



Provided by the author(s) and University of Galway in accordance with publisher policies. Please cite the published version when available.

Title	The factors which influence nurses when weaning patients from mechanical ventilation: Findings from a qualitative study
Author(s)	Lavelle, Claire; Dowling, Maura
Publication Date	2011-07-23
Publication Information	Lavelle, Claire, & Dowling, Maura. (2011). The factors which influence nurses when weaning patients from mechanical ventilation: Findings from a qualitative study. <i>Intensive and Critical Care Nursing</i> , 27(5), 244-252. doi: <a href="https://doi.org/10.1016/j.iccn.2011.06.002">https://doi.org/10.1016/j.iccn.2011.06.002</a>
Publisher	Elsevier
Link to publisher's version	<a href="https://doi.org/10.1016/j.iccn.2011.06.002">https://doi.org/10.1016/j.iccn.2011.06.002</a>
Item record	<a href="http://hdl.handle.net/10379/14723">http://hdl.handle.net/10379/14723</a>
DOI	<a href="http://dx.doi.org/10.1016/j.iccn.2011.06.002">http://dx.doi.org/10.1016/j.iccn.2011.06.002</a>

Downloaded 2023-03-31T19:41:43Z

Some rights reserved. For more information, please see the item record link above.



**THE FACTORS WHICH INFLUENCE NURSES WHEN WEANING PATIENTS  
FROM MECHANICAL VENTILATION: FINDINGS FROM A QUALITATIVE  
STUDY.**

**Claire Lavelle (First author)**, MSc (Specialist Nursing), BSc (Nursing), PGD  
(Intensive care nursing), RGN.

Staff nurse, Intensive Care Unit, University Hospital Galway, Galway, Ireland.

Phone: 0863707478

Fax: none

Email: [clairemlavelle@hotmail.com](mailto:clairemlavelle@hotmail.com)

**Maura Dowling (Second and corresponding author)**, PhD, MSc, RGN, RNT.  
Lecturer, School of Nursing and Midwifery, National University of Ireland, Galway,  
Ireland.

Phone 353 91 493833

Fax: Fax: 353 91 494537

Email: [Maura.dowling@nuigalway.ie](mailto:Maura.dowling@nuigalway.ie)

## **Abstract**

The aim of the study was to describe the factors that influence critical care nurses when deciding to wean patients from mechanical ventilation. The study adopted a qualitative methodology, using semi-structured interviews and a vignette. A random stratified sample of critical care nurses (n=24) from one Irish intensive care unit was employed. Each nurse was interviewed once, and a vignette was used to structure the interview questioning. The findings were analysed using thematic content analysis. Six major themes influencing nurses' decision to wean emerged, as follows: physiological influences; clinical reassessment and decision making; the nurse's experience, confidence and education; the patient's medical history and current ventilation; the intensive care working environment; and use of protocols. The findings highlight the complex nature of weaning patients from mechanical ventilation and the major role of the nurse in this process.

**Key words:** intensive care; weaning; protocol; vignette.

## **Introduction**

The role of the nurse is one aspect of many complex features involved in weaning patient from mechanical ventilation. This paper presents the findings of a qualitative study describing the factors that influence critical care nurses when deciding to wean patients from mechanical ventilation.

Over 90% of critically ill patients require mechanical ventilation and 40% of the time is spent in the process of weaning the patient off (Meade et al., 2001). Weaning patients from mechanical ventilation is a complex and challenging process. It is not merely the discontinuation of ventilation; it also requires ‘continuity of care, knowing the patient and the development of patient centered, individualised weaning plans’ (Crocker, 2009; p. 185), which suggests the importance of nurse involvement in the process.

Although every aspect of managing a patient on mechanical ventilation is a nursing challenge, weaning the patient from the machine is often the most demanding (Handerhan and Allegranza, 1989). The complex nature of weaning is reflected in the lack of consensus for the definition of weaning in the literature (Crocker, 2002; Burns, 2005; Pierson, 2008). Blackwood (2000) discusses the various views held by clinicians on when weaning should occur. Some clinicians maintain the transition should be gradually initiated from the outset with as much of the breathing workload transferred to the patient as tolerated. Other clinicians believe that the transition should only be

attempted after the patient has fully recovered, while a third group fall somewhere within these two views (Blackwood, 2000).

In the past, the traditional doctor led approach to weaning was the only method used.

However, over the past few decades, the role of the critical care nurse in weaning has gained momentum.

## **Background**

The search for definition consensus of weaning is hampered as the use of the term weaning is under debate by some researchers, with some using the term ‘ventilator discontinuation’. Some consider this to be a more encompassing term because ‘weaning’ implies a gradual reduction in ventilator support, and for most patients, this gradual reduction does not happen (Meade et al., 2000; Frazier et al., 2006). Moreover, definitions of weaning from mechanical ventilation tend to over simplify the process and fail to take into account the slow or difficult to wean patient. Over simplification of the weaning process implies that all patients are eventually liberated from the ventilator on a permanent basis (Crocker, 2009). For instance, Mancebo (1996) defines the process of weaning as the transition from ventilatory support to spontaneous breathing, and Knebel (1991) defines weaning as a process of assisting the patient to breathe unaided. Crocker (2009: p. 186) defines weaning more accurately ‘as the gradual reduction of respiratory support until the point has reached when either the patient no longer requires assistance or has reached their maximum potential and further reduction of respiratory support is neither feasible or realistic’. Crocker (2009; p. 185) also defines weaning as ‘continuity of care, knowing the patient and the development of patient centered, individualized

weaning plans'. This definition highlights the role of the critical care nurse in the weaning process and acknowledges its complexity.

There is also debate in the literature regarding what can be described as short term and what is long term ventilation. Burns (1995) describes long term ventilation as anything over three days whereas Crocker (2002) defines it as over seven days. Whether the patient is categorised as either a long term or short term depends on the patient's response to weaning. The patient may undergo a short trial of spontaneous breathing and if successful is then extubated or the process may take the form of a gradual withdrawal with slow decreases in the level of support given by the ventilator (Rose & Nelson, 2006).

It is imperative that the nurse is able to identify which patients are ready to wean and as early as possible. Complications associated with prolonged mechanical ventilation include ventilator associated pneumonia; ventilator associated lung injury and increased mortality (Newmarch, 2006). Other complications included airway trauma, discomfort, additional sedation and neuromuscular blockade requirements, inadvertent extubation, endotracheal tube obstruction as well as the cost (Rose and Nelson, 2006). Therefore weaning the patient from mechanical ventilation should occur as soon as the patient's condition allows, but reducing mechanical support too quickly may result in muscle fatigue or cardiovascular instability, either of which would also delay the weaning process (Newmarch, 2006).

The role of the critical care nurse in weaning is evolving and changing over time. Transferring the role and the responsibility of weaning from the traditional perspective of the intensivist to the nurse is not without its challenges (Crocker, 2009). This role transference has led to the development of the contemporary role of the intensive care nurse with the addition of tasks from medicine (role extension) and the development of nursing (role expansion) through enhanced nursing knowledge (Coombs, 2003). This role expansion is supported by the use of protocols (Gelsthorpe and Crocker, 2004; Blackwood and Wilson- Barnett, 2007). There is evidence to show that standardised weaning protocols result in a reduced weaning time for ventilated patients; however, organizational processes may also play a part in this finding (Blackwood et al., 2011).

Nurse involvement in weaning improves patient care and reduces weaning times (Anderson and O'Brien, 1995; Rose and Nelson, 2006; Crocker, 2009; Crocker and Scholes, 2009). However, variations in the context and processes of weaning patients from mechanical ventilation are evident internationally. Weaning in Australia, New Zealand, Denmark, Norway, Sweden and the United Kingdom is generally a collaborative process between nurses and medical staff (Rose et al., 2011). However, the picture is very different in the United States, where nurses may not have any involvement in the weaning process due to the presence of respiratory therapists who fulfill this role (Rose et al., 2011).

Only a few studies have investigated nurses' involvement in weaning. Rose et al. (2008) report on their survey of all nurse managers in Australia and New Zealand intensive care units which explored the scope of nursing practice and inter-professional role

responsibility for ventilatory decision making. The survey reported on nurses' contribution to important ventilatory and weaning decisions. This study reports on nurses' high level of autonomy and decision-making in ventilation and weaning. However, only 30% of intensive care units responded. An earlier study reported by Rose et al. (2007) examined the types and frequency of decisions nurses made when considering weaning patients. This prospective study was undertaken at one Australian intensive care unit over a three month period. The results showed that nurses initiated the majority of all types of ventilatory changes. A reason for this autonomy in decision-making was in part attributed to the absence of respiratory therapists in Australia. A notable exception was the decision to extubate, which was predominantly collaborative. Moreover, Rose et al. (2007) also reported that decisions regarding weaning more critically ill patients were made by medical staff (Rose et al, 2007). This study highlights nurses' central role in weaning patients from ventilation, however the nurses in the study were aware that their decision-making was being documented and this may have resulted in increased frequency of ventilator decisions (Rose et al., 2007).

The study reported here aimed to describe the factors that influence critical care nurses when deciding to wean patients from mechanical ventilation. An earlier study, also using a vignette, has been undertaken in the United Kingdom (UK); however, only seven nurses were interviewed in that study (Gelsthorpe and Crocker, 2004).

This study was undertaken because the researchers wanted to explore and describe nurses' involvement in weaning from an Irish context. This topic has not been studied in an Irish context previously.

## **METHOD**

The research method adopted was a qualitative design using semi- structured interviews guided by a vignette. The first author, a colleague of the study participants and not in a managerial role undertook all twenty-four interviews. The interview opened with participants questioned about their nursing experience and the frequency with which they weaned patients. Each participant was then asked to read the vignette (Figure 1) and answer questions about weaning the patient described in the vignette.

Use of a vignette is an economical way to elicit information about how people might behave in a situation that would be difficult to observe in daily life (Vincent and Gaddy, 2009). Vignettes also have the potential for focusing complex issues (such as weaning patients off ventilators), that would otherwise require lengthy interviewing or questionnaire completion (Richman and Mercer, 2002).

Flaskerud (1979) proposes three steps to gain internal validity for a vignette, which were adopted in this study. Firstly, a review of the literature on weaning and patient case histories was undertaken. Secondly, an expert panel of three was established which included the nursing clinical facilitator of the unit, a senior intensive care consultant and a clinical nurse manager of another intensive care unit. This panel reviewed the vignette

and recommended some changes. Finally, the vignette was pre tested with two intensive care nurses.

### **Participants and setting**

The study setting was an Irish intensive care unit. The unit has ten beds with an adjoining six bedded high dependency unit. The unit's mean APACHE 11 score for 2009 was 24 and 702 patients were admitted to the unit in 2009. Of these, 211 (30.1%) were ventilated for 48 hours or less; 103 (14.7%) for less than one week; 69 (9.8%) for less than four weeks, and 4 (0.06%) for greater than four weeks.

All nurses working in the ICU were informed about the study. For the purpose of representativeness the 57 potential participants were stratified into three levels of experience in intensive care nursing: 0-10 years; 11-20 years; and 21 years and over. From these three strata, participants were randomly chosen by a person not involved in the study by drawing names out of a hat.

A total of 25 participants were invited to join the study with an invitation letter, and all agreed to be interviewed. However, one participant had to withdraw for health reasons. Of the nurses interviewed 23 were female. Eighteen (75%) nurses had over six years' critical care experience and all had a post registration intensive care nursing qualification. Twenty one (88%) of the nurses had worked in another intensive care unit. Sixteen (67%) nurses weaned patients on a daily basis (Table 1).

### **Ethical considerations**

Ethical approval to conduct the study was obtained from the hospital's human ethics committee. Written information on the study was provided to all the participants who signed a consent form before being interviewed. Each participant was assigned a number and is identified by number only in the study findings.

### **Data analysis**

All twenty four interviews were recorded and transcribed verbatim. Burnard's (1991) method of thematic content analysis was adopted in this study.

Burnard (1991, p. 461) proposed a fourteen stage method for semi-structured open-ended interviews but also suggested that the method could be adapted when 'more clearly structured interviews' were used, as was the case with this study. Firstly, notes were taken after each interview and were used as 'memory joggers' (Burnard, 1991, p. 462) during the initial analysis phase. The second stage involved reading through all the transcribed interviews and making notes on descriptions given. The third stage focused on open coding and involved reading through the transcripts again. The list of open codes was then examined closely and those that were similar were collapsed into broader categories (Stages four and five). For stage six, an expert nurse in the intensive care unit who was not part of the study, was asked to examine three interview transcripts and identify a category system and similar themes were identified. This step aims to enhance the validity of the categorisation process (Burnard, 1991) and enhances a study's credibility. The transcripts were then examined again in light of the themes generated and

themes were distinguished in the text using a colour code system. The text from the transcripts was then re-organised under the themes with attention to context maintained by working alongside full complete copies of each transcript (Stages 8 -10). Three study participants were invited to review their transcribed interview and make notes on the main points that emerged during the interview. These were then compared to the themes and categories identified in the analysis (Stage 11).

Six themes emerged from the data analysis process (Table 2). The responses offered by participants were not based on 'right' or 'wrong' answers because the complexity of the patient described in the vignette and the complexity of weaning meant that a variety of responses were possible.

## **FINDINGS**

### ***Introduction***

Six central themes emerged: physiological influences; clinical reassessment/decision making; the nurse's experience, confidence and education; the patient's past medical history and current ventilation; the intensive care working environment; and using a weaning protocol (Table 2).

### **Physiological influences**

The theme of physiological influences was the most influencing factor for nurses when weaning their patient. Many aspects of assessment were discussed, including oxygen, ventilator settings and arterial blood gas results.

Participants spoke about the patient's clinical picture or general assessment, using terms such as '*...the patient's clinical picture...*' (Participant 17), or '*...watching her [patient] continuously...*' (Participant 12). Participants also discussed whether the patient was drowsy and if the patient was 'breathing up'. 'Breathing up' is jargon used to describe when the patient makes his or her own respiratory effort on the ventilator. This was succinctly conveyed by the following comment from Participant 5: '*You're looking clinically at the patient is she making any effort herself, what are her breaths like, when does she key in her own effort; is she synchronised with ventilator*'.

The patient's oxygen requirement in relation to weaning was highlighted by most participants. The patient in the vignette was still requiring 70% of oxygen, and most participants stated that they would try to reduce the oxygen first before attempting to reduce other ventilator settings.

Most participants also identified ventilator settings as an influencing factor for the nurse when weaning. Participants described how they would or would not reduce the ventilator settings in relation to the patient and to weaning. No participant stated that they would wean the Positive End Expiratory Pressure (PEEP). This is highlighted in the following comment '*...she is on a lot of oxygen so I would be reluctant to wean the PEEP.*' (Participant 1). Similarly, Participant 22 noted that: '*I'd wean her oxygen a little more before I'd wean her PEEP.*'

Participants discussed pressure support and tidal volumes and modes used in relation to the ventilator settings. The main focus for these participants was the use of new and more complex modes of ventilation in the unit. Participant 21 stated that she sometimes had to check or read up on a new mode which would slow the weaning process. *‘...some of the new modes I have to double check them; that’s why I’m leaving that 10% for double checking’*. Similarly, Participant 23 highlighted that treatments change all the time and her learning is continuous: *‘...only issue is new modes of ventilation, its changing all the time, so there still is loads to learn’*.

Checking blood gases before deciding to wean was important to participants. Participant 22 suggested a level of dependence on blood gases when initiating weaning: *‘...first repeat a gas after an hour or whatever and then come down on her pressure support see how you’re doing with that, repeat another gas, em...make sure everything is going fine ‘cause she is quite drowsy’*.

### **Clinical reassessment/decision making**

Participants talked about four key aspects when discussing re-assessment of the patient, namely, arterial blood gases, respiratory distress, cardiovascular system, and the patient. Participants stated that they would reassess the changes they made to the ventilator and the effect these changes had on the patient. For these participants, the monitoring after the change was central to the success of weaning their patient. *‘...I’d hope I’d be quick to see if she was not coping and increase her support if necessary’* (Participant 1).

Participant 5 reinforced this view: *‘So what you’d be doing is adjust something, wait and*

*reassess, see the effect of it and then go back up and try something else.*’ Participant 5 further developed this point by identifying how this decision making can lead to improved care: *‘I suppose we would make the decision earlier in the day ...we do have a broad base of knowledge, we don’t take risk unnecessarily and I think that we are competent to extubate patients and wean sooner rather than later’*. Decision making was associated with confidence and experience: *‘I would be confident with my decision making I suppose from experience, if you’ve done it before.’* (Participant 22).

### **The nurse’s experience, confidence and education**

Participants highlighted professional aspects that influenced decisions to wean, including experience, confidence, education and knowledge, scope of nursing practice and intuition.

All participants discussed the nurse’s scope of practice but this was because all were questioned on their views on weaning in relation to their scope of practice. Participants discussed a variety of reasons for why weaning was part of their scope of practice, namely, competence, proficiency, education, experience and confidence.

Experience in intensive care and weaning emerged strongly in the interviews, evident in the following views: *‘I’ve been in ICU [Intensive Care Unit] so long, that I’ve come across so many different types of patients...I think we actually wean patients here all the time ourselves but it’s not really evident in paper’* (Participant 2). *‘I can tell if a patient is tolerating it by just looking at them’* (Participant 17). Confidence to wean was also

discussed in relation to experience. *'I feel confident and competent to wean...I know when I started to work in ICU I didn't...'* (Participant 1).

Knowledge and education also influenced participants when weaning. Some participants conveyed the view that education not only provided nurses with the theoretical and practical skill to be able to wean a patient, it also afforded them the credibility to carry out this role; illustrated in the following viewpoint: *'...because you've done your [ICU] course, you know your respiratory system, you know your patient as well, how the patient is doing and the combination of everything'* (Participant 22).

Finally, during the analysis, any evident association between participants' responses and years of experience was looked for. The responses suggested that more experienced nurses noticed immediately how seriously ill the patient in the vignette was.

### **The patient's past medical history and current ventilation**

Participants were aware that certain conditions can slow weaning or make weaning patients off ventilators more complex. The patient in the vignette had chronic obstructive pulmonary disease (COPD) which is one such condition. Participants who mentioned the patient's past medical history also highlighted the patient's diagnosis of COPD. *'She's got COPD so alarm bells go off straight away when you see that'* (Participant 6).

Particular aspects of the 'patient themselves' also affects their weaning, for example, the patient's level of tolerance of the endotracheal tube; *'...they may be awake and*

*comfortable but is this patient ready to wean if you take that tube out; will they breathe for themselves? I find the patients who don't tolerate the tube often do well with being extubated sooner rather than later, as they're having to go back on sedation'* (Participant 5). Participants also took into account the patient's condition over the previous twenty hours: *'... how did the night go; was she very stable, does she need lots of anything... medication to keep her comfortable or did she sleep well...'* (Participant 12).

The length of time the patient is intubated; if they were intubated before, and if there were any attempts at extubation in the past was also highlighted: *'I suppose previous admissions, previous attempts I suppose I'd look back over and see if anyone had attempted to wean before and how they got on and if they are sitting out on the chair...'* (Participant 21).

Psychological influences were also highlighted by some participants, illustrated in the following comments: *'if the patient is agitated or distressed on weaning I would probably try and ease off on it...'* (Participant 1). *'...if the patients are psychologically very anxious...or some of them you know might want to pull their tube out before they're ready or some you might push a bit further or bit quicker'* (Participant 18).

### **The intensive care working environment**

The medical team's involvement in weaning was discussed by most participants. Participants conveyed that they liaised and consulted with the doctors, particularly regarding complex patients, but they also felt that they were in a better position than the

doctors to be able to wean the patient: *'I would liaise with the medical intensivists and their team and if they had any objections to weaning I certainly take it on board'*

(Participant 1).

Some participants highlighted that the nurse was in the best position to wean:

*'...anaesthetic doctors may review, will review, in the morning and they may not come back to you until the evening for five minutes so there is no logic to how they would be in a better position than you would based on your clinical assessment and your knowledge and the fact that you are with your patient continuously...'* (Participant 2).

Participants conveyed that doctors do not have time to observe changes made to ventilation. They also talked about the continuity of care nurses provided.

*'...doctors aren't at the bedside throughout the day. They're just there if you call them; they're there to do just ward rounds, they don't see the little changes in the patient so I think it's important for the nurse to be active in it'* (Participant 9).

*'...the nurse is there with the patient 24/7. You're the primary care nurse during your 12-13 hour shift. So you're in the best position to supervise and care for your patient'*

(Participant 2).

### **Using a weaning protocol**

All of the study participants were asked specific questions about the use of weaning protocols. The majority of participants were aware of the unit protocol for weaning, while

10 were not aware of it. Most participants believed that it was best to use a weaning protocol in conjunction with their experience.

Some participants proposed suggestions as to why protocols could be helpful.

Participants considered that protocols are helpful to junior staff and students when learning how to wean. *'I suppose it's [weaning protocol] helpful 'cause it was my first ICU and I didn't know how to go about it whereas now I probably just do it according to how the patient is'* (Participant 10). Some participants also raised viewpoints against the use of a protocol. The main reason proposed was that a protocol hindered nurses who are more experienced:

*'...It's quicker for me than reading the protocol going to refer to the protocol all the time'* (Participant 17).

Participants also talked about the individuality of the patient in the context of a protocol.

They felt that because every patient is different, no one protocol would suit. A number of participants also pointed out that using a protocol on more 'straight forward' patients was a waste of time since these patients are easy to wean.

## **Discussion**

Physiological influences and the importance in particular of assessment before deciding to wean and during the weaning process was viewed by participants as a central theme.

Effective patient assessment is considered central to timely weaning and the prevention of premature extubation leading to re-intubation (Twibell et al., 2003). The participants

did not focus on one parameter alone, suggesting a lack of agreement about which parameters are required to ensure effective weaning. Similarly, Soo Hoo and Park (2000) in their study examining the views of respiratory therapists to weaning parameters found that that there were no universally agreed parameters.

The ventilator settings were also discussed by participants. The mode of ventilation was not included in the vignette, but the ventilator settings were. There is no agreed mode of ventilation best suited for weaning in the literature (Rose and Nelson, 2006). Most participants stated that they assessed the changes they made to the ventilator settings and the patient. They highlighted that weaning was not just about reducing settings on a ventilator but it was also about the nurse's decision-making ability to monitor and assess changes made, and reflects the decision-making theme identified in the findings.

Gelsthorpe and Crocker (2004) also examined factors which influenced the nurse to wean using a vignette, and they too found that decision-making had the greatest impact and underlined all the other factors.

Oxygen and Positive End Expiratory Pressure (PEEP) were frequently discussed together. Oxygen was viewed as far more important by participants; and was discussed by most participants compared with PEEP. However, the oxygen level required by the patient in the vignette was high and the PEEP would not necessarily be reduced in this case. This reflects findings from Rose et al. (2007) which reported that PEEP was the parameter that the nurse was least likely to reduce when weaning.

The importance of the arterial blood gas was also highlighted by participants. This reflects findings reported by Rose and Nelson (2006), where the most frequent indication for a change in ventilator setting was the process of weaning itself and the results of arterial blood analysis. Newmarch (2006) however argues that it is essential that arterial blood gas values are monitored in conjunction with a clinical assessment of the patient.

On the theme of ‘the nurse’s experience, confidence and education’, participants conveyed the view that education offered them the credibility to wean their patients and that weaning was an important critical care nursing role. It is argued that education is one of the characteristics associated with high performance intensive care units, evidenced in the findings of Rose et al. (2007) who report that 81% of nurses in their study undertook nurse initiated weaning.

The theme of ‘the patient’s past medical history and current ventilation’ highlighted participants’ views on the role of the patient in weaning. There has been little exploration of this topic, however, a recent study by Crocker and Scholes (2009) reported no evidence of the nurse engaging with patients when writing a weaning plan. They also observed a lack of attention to the patient as an active partner in their weaning (Crocker and Scholes, 2009).

Participants highlighted the effect anxiety has on the weaning process. Knowing the patient is a very important element in determining the patient’s anxiety (Blackwood, 2000). Two main factors that facilitate nurses in knowing their patients are continuity of

care and expertise (Crocker and Scholes, 2009). Findings from studies that explore the lived experience of patients undergoing the weaning process help nurses understand the patient's experience better. One such study is reported by Chen et al. (2009). Their study provides a detailed account of the experiences of patients who have been successfully weaned from mechanical ventilation. The study reported five themes: dealing with unfamiliar contexts of the weaning program, experiencing various psychological responses and ambiguity of self endurance, being tortured by helplessness, wondering whether to continue or give up and finally release from self breathing (Chen et al., 2009). Chen et al. (2009) also reported that care and concern from family members and adequate assessment of the patient by healthcare personnel can help patients through the weaning process. Similarly, Logan and Jenny (1997) reported that patients actively engaged in a variety of physical, cognitive and emotional activities that contribute to successful weaning.

Under the theme of 'the intensive care working environment', participants discussed their leading role in weaning and conveyed the view that the doctor did not have the time to reduce the patient's ventilatory settings and observe the changes made; a view supported by others (Krishnan et al., 2004; Blackwood et al., 2009). A collaborative approach between nurses and doctors when weaning is evident in the study findings. Rose et al. (2008), also report nurses' collaboration with medical staff when weaning. This is not surprising because of the emphasis placed on interprofessional collaboration in intensive care settings (Manias, 2001; Manias and Street, 2001; Coombs, 2003; Hansen and Severinsson, 2009).

The final theme identified was ‘using a weaning protocol’. Only 14 study participants were aware that the unit had a weaning protocol for post-operative patients, and only one participant discussed using the protocol. Participants also talked about the usefulness of a protocol when they were less experienced. Junior nurses may be reluctant to take on the responsibility for weaning and may devise ways of controlling their work and often leave weaning as the last nursing role (Crocker and Timmons, 2009). Expert nurses approach technology differently, and view weaning as a technology whereby they could improve patient outcomes (Crocker and Timmons, 2009).

Despite evidence supporting the effectiveness of protocols in the intensive care environment, there remains a lack of consensus on the implementation of weaning protocols (Marellich et al., 2000; Scheinhorn et al., 2001; Grap et al., 2003). Nurse led weaning using a protocol is endorsed in the UK in response to changes in nurses’ scope of practice (Blackwood, 2003). Nevertheless, weaning is more complex than just following an algorithm (Kydonaki, 2010), and Gelsthorpe and Crocker (2004) report that nurses’ decision to wean is based on professional judgment and experience; as opposed to clinical guidelines. Gelsthorpe and Crocker (2004) also report that nurses believe a protocol restricts practice. Furthermore, a meta analysis and review of this topic reports the complex nature of protocolised weaning, and highlights the difficulties in standardisation and delivery to all patients (Blackwood et al., 2009).

## **Study Limitations**

The study was undertaken at one intensive care unit and the number of participants in the study is small. The results may be biased because participants did not respond to the vignette as effectively as they would to a real patient. Whilst the vignette used in the study was as accurate as possible to a real life situation, it can never fully depict the situation. Use of in depth interviewing and observation of practice would have resulted in participants responding differently. In addition, two nurses did not notice the patient's level of oxygen documented in the vignette. Hughes and Huby (2002) argue that written vignettes should be abandoned in favour of videotaped presentations. A picture of a mechanical ventilator with clearly visible settings may have been clearer for study participants. Finally, the first author was known to the study participants, which may have influenced their comments.

## **Conclusion**

This study has highlighted the factors that influence critical care nurses in the weaning process. Similar to the findings reported by Gelsthorpe and Crocker (2004), nurses' assessment of the patient, decision-making and their collaborative role with the medical team emerged as key themes. Furthermore, similar to that reported by Gelsthorpe and Crocker (2004), nurses' views on the use of weaning protocols suggests that these may not be as useful as they are intended to be. Also noteworthy is the lesser significance placed on the role of the patient in the weaning process, which highlights the need for

greater emphasis on involving the patient. In this regard, nurses' 'knowing' their patients is central.

On a more global level, a lack of consensus surrounding many aspects of this topic remains. These aspects include the definition of weaning, the modes or techniques for weaning and parameters for deciding when a patient is ready for weaning. These basic tenets of weaning require further clarity.

In conclusion, the central role played by nurses in the weaning of patients in intensive care emerges strongly. The various factors which influence the intensive care nurse when weaning patients from mechanical ventilation highlight the complex nature of this nursing role. However, the nurse's role in weaning requires further clarity; particularly in the context of collaborative practice in intensive care.

## References

- Anderson J, O'Brien M. Challenges for the future: the nurse's role in weaning patients from mechanical ventilation. *Intensive and Critical Care Nursing* 1995; 11(1): 2-5.
- Blackwood B. The art and science of predicting patient readiness for weaning from mechanical ventilation. *International Journal of Nursing studies* 2000; 37(2): 145-151.
- Blackwood B. Can protocolised weaning developed in the United States transfer to the United Kingdom context: a discussion. *Intensive and Critical Care Nursing* 2003; 19(4):215-225.
- Blackwood B, Alderdice F, Burns K, Cardwell C, Lavery G, O'Halloran P. Protocolised vs. non-protocolised weaning for reducing the duration of mechanical ventilation in critically ill adult patients: Cochrane review protocol. *Journal of Advanced Nursing* 2009; 65(5): 957-964.
- Blackwood B, Alderdice F, Burns K, Cardwell C, Lavery G, O'Halloran P. Use of weaning protocols for reducing of mechanical ventilation in critically ill adult patients: Cochrane systematic review and meta-analysis. *BMJ* 2011; 342(7790): 214.
- Blackwood B, Wilson-Barnett J. The impact of nurse directed protocolised weaning from mechanical ventilation on nursing practice: A quasi experimental study. *International Journal of Nursing Studies* 2007; 44(2): 209-226.
- Burnard P. A method of analysing interview transcripts in qualitative research. *Nurse Education Today* 1991; 11: 461-466.
- Burns S. Mechanical ventilation of patients with acute respiratory distress syndrome and patients requiring weaning: the evidence guiding practice. *Critical Care Nurse* 2005; 25(4): 14-23.
- Chen C, Lin C, Tzeng Y, Hsu I. Successful mechanical ventilation weaning experiences at respiratory care centers. *The Journal of Nursing Research* 2009; 17(2): 93-101.
- Coombs M. Power and conflict in intensive care clinical decision making. *Intensive and Critical Care Nursing* 2003; 1(3): 125-135.

Crocker C. Nurse led weaning from ventilatory and respiratory support. *Intensive and Critical Care Nursing* 2002; 18(5): 272-279.

Crocker C. Weaning from ventilation- current state of the science and art. *Nursing in Critical Care* 2009; 14(4): 185-190.

Crocker C, Scholes J. The importance of knowing the patient in weaning from mechanical ventilation. *Nursing in the critical care* 2009; 14(6): 289-296.

Crocker C, Timmons S. The role of technology in critical care nursing. *Journal of Advanced Nursing* 2009; 65(1): 52-61.

Flaskerud J. Use of vignettes to elicit responses towards broad concepts. *Nursing Research* 1979; 28(4): 210-212.

Frazier S, Stone K, Moser D, Schlanger R, Carle C, Pender L, Widener J, Brom H. Hemodynamic changes during discontinuation of mechanical ventilation in medical intensive care unit patients. *American Journal of Critical Care* 2006; , 15(6): 580-593.

Gelsthorpe T, Crocker C. 2004. A study exploring factors which influence the decision to commence nurse led weaning. *Nursing in Critical Care* 2004; 9(5): 213-221.

Grap M, Strickland D, Tormey L, Keane K, Lubin S, Emerson J, Winfield S, Dalby P, Townes R, Sessler C. Collaborative practice: development, implementation and evaluation of a weaning protocol for patients receiving mechanical ventilation. *American Journal of Critical Care* 2003; 12(5): 454-460.

Handerhan B, Allegrezza N. Getting your patient off a ventilator. *RN* 1989; 52(12): 60-65.

Hansen B, Severinsson E. Physicians' perceptions of protocol-directed weaning in an intensive care unit in Norway. *Nursing and health Sciences* 2009; 11(1): 71-76.

Hughes R, Huby M. The application of vignettes in social and nursing research. *Journal of Advanced Nursing* 2002; 37 (4): 382-386.

Knebel AR. Weaning from mechanical ventilation: current controversies. *Heart & Lung: Journal of Critical Care* 1991; 20(4): 321-334.

Krishnan J, Moore D, Robeson C, Rand C, Fessler H. A prospective, controlled trial of a protocol based strategy to discontinue mechanical ventilation. *American Journal of Respiratory and Critical Care Medicine* 2004; 169(6): 673-678.

- Kydonaki K. Observing the approaches to weaning of the long-term ventilated patients. *Nursing in Critical Care* 2010; 15(2): 49-56.
- Logan J, Jenny J. Qualitative analysis of patients' work during mechanical ventilation and weaning. *Heart & Lung: Journal of Acute and Critical Care* 1997; 26(2): 140-147.
- Mancebo J. Weaning from mechanical ventilation. *European Respiratory Journal* 1996; 9(9): 1923-1931.
- Manias E. Nurse-doctor interaction during critical care ward rounds. *Journal of Clinical Nursing* 2001; 10(4): 442-450.
- Manias E, Street A. The interplay of knowledge and decision making between nurses and doctor in critical care. *International Journal of Nursing Studies* 2001; 38(2): 129-140.
- Marelich GP, Murin S, Battistella F, Inciardi J, Vierra T, Roby M. Protocol weaning of mechanical ventilation in medical and surgical patients by respiratory care practitioners and nurses: Effect on weaning time and incidence on ventilator-associated pneumonia. *Chest* 2000; 118(2): 459-467.
- Meade M, Guyatt G, Griffith L, Booker L, Randall J, Cook D. Introduction to a series of systematic reviews of weaning from mechanical ventilation. *Chest* 2001; 120 (6 Supplement): 435S-437S.
- Newmarch C. Caring for the mechanically ventilated patient: part two. *Nursing Standard* 2006; 20(18): 55-64.
- Richman J, Mercer D. The vignette revisited: evil and the forensic nurse. *Nurse Researcher* 2002; 9 (4): 70-82.
- Rose L, Nelson S, Johnston L, Presneill, J. Decisions made by critical care nurses during mechanical ventilation and weaning in an Australian intensive care unit. *American Journal of Critical Care* 2007; 16 (5): 434-444.
- Rose L, Nelson S. Issues in weaning from mechanical ventilation: literature review. *Journal of Advanced Nursing* 2006; 54 (1): 73-85.
- Rose L, Nelson S, Johnston L, Presneil, J. Workforce profile, organisation structure and role responsibility for ventilation and weaning practices in Australia and New Zealand intensive care units. *Journal of Clinical Nursing* 2008; 17(8): 1035-1043.
- Rose R, Blackwood B, Burns SM, Frazier SK, Egerod I. International perspectives on the influence of structure and process of weaning from mechanical ventilation. *American Journal of Critical Care* 2011; 20(1): e10-e18.

Scheinhorn D, Chao D, Stearn-Hassenpflug M, Wallace W. Outcomes in post ICU mechanical ventilation: A therapist implemented weaning protocol Chest 2001; 119(1): 236-242.

Soo Hoo G, Park L. Variation in the measurement of weaning parameters- a survey of respiratory therapists. Chest 2002; 121(6): 1947-1955.

Twibell R, Siela D, Mahmoodi M. Subjective perceptions and physiological variables during weaning from mechanical ventilation. American Journal of Critical Care 2003; 12(2): 101-112.

Vincent CVH, Gaddy EJ. Pediatric nurses' thinking in response to vignettes on administering analgesia. Research in Nursing and Health 2009; 32(5): 530-539.

**Figure 1: VIGNETTE**

A seventy year old woman with a medical history of hypertension, ischaemic heart disease and chronic obstructive airway disease was admitted to hospital with acute abdominal pain. She was found to have a perforated caecal carcinoma and required emergency abdominal surgery. Following surgery, the patient was admitted to intensive care for ventilatory and inotropic support. She had developed severe signs of sepsis which manifested by a decompensated cardio pulmonary system. The patient also developed acute renal failure, requiring continuous renal replacement therapy (CRRT).

On day five in intensive care, her oxygen requirements had decreased overnight from 90 to 70 percent, pressure support had reduced from 25 over 10 to 20 over 8, mandatory respiratory rate was 12 and tidal volume generated was approximately 460mls.

Noradrenaline (6mg in 50mls) had been reduced from 10mls/hr to 4mls/hr (20mcg/hr to 8mcg/hr) and she was normotensive. She remained very drowsy despite sedation (morphine and midazolam) having been stopped. CRRT had been discontinued and urine output was >40mls/hr, yet appeared very dilute. Her abdomen was slightly distended and the patient was not absorbing her feed despite her gut being rested postoperatively.

Bowels had not been open since admission and she had commenced on prokinetics.

Trace elements were within the normal range. The wound appeared intact.

**Table 1: Study Sample**

<b>Years of nursing experience</b>	<b>0-10</b>	<b>11-20</b>	<b>21+</b>
	11 (46%)	8 (33%)	5 (21%)
<b>Years of Intensive care nursing experience</b>	<b>0-5</b>	<b>6-10</b>	<b>11+</b>
	6 (25%)	11 (46%)	7 (29%)
<b>Nurses who wean patients on a daily basis</b>	<b>YES</b>	<b>NO</b>	<b>Where possible</b>
	16 (67%)	2 (8%)	6 (25%)

**Table 2: Study themes**

<b>Theme</b>	<b>Sub-themes</b>
Physiological influences	<ul style="list-style-type: none"><li>▪ Patient assessment</li><li>▪ Oxygen</li><li>▪ Ventilator settings</li><li>▪ Use of diagnostic tests</li></ul>
Clinical reassessment/decision-making	
The nurse's experience, confidence and education	<ul style="list-style-type: none"><li>▪ Experience</li><li>▪ Confidence</li><li>▪ Education/Knowledge</li><li>▪ Scope of practice</li><li>▪ Intuition</li></ul>
The patient's past medical history and current ventilation.	<ul style="list-style-type: none"><li>▪ Patient's past medical history</li><li>▪ The 'patient themselves'</li><li>▪ Psychological factors</li></ul>
The intensive care working environment	<ul style="list-style-type: none"><li>▪ Medical colleagues</li><li>▪ Nature of intensive care nursing</li><li>▪ Scans/resedation</li></ul>
Using a weaning protocol	

**Table 3: Aspects of assessment discussed by participants**

<b>Assessment parameters</b>	<b>Number of nurses</b>
Patient's Clinical picture	10
Patient's Drowsiness	9
'Breathing up'	6
Patient's Bowel	8
Continuous renal replacement therapy	7
Inotropes	4

**Table 4: Focus of reassessment**

<b>Parameter</b>	<b>Number of nurses mentioning this</b>
<b>Arterial blood gases</b>	17
<b>Respiratory distress</b>	
○ Tidal volumes	8
○ Oxygen saturations	5
○ Tachpnea	6
○ Respiratory rate and ‘breathing up’	4
○ Laboured breathing	2
○ Tiring	3
○ Diaphoretic	1
<b>Cardiovascular system</b>	
○ Tachycardia	2
○ Hypertension	1
○ Needing more vasopressor therapy	2
<b>The Patient</b>	
○ Comfortable and stable	3
○ Looks compromised	1
○ Alert and orientated	1
○ Agitated and distressed	1
<b>Other</b>	
○ Abdomen	1

**Table 5: Professional nursing aspects that influence decision to wean**

<b>What influences decision to wean</b>	<b>Number of nurses who discussed this</b>
The nurse's experience	16
The nurse's confidence	10
The nurse's education/knowledge	12
The nurse's scope of practice	23
The nurse's intuition	4

## **Interview Schedule.**

### **Part One.**

1. Years of service; 0-10yrs, 10-20yrs, 20yrs+
2. Years of ICU experience; 0-5yrs; 6-10yrs; 11+.
3. Have you undertaken a specialist ICU post registration course? Yes/No.
4. Have you worked in another ICU before; Yes/No
5. Do you think that you wean patients on a daily basis? Yes/No
6. Are you aware of the weaning protocol on our ICU unit? Yes/No
7. Do you use the weaning protocol to wean patients on a daily basis? Yes/No

### **Part two.**

Read vignette

Question;

You are the nurse looking after this lady.

Would you wean this lady? If so, how would you do it?

If not, why not?

What would need to change for this lady to be ready to wean?

What other factors besides physiology factors influence your decision to wean your patient? \*probe\*

Do you feel confident and in control of weaning your patients? Why?

Do you feel it is within your scope of practice?

What in your opinion are the benefits of the nurse being involved in weaning?

### **Part three**

Read the hospital weaning protocol

Question;

Would you wean the patient now using the protocol? If so, how would you do it?

If not, why not?

Have you used a nurse led weaning protocol before?

Did you find it helpful? Or do you think it would be helpful?

Do you think the protocol should be used to guide weaning or do you think your experience of weaning patients should be your guide?

Do you feel the patient type would influence you using a protocol?

### **Part four**

Anything the participant would like to add or ask.

