurse-to-patient ratios, the use of dependency, or severity of illness, scoring systems can assist the facilitation of this process. However, there are a number of problems in using these tools, as it is widely accepted that they do not reflect the totality of the nursing workload within critical care environments (Arthur, 1994, Campbell et al, 1997, Dickie et al, 1998; Large et al, 1991; RCN, 1995).

The ICS (1997) suggested that, although healthcare support workers may be employed in critical care environments to assist nursing staff in performing non-nursing duties, the introduction of these staff should not be allowed to reduce the skill mix to an inappropriate level for the delivery of patient care.

The British Association of Critical Care Nurses (BACCN), (2010) position statement states that:-

- Every patient in a critical care unit has the right to be cared for by a registered nurse
- Every critically ill patient should have access to a registered nurse with a post-registration qualification in the relevant specific speciality
- Unconscious/ventilated patients should have a minimum of a one-to-one nurse-patient ratio
- The nurse-patient ratio within any critical care area should not go below one nurse to two patients.

For handling tasks two or more staff are needed, therefore additional staff will be required, particularly for proning (see 10.10) and when re-positioning bariatric patients (see 10.14.1).

HDU
1 member of staff: 2 patients

The ratio of nurses to patients will be slightly lower than in intensive care but higher than in most general wards. Some hospitals have a combined ICU and HDU or a certain number of beds in ICU given to HDU patients. In these cases, although a patient is not moved to another ward, the level of care is slightly reduced as s/he is no longer in such a critical state. Patients spend varying lengths of time in HDU, depending on the nature of their illness and the demands on the unit. Some hospitals in the UK have no HDUs, and in these cases patients are usually transferred directly from ICU to a general ward.

4. Staffing competencies (after Benner, as cited in Ruszala et al, 2010))

Novice (N); Advanced Beginner (AB); Competent (C); Proficient/Practitioner (P); Expert (Ex)

Competence has been defined by the NMC (2002) as: 'Possessing the skills and abilities required for lawful, safe and effective professional practice without direct supervision.'

Novice – these would be students on placement and ward nurses interested in training for ICU. These staff would be closely supervised and monitored by senior staff.

Advanced beginner – after 6months the AB would have more responsibility delegated to them, once they could demonstrate the key principles of patient safety within the ICU. They would be looking after a patient on a 1:1 ratio with more senior staff overseeing and assessing. More senior staff would expect to give advice or be asked for advice as necessary.

Competent – this nurse will have completed an Intensive Care course and will be able to look after, for example, critically ill children, patients on dialysis. They would be expected to supervise and assess Ns and ABs in M&H tasks.

Proficient/ practitioner – will have more years of experience and will be a Senior Staff Nurse/ Junior Sister/ Charge Nurse.

Expert – more years of experience, more critical care courses successfully completed, and will be a Senior Sister/ Charge Nurse. The expert could also be a M&H link worker who has undertaken a 'train the trainers' M&H course, or a Critical Care Practitioner with a dual teaching and clinical role.

M&H in ICU/HDU will require various levels of competence. In some areas high levels (P or Ex) will be required, because of the complexity and/or difficulty of the task, or the consequences of making a mistake, as for example in the case of patients with actual or suspected spinal injuries. It is essential therefore that competence is assured by means of training, assessment and supervision.

5. Environment

This needs to be extremely well planned with everything needed for the patient easily accessible by both staff and patient. High quality, safe, efficient and

effective practice is rendered difficult or impossible in sub-standard working and clinical environments. This is often overlooked; therefore attention must be paid to: - space and layout (including storage), flooring (and its weight limit for bariatric patients), lighting, other ambient conditions, equipment and furniture, in order to ensure good ergonomics. Many ICU departments will have a pod behind the head of the bed from which items fan out on either side, such as monitor/s, drips, pumps etc. Beds are usually set away from walls to allow all round easy access to the patient.

6. Communication and information systems regarding initial referral and entry to the system

Patients admitted via A&E will be assessed by the ICU practitioner for suitability. Patients admitted to ICU from a ward will have become critically ill (e.g. cardiac arrest or condition markedly deteriorated). Referral will be via the ward doctor/ consultant.

Patients are normally transferred from ICU to HDU as there is more observation and higher staffing levels than on a general ward. If there is no bed on ICU, a patient may be transferred to HDU or another hospital until one becomes available. It is vital that communication is effective, so that the correct information is relayed between the various teams and individuals involved in the 'patient journey'.

7. Treatment planning

The goal is always to transfer the patient as soon as possible from ICU to HDU, a ward, or a specialist unit, whichever is in the best interests of the patient. At all stages of a patient's journey through the system, treatment must be patient centred and planned by the multidisciplinary team with goals agreed by all concerned (NICE, 2009). M&H considerations should form part of the treatment plan and be recorded in the observation charts (see Section 9 – M&H assessment).

8. Moving & handling tasks

ICU

According to Waters et al (2007) critical care nurses are at high risk for the development of work-related musculoskeletal disorders (WMSDs). Many patient handling tasks in critical care require physical demands that may result in excessive internal forces, increasing the risk for WMSDs in nurses. Retsas & Pinikahana (1999) outline the manual handling practices and injuries among ICU nurses.

There are solutions for performing these tasks more safely, using technology (LOLER, 1998; PUWER, 1998), and it is important to incorporate positioning within manual handling training which enables nurses to understand the importance of moving and handling patients into appropriate therapeutic

positions, to maximise the patient's physiological functioning and recovery. Nurses require a combination of underpinning back care knowledge, critical care haemodynamics and understanding of the availability of M&H products to position the patient safely in an acute care setting (Griffiths & Gallimore, 2005).

In order to maintain patient safety and dignity the ICU employs a range of equipment which is selected according to the patient's clinical condition and the movement to be undertaken.

Waters et al (2007) have identified patient handling tasks with high risk for WMSDs in nurses working in critical care. They are:

1. Pushing occupied beds/ trolleys
2. Supine lateral patient transfers
3. Moving patients to the head of the bed
4. Repositioning patients in bed (e.g. rolling from side to side, 2 hourly turns)
5. Making occupied beds
6. Applying anti-embolism stockings
7. Lifting or moving heavy objects and equipment
8. Positioning a patient when taking a mobile x-ray.

According to Morrell (2010);

9. Proning patients is another high risk task undertaken by intensive care staff.

Further tasks undertaken in the ICU are;

10. Performing passive movements
11. Positioning the patient upright (i.e. sitting up in bed)
12. Transfers from bed to chair
13. Standing a patient
14. Handling the bariatric patient.

(See also Section 10 – methods, techniques and approaches).

HDU

Tasks undertaken in a HDU will be a half-way point between an ICU and ward environments. The patient on a HDU will receive less monitoring and support compared to the ICU environment. The available nurse patient ratio on a HDU will be significantly higher than the average ward staffing levels (section 1 – HDU).

9. Moving & handling assessment

All moving and handling tasks must be assessed. This can be done generically in connection with the drawing up of SOPs, or individually. Each patient will have their own M&H plan which is either built into the observation chart with space for M&H tasks, or separate documentation, specifying turning frequency,

the number of staff and any other issues such as equipment required. The assessment is carried out by the nurse allocated to the specific patient. Where 2 or more staff are required for a task, staff allocated to other patients will be asked to help (see Section 3 – staffing levels).

For patients requiring proning, the number of staff required will be determined on a case by case basis by an individual risk assessment, with a recommended minimum of 5, and 6 for bariatrics. (See also section 10.9).

In emergency situations assessments will need to be made rapidly, but not so fast that safety is compromised. Forward planning for every reasonably foreseeable eventuality will minimise the occurrence of true emergency handling.

10. Methods, techniques and approaches

10.1 Pushing occupied beds/ trolleys

Reference should be made to the local transport policy which should specify how patients are transferred on a bed/ trolley to other wards/ departments; how many staff are required, which direction the bed should be pointing during the transfer (head end/ foot end first). Training on the use of profiling beds should be provided to staff in all organisations and environments when new beds are purchased or being used. Issues such as the safe use of brakes and how to apply the steer function should be specified during the training.

10.2 Supine lateral patient transfers

(Refer also to section 11, handling equipment).
Lying to lying manoeuvres between bed and/or bed/ stretcher/ trolley can be achieved in various ways. Firstly, by using an inflatable transfer mattress and secondly, a hard transfer board and two slide sheets. In most cases these manoeuvres are carried out on an unconscious patient who is totally dependent, or a patient who has limited ability to assist. (Further information can be found in Hall (2005[a]) or Nelson et al (2009[a]).

10.3 Moving patients to the head of the bed

For further information on moving a patient to the head of the bed see Hall, J (2005[b]) and for repositioning a patient in bed using slide sheets see Nelson et al (2009[b])

10.4 Repositioning patients in bed (e.g. rolling from side to side)

See Hall (2005[c)] for further information on rolling a patient from side to side.

For repositioning in bed, using a ceiling-mounted or floor-based patient lift/ hoist, see Nelson et al (2009[c]).

2 hourly turns

The usual recommendation to prevent the problem of prolonged immobility in a critical care environment is to change the patient's position every two hours. In ICU, special equipment can be used to help in the prevention of pressure ulcers. This includes special mattresses that can be used on standard beds and specialised beds. If the repositioning is not being achieved at an appropriate frequency, an alternative strategy could include the use of specialised turning mattresses or beds, which are designed to change patient position either at regular intervals or constantly.

Frequent side to side turning provides many benefits for acute care patients, including decreased urine stasis associated with urinary tract infection and reduced delirium. Winkelman and Chiang (2010) reviewed the data related to frequency of manual turning and turning positions among adults who are receiving mechanical ventilation in ICUs. Turning helps loosen chest secretions, provides postural drainage and promotes local segmental ventilation and therefore oxygenation (Olséni et al, 1994; Leader, 2010). Manual turning is prescribed at traditional intervals of every 2 hours around-the-clock (Hagisawa and Ferguson-Pell, 2008). Although the origins of this common intervention are unclear, it has been adopted in a variety of guidelines (Irion, 2002).

The intervention of turning and lateral tilt occurs regularly in ICU/HDU environments. Lateral tilt was defined as a side-lying position of 30º to 60º shoulder/hip tilt from a supine position (Johnson & Meyenberg, 2009; Thomas & Paratz, 2007; Hamlin et al, 2008). The time required for a nurse to complete a manual turn has been reported as 2 to 17 minutes and should be considered for investigations that examine frequent manual turning in non–ICU settings (Bugaresti et al, 1991). Staff can be injured while handling patients and occupational injury rates are important in considering the effects of manual turns (American Nurses Association, 2006).

It is important to incorporate positioning within MH training that enables nurses to understand the importance of M&H patients into appropriate therapeutic positions, to maximise their physiological functioning and recovery (Griffiths and Gallimore, 2005). Nurses require a combination of underpinning back care knowledge, critical care haemodynamics and understanding of the availability of MH products to safely position the patient in an acute care setting.

10.5 Making occupied beds

Nurses should adhere to good ergonomics principles. Beds should be raised to a suitable working height to avoid stooping and over-reaching, thus minimising back stress (Braggins S, 2000). They should be made by two nurses in the interest of efficiency and patient safety.

10.6 Applying anti-embolism stockings

If the stockings are gathered together in the typical 'doughnut' fashion, the effect of the elastic material is multiplied many times and makes application difficult. The patient's measurements and the size of the stockings at assessment should be documented to serve as a base line measure. Leg measurements will need to be checked regularly to avoid potential complications related to swelling of the leg causing excessive pressure from the stockings. The use of an applicator will assist the procedure. Apart from the metal applicators

there are now tubular slidesheet ones, such as the Patient specific dressing pack (Hospital Direct) and the Easy-Slide-Caran (ArjoHuntleigh).

10.7 Lifting or moving heavy objects and equipment

Fluid bags used in dialysis (see G7 - renal) are heavy.

Refer to The Manual Handling Operations Regulations (2004) for the risk assessment filter. Refer to Smith, J (ed), 2005, Appendix 2 for further information. (See also Section 13 – risk rating).

10.8 Positioning a patient when taking a mobile x-ray

The use of x-ray cassette holders combined with slide sheets (x-ray plate insertion system) will minimise the handling risk for staff and obviate the need to disturb the patient by sitting them forward or rolling them. Some ICU beds have an integrated cassette carrier or mattress with a pocket to facilitate insertion of plates (section 11.1).

10.9 Proning patients

The use of the prone position was first advocated over two decades ago (Bryan, 1974) as a strategy for improving oxygenation in patients with acute bilateral lung injury/ disease, pneumonia and ARDS (Albarran, 1992; Broccard et al, 1997; Brussel et al, 1993; Pappert et al, 1994; Ryan and Pelosi, 1996). Despite the numerous studies demonstrating a significant improvement in oxygenation, prone positioning is still underused (Gosheron et al, 1998; Webster, 1997). This reluctance may be due to the logistical difficulties in turning critically ill patients prone (O'Connor et al, 1998), as well as the unpredictability of the prone position.

There are many different ways to place a patient in the prone position. However, each healthcare provider will have its own local protocols, which should be followed. Many staff (5-6) are required to complete a proning manoeuvre, particularly in the case of a bariatric patient. Morrell (2010) recommends approximately six nurses to gently roll the patient over, plus one anaesthetist to manage the endotracheal tube.

There is no consensus of opinion regarding the length of time a patient should be placed in the prone position. This is possibly because no one can predict how a patient will react to being turned, in terms of haemodynamic stability and maintaining an adequate gas exchange. If oxygenation improves during the pronation period, the patient can be nursed in the prone position for up to 20 hours a day (Fridrich et al, 1996). The frequency of turning will ultimately depend on the patient's response.
N.B. If a patient is returned to the supine position too early, respiratory decompensation can occur, which means that oxygenation may return to pre-pronation levels (Curley et al, 2000; Dirkes and Dickinson, 1998; Mure et al, 1997; Vollman, 1997).

Advantages of proning

- Optimise postural drainage (Gosheron et al, 1998)
- Increasing secretion removal from the airways
- Improved air entry and increased ventilation

- Pressure from the weight of the abdominal organs and cardiac structures is reduced, thereby reducing the effort of breathing (Dirkes and Dickenson, 1998).

Disadvantages of proning

- The number of nursing staff required to place the patient in the prone position. Hess et al (1992) stated that sufficient numbers of well-trained staff are required to ensure the safety of the patient during the proning procedure. This may be a problem in ICUs with staff shortages, where the actual turn may result in job-related injuries to staff (Summer et al, 1989).
- In the event of an emergency, treatment might be delayed if the patient has to be safely repositioned into the supine position before cardiopulmonary resuscitation is commenced.
- The risk of developing pressure ulcers as the patient is immobile and pressure on bony prominences is prolonged. However, for some patients, the benefits of prone positioning may outweigh the risks of developing pressure ulcers (Morrell, 2010).

Contraindications for proning

These will include;

- Spinal instability
- Increased intracranial pressure (Gatinoni et al, 2001)
- Abdominal compartment syndrome
- Shock
- Multiple trauma
- Massive resuscitation
- Pregnancy
- Abdominal surgery
- Extreme obesity (Balas, 2000).

All of these conditions should be considered relative to the risk benefit ratio of positioning a patient prone. The inherent risks of prone positioning are often offset by the need to provide adequate oxygenation.

Complications of proning

- The possibility of self-extubation
- Loss of intravenous access (Fridrich et al, 1996)
- Difficulties in monitoring patients
- Difficulties in performing cardiopulmonary resuscitation (Vollman, 1997)
- The positioning of ventilator tubing due to the unusual position of the patient
- Risk of aggravating cardiovascular instability (Thomas, 1997).
- Complications such as facial, orbital and ocular oedema are under-documented.

However, most patients can be moved safely into the prone position, with forethought and adequate planning.

Turning the patient prone
Once a decision has been made to pronate the patient, the actual turn has to be instituted. This is essentially a medical decision, even though it is a nurse-led procedure in many ICUs. It requires a team approach. Prior to commencement of the turn, it is essential to ensure that the patient's arms are positioned close to her/his side, palms facing inwards. Pillows should then be carefully placed across her/his chest, pelvis and knees (Pelosi et al 1998). Ensuring all essential lines are safely secured and directed towards the patient's head, the coordinator should be positioned at the patient's head, with two additional members of staff on either side (total five). More staff may be required depending on the individual risk assessment and local protocol when proning a bariatric patient (see above, page 8). A slide sheet is inserted under the bottom bed sheet, which must be pulled straight and taut and a second bed sheet laid across the patient, ensuring that all corners are matching. The patient's head and face are then uncovered, and the staff either side should proceed to roll the matching edges of the sheets together tightly, effectively cocooning the patient inside. Once the patient has been secured, and it is safe to proceed the patient should be slid across the bed away from the ventilator, to as near the opposite edge of the bed as is safely possible and turned prone. The slide sheet should then be removed. See Rowe (2004) for clinical guidelines for prone positioning in critically ill adults. This position was first suggested in the early 1970s (Bryan 1974) but is still controversial and is not used frequently. It can be difficult to co-ordinate the movement of an unconscious patient from the supine to prone position, and injuries to nursing staff have been reported when undertaking this manoeuvre.

Griffiths & Gallimore (2005) have also looked at proning patients. Many authors state the number of people required to be present at the procedure (Ball et al, 2001; Hess et al, 1992; Marion, 2001; Harcombe (2004) looked at nursing patients with ARDS in the prone position. Once established in the prone position, the bed should be placed in a reverse Trendelenburg's position, i.e. tilted foot down 30–45° (Gosheron et al, 1998), to reduce the severity of facial and periorbital oedema.

Once in the prone position the patients' pain/sedation status should be assessed, and where required, prescribed analgesia/sedation is accordingly administered to optimize sedation, prevent pain, minimize discomfort and avoid agitation during the turn (Canter, 1989; Jolliet et al, 1998).

10.10 Performing passive movements
Passive movements may help maintain joint range and muscle length. They should be incorporated into the care plan and be carried out as part of the re-positioning routine.

10.11 Positioning the patient upright in bed
The best backrest angle for respiration in patients has been found to be 45°, (with the bed knee break engaged to prevent the patient slipping down the bed), and the patient's feet lowered – in the reverse Trendelenburg position (Burns et al, 1994). This degree of elevation of the backrest has been shown to reduce the incidence of pneumonia in ventilated patients (Drakulovic et al, 1999).

By elevating the backrest on the bed, gravity reduces the number of bacteria entering the lungs and thus decreases the risk of aspiration. This is an important factor in patients who are being fed via nasogastric tubes, but is equally important in all ventilated patients. This has resulted in a number of authors advocating the elevation of backrests in ventilated patients to 45° (Grap et al, 2003; Helman et al, 2003; Vollman, 2004). There are, however, a number of complications associated with elevating the backrest, especially in critically ill patients. Raising the head of the bed is known to affect haemodynamic stability; as the angle of the backrest is increased, so cardiac return is reduced. This can cause a significant fall in cardiac output and thus blood pressure (Giuliano et al, 2003).

10.12 Transfers from bed to chair

Using a bed that converts to a chair is particularly useful when the patient's tolerance for sitting in a chair is limited (e.g. 10-15 minutes) due to pain, fatigue, illness or disability. Transferring a patient from bed to chair/ chair to chair/ toilet using a floor based patient lift is described in both Alexander (2005) and Nelson et al (2009[d]).

10.13 Standing a patient

See Thomas (2005) for further information.

10.14 Handling the bariatric patient in ICU/HDU

Prior assessment of the bariatric patient is vital to ensure the provision of appropriate equipment and resources. Instructions should be provided for staff on available equipment and techniques, and the importance of securing help prior to M&H the bariatric patient. (Refer to G15 – bariatric M&H – for further information).

10.14.1 Repositioning the unconscious or full care morbidly obese patient

Added strain to the bedside staff is unavoidable. WMSDs must be monitored when caring for these patients. The use of bariatric slide sheets/ Reposheets will reduce the incidence of injury.

In the unconscious or full care patient it may require 5 people to move and reposition safely. The use of bariatric slide sheets (e.g. RepoSheets) will facilitate repositioning. One caregiver is dedicated to monitoring the artificial airway. One supports the head. One is positioned on each side whilst the 5th caregiver at the foot of the bed, lifts the heels to reduce drag/ resistance. In moderate-sized departments, 5 people may be most or all of the available staff. To reduce the likelihood of staff avoiding the situation (because it is exhausting) and leaving the primary nurse without enough help to execute a move safely, it may be beneficial to inform during change of shift report that "the patient will be turned by the whole team on the even hours and that everyone will be expected to help". By rotation, one caregiver should be free to monitor the alarms of the other patients. If the department has many employees on duty at once, a predetermined rotational system will ensure compliance with turning/ inspection

and personal care. The assistance of the physiotherapist can be secured so that s/he is responsible for the airway during all moves. Because the care of the unconscious morbidly obese patient requires more time per patient, adding hours per care to the work system is warranted. An estimated additional 1.5 hours of care is required (Davidson et al, 2003).

Proning an obese patient will be based on a case by case individual risk assessment, with a minimum of 7 members of staff (see section 10.9). It must be noted that the risk of achieving a prone position may far outweigh the respiratory benefits.

10.14.2 Obtaining a standing position in the conscious morbidly obese patient

Standing and ambulation decreases pain, decreases the risks of immobility and improves recovery (Davidson et al, 2003).

The extra work load created by caring for the morbidly obese patient centres on moving and repositioning the patient safely. When encouraging a morbidly obese patient to stand for the first time equipment must be used, e.g. a tilt table with appropriate SWL, where support straps must be used. Alternatively a bed that approaches vertical may be used, with a minimum of three carers. Later, for subsequent stands a hoist with lift pants may be used.

Straining to pull the patient to a standing position manually should not be attempted. Caregivers need to be alerted to the fact that if the patient starts to slip toward the floor, it will not be possible to break the fall. Most nurses will by instinct try to brace the patient to prevent a fall, which would most likely result in employee injury.

With a bed that has a vertical tilt facility the patient can take weight on her/his feet. The provision of a walking frame will offer support, whilst the caregivers stand one on each side. The patient is encouraged to use her/his own strength to maintain the standing position.

11. Handling equipment

The products included in this and the following list, are shown to provide information on what is available in the market. Generic nomenclature has been used where possible. Where a specific product and manufacturer is included, this does not represent an endorsement by the London Group of NBE. Other manufacturers may make similar or better products. All products should be risk assessed for use within ICU and HDU, bearing in mind the patient groups.

11.1 Critical care beds

Griffiths and Gallimore (2005) focus on the technical and ergonomics features of critical care beds and support platforms, and their role in reducing manual handling risks to nurses. Nursing students and nurses new to critical care settings should regard items such as trolleys, beds and patient platform support surfaces as pieces of manual handling equipment, just as they would a hoist.

Most critical care beds have therapeutic and ergonomic features to benefit patients and staff. Bariatric and critical care beds have a higher safer working load (SWL) than those designed to be used in the ward setting as indicated in the manufacturers manuals (Griffiths, 2006). Automated profiling beds have a variable height facility and can be folded in three or four sections. These beds can help reduce the risk of manual handling injuries to nursing staff as well as enhancing the patient experience. The sophisticated nature of these beds, and their use in combination with small handling aids such as slide sheets, should enable the patient to be moved into position without much need for using a hoist. Where monitoring the patient's weight is important, some beds offer a built-in weighing facility reducing the handling involved when weighing by hoist. Critical care beds are designed for easier access during patient transfers from bed to chair. Side rails that are usually full length are half-length, and have two rails each side of the bed, at the head and foot ends. The two rails enable safer bed exit as there is less risk of the patient falling and injuring her/himself and staff.

In 1967 the term 'rotational therapy' was used by Keane, who hypothesised that frequent automatic turning of patients prevented pulmonary complications by improving mobilisation of pulmonary secretions (Sahn, 1991). Some manufacturers have designed beds specifically for the purpose of achieving rotational therapy, repositioning and management of the immobile or heavy patient. Certain beds have a lateral tilt facility to enable postural therapy to be undertaken by the physiotherapist. An additional useful ergonomics feature available with some critical care beds is the turn assist (Hill-Rom's Total Care Spo2RT Pulmonary Therapy System) This helps to reduce back strain for nurses during routine nursing procedures such as changing linen or inspection of the patient's skin.

Some also have an optional or integrated X-ray cassette carrier to the X-ray translucent backrest, thus minimising the need to handle patients when sitting them forward during chest X-ray. Some have a mattress with a pocket to slide the x-ray cassette into when required.

The patient can be elevated from a supine to a full chair position of 65^0 or in a chair egress position of 75^0. Auto-contour and auto-cardiopulmonary resuscitation (CPR) facilities enable the patient to have the backrest and knee break adjusted simultaneously during patient positioning to minimise shear forces acting on the buttocks of the patient, hence reducing the risk of pressure damage to the patient's sacrum (Collins, 1999). They also enable the nurse to put the patient back in the supine position quickly and with little effort if CPR is required.

There is evidence of the effectiveness of air-fluidised and low air-loss devices in treating wounds (Dolynchuk et al, 2000). It was noted that a reduced heat accumulation differentiated low air-loss and air-fluidised support mattresses from other types of support surfaces. Most had low moisture retention, shear reduction and pressure reduction characteristics. This combination helps to reduce the risk of microscopic blood vessels in the tissues becoming occluded, thereby maintaining oxygen and nutrient supply to the tissue cells.

Practitioners and/or managers need to consult with MHPs/ BCAs when purchasing beds and M&H equipment to reduce the risks of manual handling accidents in the critical care setting. The cost of the initial purchasing investment will be regained by savings in injury-associated costs to the employer.

11.2 Pressure relieving mattresses

These should also be high specification ones. Some mattress manufacturers provide mattresses with a pocket to slide an x-ray plate into when required. The Total Care Duo™2 (Hill-Rom) is suitable for patients with or at risk of skin damage including burns, pressure sores, plastic surgery and many other conditions.

11.3 Sliding sheets

A roller or 2 flat slide sheets (bed length) should be used per patient to facilitate moves around the bed. To reduce cross infection risk, disposable single patient use or single patient use (washable) slide sheets should be used. Extra wide slide sheets should be readily available for bariatric patients (see 11.11.1).

11.4 Mobile hoist

Disposable single patient use slings in a variety of sizes to cover all age groups found in ICU and HDU should be available for the hoist. The hoist must have the ability to have a stretcher/ flatlifter attached for hoisting a supine patient. If the stretcher/ flatlifter is fabric, there must be enough supplies for one per patient. Hoists such as a the Liko Golvo with hand rails which can be utilised when needed, and folded down when not, are useful to support standing practice. Other hoists, such as the Arjo Encore can be adapted to allow a patient to use it for walking practice. It may be necessary to disconnect patient attachments temporarily before the move.

11.5 Overhead/ gantry hoist

An overhead hoist is essential for M&H a bariatric patient. With a lifting capacity of up to 1100 lbs/ 500 kg, the freestanding system Ultra Twin Free Span meets the highest demands. The Liko Ultra Twin Free Span is a freestanding system, and since it is not fixed to the walls or the ceiling, there are no special strength requirements for those structures. The system is available in a range of different rail lengths for optimal adaptation to the size of the room. Many manufacturers provide these.

11.6 Lift pants

These can be used for standing training with an overhead hoist or with a mobile hoist with sufficient lifting height. The advantage of an overhead hoist is that the patient can move more freely within the lifting area of the hoist which, in the case of a traverse-type overhead lift, can mean practically the entire room.

11.7 Walking harness

This is a versatile lifting aid and an excellent help for toilet visits, standing training, gait practice and mobility training. It fits around the upper body and partly under the arms, a lifting principle that presupposes a certain degree of body stability, since the patient supports some of her/his body weight via the legs and feet.

11.8 Inflatable bed/ patient length cushion for supine lateral transfers
A transfer device is essential despite the cost, particularly for bariatric patients. The HoverMatt or Air Pal is a thin air mattress which is hooked to an air compressor (noisy, yet efficient) after being placed under the patient. When the compressor is turned on, the patient is levitated on a cushion of air in a supine position. The patient can easily be repositioned on the bed, even if unconscious, with minimal effort. The transfer device may also be used to move patients from the bed to an alternative flat surface.

11.9 Transfer/ sliding board
A large rigid board that will bridge the gap between two surfaces, allowing a patient to be safely transferred. Sliding sheets should be used in conjunction with this. (See MIC global UK, for pat slide user guide).

11.10 Tilt table
During a period of sustained immobilization this can be used to apply gravitational pull and reduce postural hypotension. The patient will be strapped to a tilt table lying flat and then tilted fully or almost fully upright (as if in standing). This is useful to acclimatize the patient to standing prior to walking.

11.11 Bariatric equipment for the heavier patient in ICU/HDU
(See also to G15 – bariatric M&H).
When preparing for the admission of a bariatric patient in the ICU/HDU environment the following modifications and equipment may be required:
- Bariatric commodes
- Bariatric wheelchairs
- Bariatric gowns
- Large and extra-large blood pressure cuffs
- Beds that accommodate morbidly obese in girth as well as weight
- Bedside chairs
- Floor mounted toilets
- Obesity tested patient transfer device

Contact the MHP/ BCA/ M&H co-ordinator for advice on the vast array of obesity related equipment available.

11.11.1 Repositioning sheet
This is used for turning, or repositioning a bariatric patient higher up in bed. The RepoSheet (manufactured by Liko) is placed under the patient and can function like an ordinary sheet during the entire care period. Currently two sizes are available, Regular, lifting up to 200 kg/ 440 lbs, and Ultra, lifting up to 500 kg/ 1,100 lbs. These RepoSheets work best in combination with an overhead hoist. With minimal effort, caregivers are then able to reposition and turn the patient easily.

12. Other equipment and furniture which are useful in critical care environments

ICU

12.1 Specialist tilt in space chairs

e.g. The Bartrams I-660 Rehabilitation chair. This has a weight capacity of 300 kg (47 stone, 660 lbs). It performs the functions of stretcher and mobile chair, with custom seating tilt-in-space and Trendelenburg position capability.

12.2 Adjustable height saddle stools
For use by staff during various procedures e.g. allows healthcare staff to be comfortably seated during epidurals. The spine's curvature is crucial in influencing how much stress it suffers when seated. When seated on a saddle seat, the pelvis is properly positioned and stabilised, so the least stressful position for the muscles, ligaments and joints is naturally assumed and the spine retains its stress-free posture.

Because these stools are wheeled, staff are able to position themselves optimally in relation to the patient and the procedure.

12.3 Electric bed movers
Pushing a heavy profiling bed with a patient, oxygen and emergency monitoring and resuscitation equipment can be a very strenuous task. The application of an electric bed mover will enable the task of transporting a critically ill patient/ bariatric patient easier and safer to achieve. (See section 16 – transport).

HDU
12.4 Specialist height adjustable seating
Seating in this area should also have height adjustable drop down arms. Housekeeping wheels are advisable for ease of moving empty chairs.

12.5 Beds
These will be of a lower specification than ICU but higher than in a general ward.

12.6 Other suitable equipment
Sufficient supplies must also be provided, such as trolleys, couches, wheelchairs, commodes, walking aids, arm chairs and specialist seating.

13. Risk rating

To carry out a 'suitable and sufficient' assessment, each task should be evaluated as part of the assessment process, so that the level of risk is quantified. Such assessments should be used, wherever possible, in the design of a safe system of work, and in highlighting any residual risks.

Various systems exist, but it is suggested that the NHS risk management 5x5 matrix, with 0-25 scale, is used for an overall evaluation of risk (NPSA, 2008) (see CD1, appendix 9 in folder 5). It is in common use, simple to use with 5 levels of risk, determined by a calculation of the likelihood or probability of an adverse event occurring multiplied by the severity of consequences or impact should it occur.

Likelihood/Probability (0-5) x Severity of Consequences or Impact (0-5) = 0-25

The values below are based on this system. Calculations lead to the following possible scores or ratings: -

1 – 6 = Low; 8 – 12 = Medium; 15 – 16 = High; 20 = Very High; 25 = Extreme

These ratings can then be used to alert staff, to prioritise action and justify any necessary expenditure to make the situation safer, on the basis of reasonable practicability. Options can be evaluated by considering risks, costs, and actions planned or taken, to reduce the level of risk to the lowest level that is reasonably practicable, which can thus be demonstrated.

Such assessments should be used, wherever possible, in the design of a safe system of work, and in highlighting any residual risks (Brooks and Orchard, 2011). ICU handling is inherently more risky than some other patient handling, due to patients being ventilated and either unconscious and a 'dead weight', or, if conscious, possibly in pain, anxious and possibly uncooperative.

In ICU the postural risks are likely to be significant. For assessing postural risks and those associated with tasks other tools are available, such as RULA (Hignett S & McAtamney L, 2006), REBA (Hignett S & McAtamney L, 2000) and OWAS (Karhu et al, 1977). These not only look at postures but forces.

14. Alerting the M&H team

This will vary according to the unit and the involvement and expertise of any M&H Link Worker (LW). In ICU, the LW would be an expert practitioner with a MH role who would also carry out any local and refresher training. There will be an expectation that the LW would have undertaken a 'train the trainers' M&H course to gain the relevant knowledge and skills required for this role.

Sometimes the M&H team will need to be summoned to help with a particular situation. With proper prior planning however (link workers, standard operating procedures (SOPs), equipment and training, etc.) it should be possible for areas to deal with their own problems. Reports of incidents and unusual circumstances should be passed routinely to the M&H team for monitoring purposes and to gain their advice for the prevention of a similar recurrence.

Any high risk situation such as a bariatric patient, spinal injury patient, anyone needing proning or using the tilt table are occasions when the LW may want to call in the M&H team. In the unconscious or full care patient it may require 5 or 6 people to move and reposition the patient safely.

The M&H team may be called in to HDU for further advice in 'sit to stand' situations, or for walking practice using a hoist with a vest sling.

15. Referral to and involvement of other specialists

Involving relevant teams at the appropriate time will minimise the chances of harm occurring in a specific situation, and will promote the provision of suitable measures for future occurrences. M&H in these specialist, unusual or emergency situations will sometimes require the input of such advisors as: - tissue viability nurse, infection control nurse, occupational therapist,

physiotherapist, speech and language therapist (SLT), dietician, pharmacist, occupational health nurse and the prevention and management of violence and aggression lead.

In the case of a patient with a spinal injury it will also be necessary to contact an external specialist from the nearest spinal injuries unit for advice.

The referral to the SLT is particularly important, as communication with patients who are in ICU is vital, particularly if they are unable to speak. The use of cards may be used for this purpose.

The involvement of the fire officer is important, as it is extremely difficult to evacuate patients on ventilators. The ICU must have a policy to cover the actions required in the event of fire.

Security, general H&S, estates, facilities may also need to be involved.

16. Transport (internal and external)

ICU will have its own transportation policy stating the number of staff required, whether an anaesthetist is required, and what equipment (such as oxygen, mask, resuscitation box/ bag) needs to go with the patient (Intensive Care Society 2002; Warren et al 2004). The policy will also state which way the patient needs to travel in order for the nurse/ anaesthetist to monitor the patient's face. HDU will have its own transportation policy.

<u>Transport of the critically ill bariatric patient</u>
A risk assessment must take into account any sloping pathways within and outside the building that may be encountered.

Floor weight limits may need to be checked.

Prior to sending a morbidly obese patient to another department for test, procedure, or surgery the space required for the procedure and the weight limit of the operating table should be evaluated. It is helpful if the weight limits for each table and the space required for each procedure are posted in the critical care department so that patient selection may be screened prior to expending the energy and risk of transporting the patient out of the ICU. Common tests needed when complications occur are computerized tomography(CT), nuclear medicine red blood cell scan (to look for a source of bleeding), white blood cell scan (to identify the source of an infection), or rarely, angiography.

Transport within the department, clinic, hospital, etc, must be catered for, with variable height trolleys or, more likely, the patient is transported on her/his profiling bed. Transport to other units may require specialist vehicles i.e. Special Care Baby Unit/ bariatric/ ambulances and these too should be suitable i.e. additional space and specialist handling equipment. (See also G15 – bariatric M&H).

17. Discharge and transfer planning

Before a patient is discharged from intensive care, s/he should have another health check (called a short clinical assessment) to identify:
• any physical or psychological problems
• the likelihood of any problems developing in the future
• their current rehabilitation needs.
If the health check shows that the patient could benefit from more structured support, s/he should be given a more detailed health check (called a comprehensive clinical assessment) to identify their rehabilitation needs (NICE 2009).

The decision to discharge a patient from ICU will depend partly on the level of care available in the unit or ward to which the patient is to be discharged. The availability of step-down care within the hospital has an important influence on the decision to discharge from critical care (Cronin et al, 2010).

Patients discharged from ICU are either transferred to HDU, another ward or another hospital. Careful planning is required, with the ward bed being taken to ICU. The ward bed must be a profiling bed with a high specification pressure relieving mattress. As mentioned above (Section 16), there is a protocol to be followed when transferring a patient out of ICU. This is particularly important where the patient is being transferred to a specialist unit elsewhere, e.g. a child from a District General Hospital ICU to a specialist paediatric hospital. It is essential that all such movements of patients from one care organisation to another are planned. This is particularly important when there are clinical complexities or complications, H&S issues and where patients are bariatric.

18. References

Health & Safety at Work etc Act (1974) Reprinted 1994 London: TSO; Ch 37 Sec 2(1) & (2(2)(a),(b),(c),(d),(e), 7

Albarran (1992) *The prone Position: An alternative to improving Arterial Oxygenation. A Critical Review of the published Literature*. Unpublished BSc(Hons) Dissertation. Bristol, University of the West of England

Alexander P (2005) *Sitting to sitting transfers* IN Smith J (ed) The Guide to the Handling of People (2005) 5th Edition Teddington: National Back Pain Association pp159-187

American Nurses Association (2006) *Ergonomics: Handle with Care*. New York: ANA

Arthur T (1994) *Determining nurses' staffing levels: a critical review of the literature* Journal of Advanced Nursing. 19, pp558-565

Balas M (2000) *Prone positioning of patients with acute respiratory distress syndrome: applying research to practice* Critical Care Nurse. 20,11 pp24-36

Ball C, Adams J, Boyce S, & Robinson P *(*2001). *Clinical guidelines for the use of the prone position in acute respiratory distress syndrome* Intensive and Critical Care Nursing. 17,2, pp94-104.

Beare PG and Myers JL (eds) (1998) *Adult Health Nursing*. Third edition St Louis MO: Mosby

Benner P (1984) *From novice to expert. Excellence and power in clinical nursing practice* Boston: Addison-Wesley pp 13-34 as cited in Ruszala S, Hall J and Alexander P (2010) in Standards in Manual Handling Towcester: NBE

Braggins S (2000) *Back Care A Clinical Approach* London: Churchill Livingstone p195

British Association of Critical Care Nurses (BACCN) (2010) *Standards for Nurse Staffing in Critical Care*

British Medical Association (1967) *Report on the Working Party on Intensive Care* London: BMA Planning Unit

Broccard AF, Shapiro RS, Schmitz LL (1997) *Influence of prone position on the extent and distribution of lung injury in a high tidal volume oleic acid model of acute respiratory distress syndrome* Critical Care Medicine. 25, 1, pp16-27

Brooks A & Orchard S (2011) *Core person handling skills* in Smith J (ed) The Guide to the Handling of People a systems approach 6th ed Teddington: BackCare Ch 10

Brussel T, Hachenberg T, Roos N (1993) *Mechanical ventilation in the prone position for acute respiratory failure after cardiac surgery* Journal of Cardiothoracic Vascular Surgery. 7, 5, pp541-546

Bryan A (1974) *Comments of a devil's advocate* American Review of Respiratory Disease. 110, 6 Pt 2, Suppl, pp143-144

Bugaresti JM, Tator CH, Szalai JP(1991) *Effect of continuous versus intermittent turning on nursing and non-nursing time for acute spinal cord injuries* Paraplegia 29: pp220-342

Burns SM, Egloff MB, Ryan B, Carpenter R, Burns JE (1994) *Effect of body position on spontaneous respiratory rate and tidal volume in patients with obesity, abdominal distension and ascites* American Journal of Critical Care 3, 2, pp102-106

Canter C (1989) *Nursing mechanically ventilated patients in the prone position* Care of the Critically Ill; 3: 3

Campbell T, Taylor S, Callaghan S (1997) *Case mix as a predictor of nursing workload* Journal of Nursing Management 5, 4, pp237-240

Collins F (1999) *Preventing pressure sores in the seated patient* Nursing Standard 13, 42, pp50-54

Cronin E, Nielsen M, Spollen M and Edwards N (2010) 1. *Adult critical care* HCNA Series 3

Curley MAQ, Thompson JE, Arnold JH *(*2000) *The effects of early and repeated prone positioning in paediatric patients with acute lung injury* Chest. 118, 1, pp156-163

Davidson J, Kruse M, Cox D, Duncan R (2003) *Critical Care of the Morbidly Obese* Critical Care Nursing Quarterly Vol. 26, No. 2, pp105–116

Department of Health (1996) *Guidelines on Admission to and Discharge from Intensive and High Dependency Units* London: HSMO

Department of Health (2000) *Comprehensive critical care: a review of adult critical care services* London: DH

Dickie H, Vedio A, Dundas R (1998) *Relationship between TISS and ICU cost* Intensive Care Medicine 27, 10, pp1009-1017

Dirkes SM, Dickinson SP (1998) *Common questions about prone positioning for ARDS* American Journal of Nursing 98, 6, 16JJ, 16NN, 16PP

Dolynchuk K, Keast D, Campbell K *et al* (2000) *Best practices for the prevention and treatment of pressure ulcers* Ostomy/Wound Management 46, 11, pp38-52

Drakulovic MB, Torres A,Bauer TT, Nicolas JM, Nogue S, Ferrer M (1999) *Supine body position as a risk factor for nosocomial pneumonia in mechanically ventilated patients: a randomised trial* Lancet p354, 9193, pp1851-1858

Fridrich P, Krafft P,Hochleuthner H, Mauritz W (1996) *The effects of long-term prone positioning in patients with trauma-induced adult respiratory distress syndrome* Anaesthesia and Analgesia 83, 6, pp1206-1211

Gattinoni L, Togoni G, Pesenti A et al (2001) *Effect of prone positioning on the survival of patients with acute respiratory failure* New England Journal of Medicine 345, 8, pp568-573

Giuliano KK, Scott SS, Brown V, Olson M (2003) *Backrest angle and cardiac output measurement in critically ill patients* Nursing Research 52, 4, pp242-248

Gosheron M, Leaver G, Forster A, Harmsworth A (1998) *Prone lying: a nursing perspective* Care of the Critically Ill 14, 3, pp89-92

Grap MJ, Munro CL, Bryant S, Ashtiani B (2003) *Predictors of backrest elevation in critical care* Intensive and Critical Care Nursing 19, 2, pp68-74

Griffiths, H (2006) *Manual handling risk management: critical care beds and support systems* Nursing Standard, Apr 2006, vol.20 /is. 32 (45-53)

Griffiths H, Gallimore, D. (2005) *Positioning critically ill patients in hospital* Nursing Standard 19, 42, pp56-64

Hagisawa S, Ferguson-Pell M. (2008) *Evidence supporting the use of two-hourly turning for pressure ulcer prevention* J Tissue Viability; 17(3):pp76-81

Hall J (2005[a]) *Lying to lying associated manoeuvres* IN Smith J (ed) The Guide to the Handling of People (2005) 5th Edition Teddington: National Back Pain Association pp230-237

Hall J (2005[b]) *Lying to lying associated manoeuvres* IN Smith J (ed) The Guide to the Handling of People (2005) 5th Edition Teddington: National Back Pain Association pp225-227

Hall J (2005[c]) *Lying to lying associated manoeuvres* IN Smith J (ed) The Guide to the Handling of People (2005) 5th Edition Teddington: National Back Pain Association pp225-227

Hamlin SK, Hanneman SK, Wachtel S, Gusick G (2008) *Adverse hemodynamic effects of lateral rotation during mechanical ventilation* Dimens Crit Care Nurs. 27(2):54-61

Harcombe CJ (2004) *Nursing patients with ARDS in the prone position* Nursing Standard 18, 19, pp33-39.

Helman DL, Sherner JH, Fitzpatrick TM, Callender ME, Shorr AF (2003) *Effect of standardized orders and provider education on head-of-bed positioning in mechanically ventilated patients* Critical Care Medicine 31, 9, pp2285-2290

Hess D, Agarwal NN, Myers CL (1992) *Positioning, lung function and kinetic bed therapy* Respiratory Care 37, 2, pp181-197

Hignett S. and McAtamney L. (2000) *Rapid Entire Body Assessment (REBA)* Applied Ergonomics 31:201-205

Hignett S & McAtamney L (2006) *REBA and RULA Whole body and Upper Limb rapid assessment tools* in Karwowski W & Marras WS (Eds) the Occupational Ergonomics Handbook (2nd ed) Boca Raton FI CRC Press 42-1-42-12

HSC (1998) *L113 Safe use of lifting equipment Lifting Operations and Lifting Equipment Regulations 1998 ACOP and guidance* Sudbury: HSE Books

HSC (1998) *L22 Safe use of work equipment Provision and Use of Work Equipment Regulations 1998 ACOP and guidance* Sudbury: HSE Books

HSE (2000) *L21 Management of health and safety at work Management of Health and Safety at Work Regulations 1999 and ACOP* Sudbury: HSE Books Reg 5

HSE (2004) *L23 Manual handling Manual Handling Operations Regulations 1992 (as amended) and Guidance on regulations* Sudbury: HSE Books amended http://www.hse.gov.uk/foi/internalops/fod/oc/300-399/313_5.pdf

Intensive Care Society (ICS) (1997) *Standards for Intensive Care Units* London: Intensive Care Society

ICS (2002) *Guidelines for the transport of the critically ill adult* 2nd ed London: Intensive Care Society
http://www.ics.ac.uk/downloads/icstransport2002mem.pdf

Irion C (2002) *Comprehensive Wound Management* Thorofare, NJ: Slack Inc p104-5

Johnson KL, Meyenberg T (2009) *Physiological rational and current evidence for therapeutic positioning of critically ill patients* AACN Adv Crit Care 20(3): pp228-260

Jolliet P, Bulpe P, Chevrolet J. (1998) *Effects of the prone position on gas exchange and haemodynamics in severe acute respiratory distress syndrome* Critical Care Medicine; 26: pp1977–1985

Karhu O, Kansi P, Kuorinka I (1977) *Ovako Working-posture Analysis System* in Applied Ergonomics Vol 8 Issue 4 p199-201

Keane FX (1967) *Roto-rest* BMJ. 3: pp731-733

Large WP, Nattrass M, Simpson M (1991) *Working towards dependency scoring in critical care* Intensive Care Nurse 7, 4, pp214-218

Leader D (2010) *Postural Drainage Positions Used for Postural Drainage* www.copd.about.com/od/copdtreatment/ig/Postural-Drainage-Positions retrieved 03.05.12

Mackinnon E, Clarke T, England K, Burr G, Fowler S, Fairservice L (1998) *Intensive Care Nursing Staffing Review* Sydney, Australia: Central Sydney Area Health Service

Marion B (2001) *A turn for the better: prone positioning of patients with ARDS* American Journal of Nursing 101, 5, pp26-34

Morrell N (2010) *Prone positioning in patients with acute respiratory distress syndrome* Nursing Standard 24, 21, pp42-45

Mure M, Martling C-R, Lindahl SGE (1997) *Dramatic effect on oxygenation in patients treated with severe acute lung insufficiency treated in the prone position* Critical Care Medicine vol 25, issue 9, pp1539-1544

Nelson AL, Motacki K, Nivison Menzel N, (2009[a]) *The Illustrated Guide to Safe Patient Handling and Movement* New York: Springer Publishing Company pp12-14

Nelson AL, Motacki K, Nivison Menzel N, (2009[b]) *The Illustrated Guide to Safe Patient Handling and Movement* New York: Springer Publishing Company pp 22-23

Nelson AL, Motacki K, Nivison Menzel N, (2009[c]) *The Illustrated Guide to Safe Patient Handling and Movement* New York: Springer Publishing Company pp23-25

Nelson AL, Motacki K, Nivison Menzel N, (2009[d]) *The Illustrated Guide to Safe Patient Handling and Movement* New York: Springer Publishing Company pp14-15

NICE (2009) *CG83 rehabilitation after critical illness* http://www.nice.org.uk/nicemedia/live/12137/43527/43527.pdf retrieved 15.06.12

NPSA (2008) National Patient Safety Agency *A Risk Matrix for Risk Managers* www.npsa.nhs.uk Retrieved 18.02.13

Nursing and Midwifery Council (2002) *Code of Professional Conduct* London: NMC.

O'Connor M, Hall JB, Schmidt GA (1998) *Acute hypoxemic respiratory failure* In Hall J et al (Eds) Principles of Critical Care Second edition New York NY, McGraw-Hill

Olséni l, Midgren B, Hörnblad Y, Wollmer P (1994) *Chest physiotherapy in chronic obstructive pulmonary disease: Forced expiratory technique combined with either postural drainage or positive expiratory breathing* Respiratory Medicine Vol 88, Issue 6, July 1994, pp 435-440 www.sciencedirect.com retrieved 03.05.12

Pappert D, Rossaint R, Slama K, Gruning T, FAlke KJ (1994) *Influence of positioning on ventilation-perfusion relationships in severe adult respiratory distress syndrome* Chest 106, 5, pp1511-1516

Pelosi P, Tubiolo D, Masheroni D, Vicardi P, Crotti S, Alenza F, Gattinori L (1998) *Effects of the prone position on respiratory mechanics and gas exchange during acute lung injury* American Journal of Respiratory Critical Care Medicine 157: pp387–393

Pilcher T and Odell M (2000) *Position statement on nurse-patient ratios in critical care* Nursing Standard 15 (12), pp38-41

Retsas A, Pinikahana J (1999) *Manual handling practices and injuries among ICU nurses* Australian Journal of Advanced Nursing Sep-Nov; 17(1): pp7-42

RCN (Royal College of Nursing) (1995) *Dependency Scoring Systems: Guidelines for Nurses* London: RCN

Rowe C (2004) *Development of clinical guidelines for prone positioning in critically ill adults* Nursing in Critical Care 9, 2, pp50-57

Ryan DW and Pelosi P (1996) *The prone position in acute respiratory distress syndrome* British Medical Journal 1996: 312: 7035 pp860-861

Sahn SA (1991) *Continuous lateral rotational therapy and nosocomial pneumonia* Chest 99, 5, pp1263-1267

Smith J (ed) (2005) *The Guide to the Handling of People* 5th Edition Teddington: National Back Pain Association pp 297-300

Summer WR, Curry P, Haponik EF, Nelson S, Elston R (1989) Continuous mechanical turning of intensive care unit patients shortens length of stay in some diagnostic related groups *Journal of Critical Care* Vol 4 Issue 1 pp45-53

Thomas C (1997) Use of the prone position: the ventilator/perfusion relationship in ARDS *Care of the Critically Ill* 13, 3, pp96-100

Thomas PJ, Paratz JD (2007) *Is there evidence to support the use of lateral positioning in intensive care? A systematic review* Anaesth Int Care 35(2): pp239-255

Thomas S (2005) IN Smith J (ed) The Guide to the Handling of People (2005) 5th Edition Teddington: National Back Pain Association pp 123-139

Vollman KM (1997) *Prone positioning for the ARDS patient* Dimensions of Critical Care Nursing 16**:** pp184–193

Vollman KM (2004) *The right position at the right time: mobility makes a difference* Intensive and Critical Care Nursing 20, 4, pp179-182

Warren J, Fromm RE, Orr RA, Rotello RC, Horst HM (2004) *Guidelines for the inter- and intrahospital transport of critically ill patients* Critical Care Medicine vol 32, no 1

Waters, T.R., Nelson. A, and Proctor.C. (2007) *Patient Handling Tasks with High Risk for Musculoskeletal Disorders in Critical Care* Critical Care Nursing Clinics of North America Volume 19, Issue 2, pp 131-143

Webster NR (1997) *Ventilation in the prone position* Lancet 349, 9066, pp1638-1639

Winkelman C and Chiang LC (2010) *Manual turns in patients receiving mechanical ventilation* Critical Care Nurse 30(4): pp36-44

Further Reading

Collins T (1999) *Fractured neck of femur* Nursing Standard 13, 23, pp53-57

Essat Z (2005) *Prone positioning in patients with acute respiratory distress syndrome* Nursing Standard. 20, 9, pp52-55

Useful web sites

Applying anti-embolism stockings	Easy-Slide-Caran Patient specific dressing pack	www.arjohuntleigh.com www.hospitaldirectinternational.com
Beds	HillRom Spo2RT Totalcare Duo™2	www.hill-rom.co.uk
Bed movers	Electric	www.electrictuggers.com www.mastermover.com www.staminahandling.com www.ums.net.au
Hoists	Liko Golvo Ultra twin free span Arjo Encore	www.liko.com www.arjohuntleigh.com
Lateral transfer system	Air Pal HoverMatt	www.airpal.com www.ferno.com
Sliding board	Patslide user guide	www.micglobal.co.uk
Seating	Bartrams I-660 rehabilitation chair	www.bartrams.net
Sheets	RepoSheet original & ultra	www.hill-rom.co.uk
X-ray cassette insertion	X-ray plate insertion system	www.hospitaldirectinternational.com

Summary/ Key Messages

- **The intention of the entire strategy and standards document is to contribute to the improvement of: -**
  - The quality of care - 'patient experience' (dignity, privacy and choice)
    - clinical outcomes
  - Patient/ person safety
  - Staff health, safety and wellbeing
  - Organisational performance – cost effectiveness and reputation, etc.

- **The standard for G4 is:**

Systems are in place to cover all reasonably foreseeable handling situations in ICU and HDU

- **Skilful M&H is key**

- **Special points for G4 are: -**
  - **Risk of injury to patient and staff on ITU/ HDU is minimised by ensuring that:**
    - **a thorough assessment is carried out prior to movement**
    - **correct techniques and equipment are used**
    - **local supervision is provided**
  - **Sufficient numbers of competent, healthy staff**
  - **A spacious environment is particularly important for good care**