The revival of the use of the prone position as a treatment for acute respiratory distress syndrome (ARDS) has been well documented in the medical literature, but there is little information regarding the difficulties of nursing patients in this position. The purpose of this study was to increase the body of knowledge by exploring the experiences of nurses who had cared for a patient in the prone position. A questionnaire was sent to all registered nurses in four large intensive care units (ICUs) to determine the main areas of concern when nursing patients in the prone position. There was a 62% response rate. Following this, a sample of 12 nurses volunteered to participate in three focus group interviews to further explore the issues. The main difficulties experienced related to the manoeuvre, including the timing of the move, the number of personnel and the co-ordination required. Problems experienced in providing nursing care related to pressure areas, suctioning, accidental injuries and management of emergencies. Deficits in knowledge of ARDS and skills in handling communication with relatives were also identified. As a result of this exploration, guidelines have been developed, focusing mainly on the manoeuvre, organizational and nursing issues, to provide guidance in caring for a patient when being nursed in the prone position.

Introduction

The term acute respiratory distress syndrome (ARDS) was first used in 1967 by Asbaugh et al. to describe the severe form of respiratory failure occurring in association with a variety of predisposing insults. ARDS is characterized by non-cardiogenic pulmonary oedema, hypoxia and rapidly developing patchy infiltrates on chest X-ray. Due to a poorly standardized definition, the incidence of ARDS has been difficult to establish, but it accounts for approximately 10% of intensive care (ICU) admissions (Beale et al. 1993). Predisposing insults that lead to the development of ARDS include pneumonia, pancreatitis, fat embolism and sepsis. Outcome from the disease is influenced by the predisposing insult along with clinical factors such as age and number of organ failures. Sepsis induced ARDS has the highest mortality between 80 and 90% (Knaus 1996). Since the late 1960s, the treatment of ARDS has been a major focus in ICU research. A deeper understanding of the pathophysiology of the disease has contributed to combining different treatment approaches. Treatment for ARDS is directed primarily at the underlying cause, combined with supportive treatment based on mechanical ventilation. Other treatments have included...
pharmacological treatments such as nitric oxide, prostacyclin, artificial surfactant and anti-inflammatory agents and, more recently, the use of the prone position.

Mechanical ventilation in the prone position was first practised by Phiel and Brown (1976) and Douglas et al. (1977), who found this to be associated with increases in arterial oxygen saturation. Having achieved encouraging rises in oxygenation, this approach fell into relative disuse, probably because of practical problems associated with the manoeuvre. There was little documented research on this approach until the prone position re-emerged in the 1990s. At present, improved oxygenation in the prone position is thought to be due to improved matching of ventilation and perfusion (Pelosi et al. 1998).

There is an abundance of medical literature focusing on the pathophysiology of ARDS and the proposed mechanisms and rationale for the use of the prone position (Douglas et al. 1977; Pappert et al. 1994; Chatte et al. 1997; Mure et al. 1997; Pelosi et al. 1998). Conversely, the problems expressed by nurses when turning and caring for a patient in the prone position are undocumented. The relatively low incidence of ARDS means that the use of the prone position is unlikely to be an everyday occurrence. Once in position, the duration of time the patient spends in the prone position varies from four hours to 20 hours (Fridrich et al. 1996). The length of time depends on how quickly or slowly the patient responds to the treatment or whether s/he becomes prone-dependent (Jolliet et al. 1997; Marik & Iglesias 1997).

The requirement for a special bed surface on which to nurse the patient is not always mentioned in the literature but, when broached, is often associated with problems such as cost and training requirements. Mure et al. (1997) recommend foam rubber pads to support the patient under the thorax and pelvis, with the head face down supported under the chin and forehead. Vollman (1997) states that the longer the duration spent in one position, the greater the need for a support surface that provides better pressure reduction than a standard hospital mattress.

Maintaining the patient’s body alignment is important to overcome nerve damage and contractures. The need for stringent limb positioning is highlighted by Fridrich et al. (1996) who reported contractures of the hip and shoulder joints in two patients. Chatte et al. (1997) suggested positioning the arms along each side of the body and turning the head from side to side every two hours. Ball et al. (2001) recently published a more detailed description of options for modifying the position.

**Literature review**

A variety of manoeuvres and techniques are used to turn the patient into the prone position, including mechanical aids and manual turning. Phiel and Brown (1976) used a circo-electric bed to mechanically turn their patients, while Vollman and Bander (1996) described an item of equipment called the ‘Vollman Prone Positioner’, which was designed to facilitate turning the patient into the prone position. Given the relatively low incidence of ARDS, however, the cost is difficult to justify. Using manual turning techniques, there is no agreement on the number of personnel to perform the manoeuvre safely. Vollman (1997) stated that five people are needed to perform the turn, one to support the head and ventilator tubing and two on each side of the patient to roll him/her over. In contrast, Fridrich et al. (1996) reported that only three people are required: one to care for the head, tubing and intravenous lines and one on each side of the patient. There is no indication of who should co-ordinate the manoeuvre, although traditionally a physician takes care of the head and airway. Once in position, the duration of time the patient spends in the prone position varies from four hours to 20 hours (Fridrich et al. 1996). The length of time depends on how quickly or slowly the patient responds to the treatment or whether s/he becomes prone-dependent (Jolliet et al. 1997; Marik & Iglesias 1997).

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Nursing the ARDS patient in the prone position

Nasal intubation is associated with a higher risk of nasal ulceration when used in conjunction with the prone position (Ryan & Pelosi 1996). Bruising around the mouth has been identified and associated with pressure from the endotracheal tube (Chatte et al. 1997). Most frequently reported are the excessive tracheo-bronchial drainage and salivation which occur when the patient is in the prone position (Pappert et al. 1994). Peri-orbital and facial oedema has been documented in those patients nursed in the prone position. This complication became worse over time and resolved slowly once in the supine position (Fridrich et al. 1996). Lack of access to the face has led to difficulties in administering mouth care and eye care (Richardson 1997). Pupil reactions are also difficult to assess and some patients may develop corneal abrasions (Gosheron et al. 1998). Mure et al. (1997) highlight the potential problem of developing blindness due to increased pressure on the eyes. Pressure damage and alterations in breast and penis tissue have also been documented (Mure et al. 1997). When a patient is in the prone position, there is a risk of regurgitation of enteral feed, necessitating delivery of a reduced volume or colouring the feed to enable early detection of regurgitation (Gosheron et al. 1998) and ultimately an increase in reliance on parenteral nutrition.

Despite the increasing use of the prone position, there is a lack of nursing research which explores how experienced nurses care for patients nursed in this position. The purpose of this study, therefore, was to elicit the experiences of registered nurses when caring for a patient in the prone position with the aim of developing guidelines to support safe and competent practice. The research objectives were:

- to describe the problems encountered when nursing patients in the prone position;
- to discuss strategies that nurses use to minimize these problems;
- to identify effective techniques for turning patients into the prone position.

Methods

Because this phenomenon has been relatively unexplored, an exploratory study using focus group interviews was considered the best approach to addressing the research objectives. A letter was sent to the managers of six ICUs in six hospitals in Northern Ireland explaining the study, inviting their participation and requesting permission to distribute the questionnaires to nursing staff. Four units replied and agreed to participate. The identification of the sample and the topics for discussion at the interviews were elicited by distributing a questionnaire and an accompanying letter with details of the study to all registered nurses in the four units. The questionnaire was divided into two parts. Part one collected demographic information and required nurses to identify whether they had nursed patients in the prone position. The nurses who had cared for patients in the prone position were then asked to complete part two of the questionnaire, which consisted of six open-ended questions addressing the technique of turning the patient into the prone position, problems encountered and perceived advantages. At the end of the questionnaire, nurses were asked to indicate in writing if they were willing to participate in audiotaped focus group interviews.

Data analysis/results

Data from part one of the questionnaire were coded and analysed on SPSS for Windows, Version 8 using descriptive statistics to describe the sample. Data from part two of the questionnaire and focus group interviews were content analysed and were refined into themes and categories as described by Burnard (1991). One hundred and ninety-three questionnaires were distributed to all qualified nursing staff in four general ICUs and a 62% (n = 121) response rate was achieved.

Findings from part one of the questionnaire contain information on nursing experience, professional/academic qualifications and job characteristics of the sample. There was a wide range of general nursing experience within the 121 respondents. Twelve nurses (9.9%) were qualified less than one year, whereas 48.8% of the sample (n = 59) were qualified more than 10 years (see Fig. 1). In terms of ICU experience, 19% (n = 23) had less than one year’s experience, and 34%...
(n = 41) had over 10 years experience (see Fig. 2).

The majority of the respondents were registered nurses (n = 117) and 24% (n = 29) had a post-registration qualification in ICU nursing. Other post-registration qualifications held by the sample included RSCN, RM, RMN, coronary care course and cardio-thoracic course. In relation to additional academic qualifications, 16% held a Bachelor’s degree and 5% held a Master’s degree at the time of the study. Sixty-four per cent (n = 77) of nurses were working full-time and the remaining 36% part-time. The distribution of nursing grades were, 42% D, 44% E, 11% F and 3% G (see Table 1).

From the 121 replies, 53.7% (n = 65) had nursed a patient in the prone position and thus completed part two of the questionnaire. The six questions and the findings from part two were used to probe the topic further with the focus groups. Twenty-two participants gave written consent to participate in the focus group interviews but only 12 nurses were available at the time of the three pre-arranged meetings. The findings from part two of the questionnaire and the focus group interviews are presented and discussed together.

### Question 1: Who initiated the idea of proning?

The questionnaire responses indicated that the idea of using the prone position was mainly initiated by the ICU medical staff (88%, n = 57). The reasons given for this in the focus group were: (i) that it was seen as a medical treatment; and (ii) that there was a lack of experience and understanding of the rationale by nurses. The reasons why nurses did not take a more active part in initiating the idea were discussed in the focus group.

Nurses need more experience and training in why to do it, what cases and what is the benefit for the patient. You’re with your patient all the time and can see if they’re deteriorating and can suggest this as you’re there every day.

Medical staff initiate the idea because it is a medical treatment they are prescribing, but the nurses might have discussed it with them first.

### Question 2: Describe how you turn the patient into the prone position

Three distinct aspects of this manoeuvre were evident from the questionnaire responses. These aspects, control and manpower, the technique of turning and the final position, were probed further at the focus group interviews.
Nursing the ARDS patient in the prone position

Control and manpower
Nurses stressed that a nominated leader was necessary to plan and co-ordinate the turn.

It’s got to be terribly well co-ordinated, usually but not always, the consultant looks after the head.

The key issue for an effective manoeuvre was that of preparation and it was essential that one-person co-ordinated the turn. In the focus groups, nurses felt the turn was managed better by a co-ordinator who was not involved in the physical process of turning. In practice, this was not always possible and the doctor usually managed the head and tubes and the role of co-ordinator. Those nurses who had been part of a well-planned manoeuvre had not experienced any problems with turning the patient. The technique of turning was identified as a specific problem. It is difficult for staff to maintain competence with this technique, as its use is infrequent, although training could be incorporated into existing ‘in-service’ education such as moving and handling.

The number of staff necessary for the procedure varied. Questionnaire responses indicated that the number required for the manoeuvre varied from eight to five. Five staff were the most common requirement (65%, \( n = 42 \)).

There is a limit, you couldn’t get more than six people around a patient.

This supports the view of Vollman (1997) and also the procedure recommended by Advanced Trauma Life Support (ATLS) to ‘log-roll’ a patient, which has some similarities with turning a patient into the prone position (American College of Surgeons 1997). The suggestion that seven or eight people were needed seemed impractical and the ability for such a large number of people to work effectively around the bedside was questioned. None of the respondents recommended three people, as suggested by Fridrich et al. (1996). The number of staff required for the turn raises a manpower issue. Although the recommendations for ICU suggest a nurse patient ratio of one to one (Intensive Care Society 1997), these levels may not be attained and therefore there may not be enough personnel to assist with the manoeuvre.

Technique of turning
The turn was described in the questionnaire as a two-stage process and this was explored further in the interviews.

We moved the patient over on their side towards us, then moved them across the bed on the sheet. Then we completed the turn by lowering them onto their abdomen.

One nurse described how useful specialized beds were when turning the patient.

The Respicair’s very good as you can collapse one side. On an ordinary mattress we put a pillow under the abdomen to prevent regurgitation from pressure on the stomach. No pillows are needed on Respicair.

Final position
The lack of specific guidelines meant that the body position whilst prone was based on general principles such as maintaining access to the head and tube and avoiding skin and nerve damage. Nurses often sought advice on positioning from physiotherapists. The most common position described in the questionnaire was with the head facing the ventilator, one arm bent up and one arm straight. The patient position was explored further in the interview.

Mostly the head is left in one position as the fear of displacing the tube is too great.

Which side of the mouth the ET tube is will dictate to an extent which way the head is turned.

The head tends to be rotated from side to side. I had an elderly patient with an arthritic neck, his face ended up buried as we couldn’t rotate his head as his neck was too stiff, that caused pressure with his eyes.

Question 3: Have you encountered any problems turning the patient prone?

In the questionnaire response, 16 nurses had not experienced any problems. The other problems mentioned were related to
manpower, arterial/venous lines and drains and endotracheal/tracheostomy tubes. This was supported in the focus group discussion.

I had an ET tube dislodge, that was because the patient had so much head trauma the tube was just taped rather than tied.

The most common problem identified in the questionnaire related to turning technique (\(n = 26\)). Respondents stated that the manoeuvre is technically difficult, some patients are heavy to manoeuvre manually, pillows ending up in the wrong place and a lack of co-ordination of the manoeuvre. These statements were elaborated on through focus group discussion.

Lack of co-ordination was a problem – half way through the turn we stopped and said, are we doing this the wrong way?

You think you’ve got the pillow in the right position under the abdomen, but when you turn them it’s not there and you end up shuffling around to get it in the right position.

Question 4: What do you perceive as the advantages of the prone position?

From the questionnaire, improved oxygenation was mentioned by 57 nurses, other responses included improved pulmonary gas distribution (\(n = 15\)), better removal of secretions (\(n = 14\)) and decreased respiratory support (\(n = 12\)). Four nurses felt that there were no advantages as it was used as a last resort and was stressful for the nursing staff. The last statement was expressed in the focus group.

It always seems to be the last resort because they’re difficult to manage after they’re turned, especially when there’s only one doctor on the unit who can be reluctant to have the responsibility of the prone patient.

Question 5: Have you encountered any problems when the patient is prone?

When the 65 questionnaire responses to this question were analysed, the responses were thematically categorized into six main problem areas (see Table 2). Difficulties with nursing care included changing linen, catheter care, pressure area care, oral hygiene and eye care. Those who had experience with patients who developed pressure sores reported in the interview that these were most frequently on the mouth and lips, knees and ears.

Having had face and cheek sores on one patient, we were very wary of leaving someone prone overnight.

We’ve had several with these almost burn-like things around their cheeks and lips.

Pressure problems were minimized with the use of specialized beds and mattresses that reduce contact pressures. Although the purchase or hire of these aids may have financial implications if the prone position were to be used frequently, the alternative may be iatrogenic injury which also has a cost. The use of such products needed for this purpose needs further evaluation.

Accidental injuries were related mostly to facial oedema whilst foot drop and corneal abrasions were also mentioned. When asked in the focus group what was most distressing, the following responses were given:

The swelling of the face and eyes, one eye was only half closed on the pillow side, that caused terrible damage.

The facial swelling and huge oedematous eyes are so sore and the relatives so distressed.

The procedures that were difficult to perform were chest X-ray, dialysis and physiotherapy. Patients with a tracheostomy appeared to be more disadvantaged than those with endo-tracheal tubes because of technical difficulties in terms of accessing the in line suction catheter and positioning the upper

<table>
<thead>
<tr>
<th>Problem</th>
<th>N</th>
<th>%</th>
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<tbody>
<tr>
<td>Difficulties with nursing care</td>
<td>61</td>
<td>94%</td>
</tr>
<tr>
<td>Development of pressure sores</td>
<td>32</td>
<td>49%</td>
</tr>
<tr>
<td>Accidental injuries</td>
<td>22</td>
<td>34%</td>
</tr>
<tr>
<td>Difficulty performing procedures</td>
<td>21</td>
<td>32%</td>
</tr>
<tr>
<td>Tracheal tube problems</td>
<td>11</td>
<td>17%</td>
</tr>
<tr>
<td>Other problems</td>
<td>10</td>
<td>15%</td>
</tr>
<tr>
<td>No problems</td>
<td>7</td>
<td>11%</td>
</tr>
</tbody>
</table>
Nursing the ARDS patient in the prone position

body to prevent the tracheostomy from becoming occluded. Tracheal tube problems encompassed tracheal suctioning, positioning and care of the tube.

Suction was impossible for possibly up to twelve hours. Basically the tracheostomy was buried in the bed and we couldn’t rotate the head.

The sub-category containing other problems related to care of intravenous (i.v.) lines and obtaining i.v. access. Cardiovascular instability due to line compression was also experienced, as was regurgitation of enteral feed and cardiac arrest.

Question 6: Do you have any other concerns?
The other concerns experienced by the nurses and mentioned in the questionnaire echoed previous concerns from the literature, regarding emergencies such as loss of tube and cardiac arrest (n = 41). The worry of how to manage in an emergency, especially at night, when less manpower is usually available was widespread. Other concerns reported were the technique of turning (n = 21), and the development of pressure sores. These were discussed further in the focus groups.

The medical staff feel the patient should be turned back before the night staff are on, as if they arrest, there’s not the sort of numbers around to turn them.

I worry about patients arresting, unfortunately one patient died and the doctors and everybody thought if he hadn’t been proned he might not have died, as he was young and it took a long time to turn him.

In addition, two further concerns emerged from the questionnaires: a lack of protocol and how to deal with relatives. Explaining the situation and rationale to relatives was viewed as a problem/concern although this may reflect insecurity when discussing unfamiliar techniques. These concerns were probed in the focus groups.

Having a clearer knowledge and better policies about how to prone, when and why, would give us more confidence.

A lot of relatives are distressed because they don’t recognise their relative and that’s what upsets them.

Relatives can’t understand why they’re prone and think they look in pain and they look uncomfortable and the nurse spends a lot of time at the bedside explaining the benefits.

Discussion

The sample of nurses from the four ICUs was relatively experienced. The skill mix showed that the majority were working at grade E, followed closely by a large number at grade D. This will vary from unit to unit but because nurses account for approximately 70% of ICU costs, there is constant financial pressure to limit nursing numbers and grades. The number of nurses with a recordable post-registration qualification in intensive care was just below the minimum recommended level of 25% (Intensive Care Society 1997). This does, unfortunately, reflect the situation in ICUs throughout the UK, where trained ICU nurses are in short supply. Only half the sample had nursed a patient in the prone position, which reflects the recent introduction of the technique and the relatively low incidence of ARDS. The small focus group sample allowed a more in-depth exploration of the themes generated by 65 nurses in the questionnaire. This is a small group on which to base findings. Their views, however, have expanded the knowledge of nursing problems associated with this area of nursing care.

The major issue emerging from the experiences of nurses was the need for clear guidelines for turning the patient. Having a co-ordinated well-planned manoeuvre can minimize fears associated with the actual technique of turning. This should include pre-planning of the appropriate bed surface, first to provide adequate pressure relief on the face, breast and penis, and second to aid in the turning manoeuvre. Planning should take into account the time of day to turn the patient into the prone position and back again. Emergencies occurring at night concerned nurses (when the patient was in the prone position) because of the reduced manpower available to cope with turning the patient back into the supine position.
position. Pre-planning therefore needs to take into account the timing of the manoeuvre and the manpower resources. The move has to be well co-ordinated, identifying the number of staff required and their roles in relation to the manoeuvre. Again, this may vary according to European directives and local moving and handling policies. The views of nurses in this study were that a minimum of five people were adequate to safely perform the manoeuvre. All staff should be aware of the final body position. Knowing what nursing problems to expect and how to deal with them is essential. Many of the problems expressed by nurses relate to necessary care that is required with reasonable frequency. Clear recommendations and guidelines dealing with the process of turning and caring for the patient in the prone position are therefore essential. Recent guidelines published in *Intensive and Critical Care Nursing* (Ball et al. 2001) address a range of issues such as when proning should be considered, pre-turn considerations, monitoring effectiveness and modifying the position. The following guidelines mainly focus on the major issues identified by the nurses in this study, including the technique of turning the patient and the organizational and nursing care issues.

**Recommended guidelines for nursing patients in the prone position**

The use of the prone position is potentially beneficial despite the associated hazards. These recommendations aim to ensure that the benefits are maximized and the hazards minimized. They are research based, generated from a review of the literature and from data obtained from experienced staff from four ICUs that have nursed patients in the prone position.

**Selection of patients**

The manoeuvre must be performed as early as indicated, on appropriate patients. Prone position ventilation has been evaluated for patients with ARDS, therefore the criteria for ARDS should be fulfilled:

- Acute onset of symptoms
- PaO$_2$/FiO$_2$ Ratio < 200 mmHg
- Characteristic chest X-ray
- PCWP < 18 mmHg (International Consensus Conferences in Intensive Care Medicine 1999)

**Surface for nursing the patient**

Before carrying out the manoeuvre, identify an appropriate pressure-relieving surface. (For example, Respicair or an overlay mattress such as Nimbus).

**Technique of turning**

Patients should be turned when they are (relatively) stable. The patient must be adequately sedated and is usually receiving muscle relaxants.

- A. Five staff are required to perform the manoeuvre. A doctor or experienced nurse, to manage the head and tracheal tube and co-ordinate the turn and two people each side of the patient.
- B. Disconnect infusion lines, naso-gastric feeds and ECG pads. Use a pulse oximeter to monitor heart rate and oxygen saturation.
- C. Move the patient towards one side of the bed. Roll slowly onto flank and then onto abdomen in the direction of the ventilator. Arms should be kept straight and tight to the flanks and hips.
- D. Position head facing towards the ventilator.
- E. Reconnect the equipment.
- F. If the facility exists, pressure inflated cushions below the abdomen can be reduced to facilitate abdominal movement.
- G. If the patient has a tracheostomy, position pillows under the upper body to prevent occlusion of the airway. Position face down with forehead and chin supported.

**Patient position**

A. Turn head to the opposite side every two hours to reduce facial oedema and pressure damage to ears and cheeks and place bed in reverse-Trendelenberg position.

*The technique may vary according to E.C. directives and local moving and handling guidelines.*
Nursing the ARDS patient in the prone position

B. Adopt ‘swimmer’s position’ and alternate two-hourly. (Head turned to right and right arm flexed at the elbow with the hand pointing towards the head. Left arm down by side).

Frequency of turning/duration
A. Timing of the turn must be considered. Turn early in the morning following chest X-ray and doctor’s assessment. Turn back into the supine position when significant numbers of staff are still available, e.g. before the day staff leave the unit.
B. To be effective patients should spend at least eight hours prone at each session, due to the fact that some patients have shown a delayed beneficial response after being placed prone (Pelosi et al. 1998).

Nursing care
A. Nursing care and procedures such as X-rays and sheet changes should be carried out in the supine position.
B. Taping of the eyelids/padding of the eyes is necessary to avoid corneal abrasions.
C. Absorbent material should be placed under the dependent side of the face to absorb saliva draining from the mouth.
D. The ability to absorb naso-gastric feed may be reduced, therefore monitor closely for evidence of regurgitation – or colour the feed.
E. Use closed suction system to facilitate suction of tracheal tube.
F. In emergency situations such as cardiac arrest or loss of airway, return to the supine position as quickly as possible.
G. Nurse allocation should ensure appropriate experience of nurse available for the patient in the prone position. This must be balanced with the need for more junior staff to gain experience.

Teaching/training
These guidelines on the use of the prone position and also the proposed mechanisms of action of the prone position should be delivered in regular training sessions and included in an education pack. The technique of turning should be incorporated into the moving and handling training on ICU induction and at annual up-dates, so that practice is maintained.

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