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**The Development of a Nursing Technology:
Making Visible the Nursing Contribution to
the Development of Critical Care**

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**Thesis submitted to the Faculty of Medicine and Health Sciences,
School of Nursing, The University of Nottingham for the Degree of
Doctor of Philosophy**

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Abstract

In the context of one Intensive Care Unit (ICU) and one High Dependency Unit (HDU), this thesis explores and analyses the nursing contribution to the development of critical care.¹ This comprises over more than half a century, focussing on nurses' relationship with, and perceptions of one 'technology', weaning from mechanical ventilation, as part of everyday nursing practice in the new millennium. My findings suggest that nurses take a task-focussed approach to weaning, treating it as a 'medical' technology *transferred* to them from doctors, rather than seeing its potential to become a '*nursing technology*' in which the nurse is enabled to *transform* weaning into a way of implementing care in order to improve patient outcomes. Analysis demonstrates when nurses work in this way weaning is delayed and as a result patients will be exposed to greater morbidity and mortality.

Theoretically, my argument builds in particular on Sandelowski's (1996, 1997, 1998, 2000, 2000a, 2000b) work on the nursing - technology relation in which she describes how technology has shaped nursing practice and was shaped by nursing practice. I build on Sandelowski's ideas to develop two concepts that are central to my argument: technology transferred and technology transformed.

¹ Intensive care and high dependency care were renamed Critical Care in 2000. For the purposes of clarity intensive care is used to refer to the geographical place in order to distinguish it from HDU for example and Critical Care is used for all other purposes.

I have used an ethnographic approach to study nurses using technology in the work place. The empirical data were obtained through fieldwork on one critical care unit in a large teaching hospital in the Midlands over a six-month period. The methods include participant observation, interviews with twelve nurses and the collection of over two – hundred and fifty hours of field notes.

My study of the nursing role in critical care contributes new knowledge to two fields: first, the history of intensive care as a specialism within the wider development of the National Health Service (NHS). My work adds to this literature by making visible the nursing contribution to that development and, in the process, raising a question about the extent to which previous histories may have been misleading: these (see for example Lassen 1953, Hamilton 1963, Ibsen 1966, Hilberman 1975, Pontoppidan, Wilson, Rie & Schneider 1977, Cule 1989, Crocket and Mercer 1995, Gilbertson 1995, Le Fanu 1999, Kesecioglu 2000) have tended to assume that its development was a result of new medical technology. Second, is the literature on 'technology' as it relates to nursing. I believe that my definition of a 'nursing technology' makes it possible for the first time to put structures in place which will transform nurses' contribution to patient care, improving patient outcomes. I conclude that rather than extending and expanding their roles through the transfer of technology, nurses transform those technologies that preserve the nursing role and can contribute to positive outcomes for patients. Only in this way will the nursing contribution to the development of critical care be recognised and valued.

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Transcript Codes

Indented extracts in normal font indicate excerpts from field notes or interviews and are denoted: (Interview: PXX) or (Field notes: ICU / HDU date)

All tape-recorded materials are verbatim transcriptions.

[...] words, phrases or sentences of the abstract omitted.

(()) descriptive material added by the researcher in the field notes.

() information added to make the context and / or meaning clear.

Data have been edited to preserve respondent confidentiality and all names are omitted, and replaced by a number.

Common Abbreviations and Explanation of Terms

A & E	Accident and Emergency
ASB	Assisted Spontaneous Breathing
ARDS	Acute Respiratory Distress Syndrome
BiPAP	Bi-Phasic Positive Airway Pressure (a mode of ventilation used in both ICU (BIPAP) and HDU (BiPAP))
CPAP	Continuous Positive Airway Pressure
CVP	Central Venous Catheter
DoH	Department of Health
ICS	Intensive Care Society
ICU	Intensive Care Unit
HDU	High Dependency Unit
IPPV	Intermittent Positive Pressure Ventilation
LREC	Local Research Ethics Committee
NICE	National Institute for Clinical Excellence
NIPPV	Non-Invasive Positive Pressure Ventilation
NIV	Non-Invasive Ventilation
NHS	National Health Service
NMC	Nursing and Midwifery Council
NSF	National Service Framework
PEEP	Positive Pressure Support Ventilation
RCN	Royal College of Nursing
SIMV	Synchronised Intermittent Mechanical Ventilation
UK	United Kingdom

Critical Care is a term used from 2000 to denote levels of patient care including intensive care and high dependency care. Previously intensive care and high dependency care were separate.

Intensivist is a consultant anaesthetist who specialises in intensive care medicine and is usually responsible for the overall management of ICU.

IPPV, NIV, NIPPY are all forms of ventilation (and can be used for weaning) but applied to different patient conditions and in different locations. IPPV is reserved for patients in ICU who cannot breathe independently and is often referred to as 'life support'. NIV can only be prescribed for patients who are able to breathe but require additional support. This is usually found in HDU. NIPPY is usually used on the ward and reserved for patients with chronic lung conditions who require additional support through an acute period. Patients may require this form of ventilation for periods of time at home.

Tracheostomy is a hole made in the windpipe. This can be a temporary procedure and is commonly used to assist the patient to wean from ventilation. It provides a more comfortable airway for the patient and facilitates communication.

Endo-tracheal tube is an artificial airway, a tube placed in the windpipe via the mouth or nose to allow ventilation and the removal of secretions from the chest.

Shift coordinator takes charge of ICU / HDU and is responsible for the daily management of the unit. This person usually does not look after a patient but helps other nurses to deliver care, supervises more junior nurses and organises the day-to-day running of the unit. This person takes responsibility for all nursing care for the shift. They are usually the most senior person on duty.

Weaning is the process whereby a patient takes increasing control over their breathing whilst the ventilator support is reduced. This process can utilise all forms of ventilation such as IPPV (see figure 3), CPAP, NIV (see figure 4) and NIPPY. Weaning can be accomplished in a number of ways; through protocols (see appendix 3 for examples used in this ethnography), individualised plans or led by multi-professional teams, or one professional group. Nurse-led weaning in the context of this ethnography refers to the initiation and individual planning of a patient's weaning by nurses. Nurses in this study had weaning protocols to refer to which gave guidelines for initiating weaning and a decision making tree for the stages of weaning.

Introduction

In this study I examine the nursing contribution to the development of intensive care since 1952. The thesis operates at two levels; on one level I argue that the nursing contribution is hidden, invisible or unacknowledged in the historical² and political literature. I explore what this history would look like if nurses were placed at the centre of this enquiry. The literature concerned with the development of ICU portrays a view dominated by new and innovative medical technology (Lassen 1953, Hamilton 1963, Ibsen 1966, Hilberman 1975, Pontoppidan et al 1977, Cule 1989, Crocket and Mercer 1995, Gilbertson 1995, Le Fanu 1999, Kesecioglu 2000). This view of history serves to marginalize the nursing contribution (Fairman 1992, Fairman & Lynaugh 1998). There were many contributing factors that influenced the development of ICU. One was the grouping together of sick patients who were observed by nurses (Fairman & Lynaugh 1998). Yet despite this important contribution few histories of critical care nursing exist. Those that do are American (Zalumas 1995, Fairman & Lynaugh 1998) and Australian (Wiles & Daffurn 2002). There are no British histories of critical care nursing. Given that intensive care was described by Le Fanu (1999) as one of the twelve definitive moments in modern medicine, histories of the NHS make little mention of intensive care (Rivett 1997, Klein 2001, Webster 2002).

² Reference to the historical literature is taken to mean the medical and nursing literature referring to the development of intensive care.

At a second level I examine the use of technology in the work place, drawing on the work of Sandelowski (1996, 1997, 1998, 2000, 2000a, 2000b, Barnard & Sandelowski 2001) in order to make visible the nursing contribution to the development of critical care in the new millennium. I build on Sandelowski's work by developing two key concepts not fully developed in the literature: technology transferred and technology transformed. The literature does not noticeably differentiate between medical and nursing technologies. Furthermore it is not clear when a technology is transferred from doctors to nurses whether this remains a medical technology that nurses use or whether this becomes a 'nursing technology'. There is a paucity of literature that specifically concentrates on the development of nursing technologies (Alexander & Kroposki 2001, Purnell 1998). I take these concepts and, using weaning from mechanical ventilation, I expound how these relate to critical care nursing. Weaning from mechanical ventilation is a gradual process of reducing mechanical respiratory support that parallels the patient's ability to increase their capacity to breathe independently. For example a patient may be commenced on a ventilator with a respiratory rate of 12 breaths per minute, as their condition improves and they have the ability to take some breaths themselves, the ventilator respiratory rate will be gradually reduced. This may take a series of steps for example 10, then 8, until such a time when the patient can breathe without any additional breaths from the ventilator³.

³ This is an extremely simplistic example and weaning is much more complex than this. Ventilators offer more support than just giving a breath but augment each breath or make breathing easier. Weaning is dependent on many factors and as such it is difficult to describe.

There is evidence that technology has played a major part in the development of intensive care. What is not clear is whether this has *required* nurses to adapt and change their roles (Scholes, Furlong & Vaughan 1999, Scholes & Vaughan 2002) or *because* nurses have changed their roles in an effort to accommodate the changing needs of patients (RCN 2005). What is apparent is that this contribution has remained largely unrecognised. The literature is beset with examples that give the impression that the nursing contribution to health care is 'invisible' (Lawler 1991, Sweet & Norman 1995, Sandelowski 2000, Manias & Street 2001, Allen 2001). I draw on the work of Allen whose ethnography explored the changing shape of nursing work through the division of labour in two acute hospital wards. I make the link between technology and the subsequent effect this has on the division of labour in order to explore what this would look like in the context of critical care. Sandelowski illustrates how technologies have contributed to or (re)negotiated the sphere of influence of the nurse and the social relations and division of labour between nurse, physicians, patients and others (Sandelowski 1996, 1997, 1998, 1999, 2000, 2000a, 2000b). Political and professional pressures have resulted in the devolvement of junior doctors' tasks to nurses with the consequence that nurses have extended and expanded existing nursing roles and developed new roles (DoH 1991, UKCC 1992, Calman 1993, UKCC 1999, DoH 1999, DoH 2000a, DoH 2004, RCN 2005). The introduction of the nurse consultant role was intended to improve patient outcomes by improving patient services and quality of care (DoH HSC 1999/217). An evaluation of this role revealed they had impacted on patient care by making care more patient focused, through the development of new services and improvements to new

services but did not directly address their effect on patient outcomes⁴ (Guest, Peccei, Rosenthal, Redfern, Wilson-Barnett, Dewe, Coster, Evans & Sudbury 2004).

The ultimate decision to investigate this important subject area was influenced by a report from the Audit Commission (1999), which had the potential for far-reaching policy changes within critical care (DoH 2000b, DoH 2005). Furthermore the Modernisation Agency document on long term weaning published in 2002 provided the impetus to examine weaning from mechanical ventilation (Modernisation Agency 2002). The main aim of this thesis is to determine whether the nursing contribution to the development of critical care in the new millennium can be identified through the use of one technology, weaning from mechanical ventilation.

Overview of Thesis

Chapter one is a review of the literature and provides a background to the study. The review comprises four parts and begins with an overview of the development of Critical Care from the polio epidemic in 1952 to the new millennium. Here I affirm my position that the nursing contribution is central but unrecognised in the literature. This literature gives an impression that critical care developed as a result of technological innovation (Lassen 1953, Hilberman 1975 Crocket & Mercer 1995, Le Fanu 1999). However on examination it appears that this technology was not new but transferred (usually from the operating theatre). It is here I introduce the concept 'technology transfer'. This term

⁴ Patient outcomes refer to mortality and morbidity

is usually used in the literature to refer to the devolvement of tasks from doctors to nurses. In this case I examine not just the transfer of technology between professional groups but from one geographical place to another as it relates to the development of intensive care. I offer an alternative to the commonly held view that critical care developed solely as a result of medical technology. I then build on this important concept in the following sections of the review. In order to understand the multifaceted aspects of this argument it is necessary first to explore two main areas. The first is how the transfer of technology changed the content of nurses work and the division of labour and the second, the nursing – technology relation, that is how nurses used and perceived technology in the workplace.

In the next part I draw on the work of Allen (Allen 1996, 1997, 2001). She reveals that the division of labour in health care has resulted in changes to the content of nursing work. This has come about as a result of the devolvement to nurses tasks formerly undertaken by doctors. She also reveals in her ethnography, of two wards in an acute hospital, that nurses have done this with minimal negotiation and overt conflict, however this created tensions for nurses. I also examine the literature concerned with doctor - nurse relations (Stein 1967, Stein et al 1990, Hughes 1988, Porter 1991, Svensson 1996) and the decision-making strategies that nurses use when working with doctors. The creation of new nursing roles has been one attempt to realign the doctor – nurse boundaries and I go on to explore this literature in relation to the context of critical care (Allen 1996, Read, Jones, Collins et al 1999, Scholes et al 1999, Scholes & Vaughan 2002).

I then go on to examine the relationship between nursing and technology. I concentrate on the work of Margarete Sandelowski through her historical analysis of two examples of technology in nursing: the thermometer and the electronic fetal monitor. Sandelowski alludes to the concept of what I have called 'technology transformed' but does not develop this. There is a dearth of literature exploring this important concept and therefore the literature fails to adequately describe and define the differences between a technology transferred and a technology transformed. There is no clear distinction between a 'medical technology' and a 'nursing technology'. Furthermore the literature that focuses on 'nursing technology' fails to adequately define this term (Alexander & Kroposki 2001, Purnell 1998). I suggest that technology is one way of bringing to the forefront the nursing contribution to critical care.

In the fourth part of the literature review I discuss the literature on one technology: weaning from mechanical ventilation. I have chosen this technology in particular for two reasons. The first is concerned with the role of ventilation in the development of ICU and the second, because weaning has recently become a central concern in critical care, with a focus on the economics of caring for this group of patients (Modernisation Agency 2002). This will have consequences for service delivery in the future. It is my belief that the medical narrative has limited the nurse's role in weaning (Tomlinson et al 1989, Yang & Tobin 1991, Knebel 1991, Brochard et al 1994, Esteban 1995, Ely et al 1996, Seneff 1996, Mancebo 1996, Kurek 1997, Butler et al 1999, Burns et al 2000, Meade et al 2001, Modernisation Agency 2002). I suggest this technology is in the process of being transferred from medicine to nursing. An

examination of the literature revealed there were few workplace studies that focused on what Latour describes as Technology in Action (Latour 1987). I have therefore chosen to explore the nursing contribution to the development of critical care through ethnography in order to study the use of technology in the workplace.

Chapter two is concerned with the methodology and explores my personal journey through ethnography, in parts 'seeing' for the first time the social, professional and political aspects of critical care that make up its culture. The first part is a personal account of how my study began, culminating in the focus of the study and research philosophy. The next section gives a detailed account of ethnography as a method of studying nurses using technology in the workplace. I discuss the complexities and dilemmas of being a participant observer, employed in a dual role working as a nurse consultant and a researcher (Bonner & Tolhurst 2002, Kite 1999, Savage 2000). I go on to describe the background of the study and the context of the research. Together this provides a history of the 'Trust'⁵ ICU and describes its place within a large teaching hospital. Following on from here is an account of the data collection methods, sampling process and ethical considerations.

Chapter three is devoted to the process and method of analysis. I have chosen to separate this from the discussion section in an effort to demonstrate rigour and trustworthiness of the data.

⁵ I refer to the 'Trust' as the hospital in which the study was conducted. The name of the hospital has been removed to preserve confidentiality, and as far as possible, anonymity.

Chapter four is a discussion of the results. Four main themes emerged: knowing the patient, the division of labour in weaning, making visible nursing work and the nursing relation with technology. I go on to examine each of the four main themes in detail. The first of these is concerned with knowing the patient. Whilst nurses in this study espoused the benefits of individualised care at interview and central to this was getting to know the patient, observation revealed nurses framed their 'knowing' in terms of technology but rarely got to know their patients as defined by the literature (Tanner et al 1993, Radwin 1996, Henderson 1997, May 1992, May 1991). I examine what nurses meant by knowing the patient and the factors that prevented this in practice. I draw on the work of Benner (1984), Benner, Tanner & Chesla (1992, 1997) and Tanner, Benner, Chesla & Gordon (1993) to explore the role of the expert nurse and knowing. Specifically I make an association between knowing the patient and patient outcomes in weaning (Jenny & Logan 1992). I finish with the role of the patient in weaning and employ Lawler's (1991) term 'trajectory' to examine how this was applied to weaning.

The second theme is concerned with the division of labour in weaning. I contrast my data with the work of Allen (1996, 1997, 2001). In studying critical care I have gained insight into tensions and conflicts that were not apparent in the context of a ward setting. Within the sphere of nurse-led weaning there was evidence of both boundary blurring and traditional ways of working. Inter-occupational boundary work was characterised by tension and conflict. I examine the literature by Stein (1967), Stein et al (1990), Hughes (1988), Porter (1991) and Svensson (1996) and develop this to include a fifth decision-making strategy used by nurses, an intra-

occupational mediator, not discussed in the literature before. I conclude that despite the philosophy of nurse-led weaning doctors remained in control of weaning. The nursing role was marginalized. Here I acknowledge and clarify the role of the nurse consultant.

The third theme deals with nurses' 'visibility' in critical care. I examine the contribution made by nurses to a patient's weaning and how this was made evident or obscured to others. I examine the ways in which nurses were rendered invisible, and draw on the literature to examine and interpret the data (Manias & Street 2001, Busby & Gilchrist 1992, Sweet & Norman 1995, Sandelowski 2000, Ball & McElligott (2002). I reveal that nurses busied themselves in 'getting the work done', performing tasks that were part of an elaborate matrix of routinized care. I suggest that one of these, 'doing the wash' was in fact a ritual serving the needs of the nursing staff rather than the needs of patients. I draw on the literature by Melia (1987), and that concerned with nursing rituals (Menziess 1970, Chapman 1983, Wolf 1988, Wolf 1988a, Walsh & Ford 1989, Ford & Walsh 1994, Jones 1995, Biley & Wright 1997) to explain and clarify notions of nursing work and the use of nursing rituals and in particular how these related to weaning.

The final theme explores the nursing - technology relation and I draw on the work of Sandelowski (2000) to interpret this. I begin with an examination of nurses' definition of technology and go on to explore under what circumstances their views of the same equipment changed. I analyse the literature concerned with technical competence and challenge the view portrayed in the nursing literature (Wilkstrom & Larson 2004,

Alasad 2002, Barnard 2000, Little 2000, Barnard & Gerber 1999, Locsin 1998, McConnell 1998, Cooper 1993, Walters 1995b, McConnell 1990, Ray 1987). I examine how nurses defined weaning and suggest this view of weaning limits the nursing role. Weaning was a medical technology transferred to nurses which created what Allen refers to as 'organisational turbulence' (Allen 1996). Evidence from theoretical sampling enabled me to define what is meant by the term 'technology transformed' and I describe the characteristics of this. I compare my findings with the limited literature that describes a 'nursing technology' (Alexander & Kroposki 2001, Purnell 1998).

Chapter five is a summary and synthesis of the main findings. I draw together the main elements of the research in order to provide cohesion and clarity. I acknowledge the contribution this thesis has made to the corpus of nursing knowledge. I offer an alternative definition of weaning that takes into account the whole weaning process and challenge the traditional view presented in the medical and nursing literature. I define and differentiate between a 'medical technology' and a 'nursing technology'. I am able to describe the characteristics of a technology transferred and a technology transformed as derived from this ethnography. From there I go on to describe the conditions under which a technology transferred can be transformed as illustrated by weaning from ventilation. Whilst I state that the nursing contribution to the development of critical care was invisible in the historical and political literature I am able to demonstrate that the nursing contribution to the development of critical care in the new millennium was represented through the transfer and transformation of technology. Nurses are constantly changing their

work content and adapting their roles to accommodate the needs of the organisation this is mostly unrecognised and therefore is rendered invisible. I suggest that the nursing contribution can be made visible and valued through the development of nursing technologies, furthermore patient outcomes will be improved. Finally I suggest recommendations for practice and future research.

CHAPTER ONE

Historical, Political and Professional Context

1.0 The Development of Critical Care

The first part of the literature review offers a view of the development of critical care from the position of nursing. The nursing contribution is not fully acknowledged in the historical and professional literature (Lassen 1953, Hamilton 1963, Ibsen 1966, Hilberman 1975, Pontoppidan, et al 1977, Cule 1989, Crocket and Mercer 1995, Gilbertson 1995, Le Fanu 1999, Kesecioglu 2000) as Sandelowski writes

‘Nurses looking at histories of medicine, hospitals and healthcare will typically not find themselves there’
(Sandelowski 2000:15).

I offer an alternative history of the development of ICU, which takes account of the nursing profession’s contribution, rather than the commonly held view that ICU developed predominately as a result of new and innovative technology. The technology was not new, but rather it was transferred, usually from the operating theatre, and applied to new conditions. For example, positive pressure ventilation was used during surgery in 1913, but was not introduced in to the intensive care unit until the polio epidemic in the 1950s. There were many contributing factors that shaped the development of intensive care. One was the grouping

together of sick patients so that they could be cared for by skilled nurses who 'watched over' them, by providing detailed observation (Fairman & Lynaugh 1998: 3). I will go on to demonstrate that this was a central factor that provided the conditions for intensive care to be developed.

Media images of intensive care are dominated by the presence of highly technical equipment. Media coverage during the influenza epidemic of the winter of 1999 described ICU as a place where patients were helpless and dependent upon a multitude of equipment. The following excerpt from a leading broadsheet is typical;

'Syringe drivers dose their (patient) systems with drugs at timed intervals and the contents of feedbags drip through tubes into their stomachs; monitors trace heart rates, central venous pressure and blood pressure in thin coloured lines that track mountain ranges across a black screen. On the other side of the beds are breathing machines, flashing up digital breakdowns of breathing patterns, while tubes pass through throats, hands or arms, drugs keep hearts beating and ventilators gently fill and empty lungs, breath by breath by breath' (Bibi Van der Zee, Guardian Jan 4, 2000).

Television programmes such as ER, Holby City and documentaries on ICU ('The Trust' BBC 1, Jan – Feb, 2002 and 'Intensive Care' BBC 1, 1995) as well as publications such as 'Twice Dead'⁶ (Lock 2002) serve to

⁶ See chapter 2, 'Technology in Extremis' pgs 57 – 75 Lock describes ICU in terms of technology.

support this commonly held view. The ventilator is seen as pivotal to intensive care. Often described as 'life support' equipment (Lock 2002). This powerful imagery of what an intensive care might be like obscures the role that nurses play in tending to both patient and machine. This review outlines the development of intensive care in England⁷ from 1952 to the new millennium. It begins with an analysis of the changing definitions reflected in policy and professional documents before moving on to examine the factors that influenced its development and concludes with a discussion of the nursing contribution.

Definition of Intensive Care

Early definitions of intensive care allude to the need for skilled nurses in order to provide a level of surveillance.

'...the support of life by high standards of nursing and observation assisted by specialised mechanical devices, combined with the study of disturbed physiology' (Crocket & Mercer 1995⁸: 51).

This definition suggests that nursing and observation are indeed separate. The need for 'assistance from mechanical devices' serves to underplay the nursing contribution. Later definitions obscure the nursing contribution by referring to observation but not to the role of nurses in

⁷ This thesis is primarily concerned with the development of critical care in England. Differing policy documents exist for Scotland.

⁸ This paper is a review of the development of ICU

undertaking this and marginalize the work that nurses did in accommodating technology.

‘A service for patients who have potentially recoverable conditions, who can benefit from more detailed observation and invasive treatment than can safely be provided in general wards or high dependency areas’ (DoH 1996: pg 6).

The Intensive Care Society (ICS) define ICU as

‘.....a designated area offering facilities for the prevention, diagnosis and treatment of multiple organ failure’ (Intensive Care Society 1997: 5).

This definition omits the contribution of nursing altogether and instead focuses on the geographical environment in which doctoring occurs, made explicit in the words, ‘prevention’, ‘diagnosis’ and ‘treatment’. Definitions of intensive care changed in 2000, following a Department of Health report. Intensive care in England was redefined (DoH 2000b) to reflect the level of patient acuity.

‘Critical Care’ is a global definition, considered to be a new speciality, an umbrella term for intensive and high dependency care, including the care of the critically ill patient on the ward’ (DoH 2000b: 7).

This definition is the first time critical care has been defined as a continuum from the traditional ICU to HDU to the ward. It makes explicit in the report that this includes patients with a critical illness as well as patients who are at risk of impending critical illness. Patients are classified according to their level of critical illness (see table 1). This dictates where they would be located in the hospital and therefore the level of care they would receive. Patients who are at risk of impending critical illness (level 1 according to the classification, DoH 2000b see table 1) can now be nursed on the ward assisted by critical care ‘outreach teams’. These dedicated teams usually include nurses from critical care.

Table 1. Classification of Critical Care Patients (DoH 2000b)

Level 0	Patients whose needs can be met through normal ward care in an acute hospital.
Level 1	Patients at risk of their condition deteriorating, or those recently relocated from higher levels of care, whose needs can be met on an acute ward with additional advice and support from the critical care team.
Level 2	Patients requiring more detailed observation or intervention including support for a single failing organ system or post-operative care and those ‘stepping down’ from higher levels of care.
Level 3	Patients requiring advanced respiratory support alone or basic respiratory support together with support of at least two organ systems. This level includes all complex patients requiring support for multi-organ failure.

The definitions of intensive care have changed over time. This originally concentrated on the need for observation, then on the use of technology, before focusing on a discrete geographical area. The definition of

intensive care then became focused on the acuity of illness and included those patients with a risk of deterioration. The intention was not to think of ICU as a separate geographical place but to create a critical care without walls (DoH 2000b). Patients therefore should be able to receive the advice and support of the critical care team wherever they are within the hospital. The changing definitions of intensive care reflect epochs in its development.

The Development of Intensive Care

Intensive care units developed in response to a number of conditions. Epidemics, the most notable, the outbreak of polio of 1952 in Copenhagen resulted in an increased number of patients requiring ventilation and necessitated the opening of respiratory units. These are recognised as the precursor to intensive care units (Hercus 1962). Polio epidemics had occurred frequently during the previous decade, yet despite the 'tank'⁹ ventilator mortality rates had remained high, at around 80% (Lassen 1953). At first it was thought patients died as a result of their disease. However it was later discovered that high levels of carbon dioxide, a result of the failure of the tank ventilator to remove gases adequately, was the cause of death. At the beginning of the 1952 epidemic, 31 patients were treated for polio, 27 had died (Hilberman 1975). A turning point in the history of polio and an important factor for the development of ICU was the referral by a physician (Lassen) of a 12-year-old patient with polio to a senior anaesthetist (Ibsen) (Lassen 1953).

⁹ The 'tank' ventilator was the ventilator in use at this time. This was a negative pressure ventilator which necessitated the patient lying down and enclosed within a metal casing very much like a water tank.

Anaesthetists at this time were not seen as 'proper doctors' but rather as 'technicians' (Le Fanu 1999: 75) and this action was seen as a 'last resort' (Ibid.). Ibsen performed a tracheostomy (a hole in the wind pipe) and manually ventilated the patient with a bag¹⁰. With the addition of further monitoring and measuring devices he was able to demonstrate how oxygen and carbon dioxide varied with each breath. Claims were made that positive pressure ventilation (alone) resulted in a reduction of mortality from polio from 80% to 40% (Lassen 1953). Russell, an anaesthetist from Oxford, brought this technique to England. He successfully treated many patients with polio but did not broaden the scope of treatment to include other groups of patients who would have benefited (Le Fanu 1999).

Once the Salk vaccine (polio vaccine) became available in 1955 (vaccination of children began in 1956 in England) the incidence of polio declined and the respiratory units were closed. Those patients with respiratory failure after this time were ventilated on the ward, but the mortality rate was high, mostly due to mechanical failure of the airway equipment and ventilators. This, together with the steady increase in the number of patients requiring ventilation, prompted the re-establishment of respiratory units and a shift from the treatment of epidemics to other medical and surgical conditions. Respiratory units became known as Intensive Care Units from this time on. The first intensive care unit opened in Kettering, England in 1962 (Crocket and Mercer 1995) and was predominately used for ventilating patients with neuromuscular

¹⁰ A bag acted like a set of bellows and delivered ventilation by positive pressure. This is still the method of ventilation today.

disease. The establishment of intensive care units did not mean there was as yet a continuous service. Units were small, often positioned at the end of a ward. They developed in response to the needs identified by individual hospitals and this in part would depend on the degree of medical specialisation (ICS 2003) (See 2.4 for a history of the Trust ICU) but also in response to changes in the NHS as a whole.

The birth of the National Health Service (NHS) in 1948 referred to as ‘the golden age of technology’ by Webster (Webster 2002: 38) heralded the availability of new forms of treatment such as antibacterial agents and reliable blood transfusions. These together with the accessibility of diagnostic radiography, the availability of pathological investigations and increased mechanisation in the operating theatre meant that advances in anaesthesia and surgery were possible. These, according to Webster (2002) transformed the capacity of the hospital and of medicine and created the conditions for the proliferation of medical and surgical specialities. These developments required close observation or what Fairman (a nurse), described as ‘watchful vigilance’ of patients post operatively by nurses (Fairman 1992: 56). The need for the centralisation of equipment and skilled nurses (in observation) forced the reorganisation of care (Ibid.). Grouping patients recovering from anaesthesia and surgery together who required advanced airway management and close surveillance was said to be successful in reducing mortality (Hilberman 1975: 162). However some surgeons opposed this at first, interpreting it as necessary because ‘something had gone wrong’ and therefore a reflection on their surgical competence (Le Fanu 1999: 80). Cardiac surgeons were operating on sicker patients and found that there was a

correlation between a nurse's level of knowledge and skill and a patient's prognosis. These surgeons began to recognise the role of skilled nurses and wanted them to look after their post-operative patients (Hilberman 1975: 162).

The development of intensive care units in America followed the model of 'Progressive Patient Care'. This was the systematic grouping of patients according to the degree of illness and dependence on the nurse rather than by disease or gender (Ministry of Health and the Public Health Laboratory Service 1962: 218). A few units in England adopted this model; Whiston hospital, Liverpool (Gordon and Sherwood Jones 1998) and Kettering (Crocket & Mercer 1995). Five main zones or phases of care were identified; (1) intensive care unit, (2) intermediate care unit, (3) self care unit, (4) continuation, long term or rehabilitation unit and (5) care at home after discharge. Within this document intensive care units were justified on three counts:

1. Better provision of skilled nurses, frequent attention from doctors and the use of special equipment.
2. Better provision can be made for patients remaining in the general wards, for attention is not distracted from them by the needs of the critically ill.
3. The best use can be made of the resources of trained nurses. (Ministry of Health and the Public Health Laboratory Service 1962)

Reference to the nursing contribution is clear and patients were defined according to the need for nursing care, but this concept was not generally communicated to the rest of the NHS and many hospitals therefore failed to take it up (Crocket & Mercer 1995). Nearly 40 years on this model is not too dissimilar from the modernization plans for critical care in 2000 (DoH 2000b).

According to Le Fanu (1999) the birth of intensive care is one of the twelve definitive moments in modern medicine. Le Fanu suggests that the success of the modern intensive care unit rested on a single manoeuvre, the introduction of positive pressure ventilation (Le Fanu 1999: 81). He makes no mention of the role or contribution of nurses to this success. There is little doubt that the application of knowledge and principles developed in anaesthetics were successfully applied to the treatment of polio. This view is in danger of over-inflating the importance of the technology (the ventilator) and making 'science' the key to this development. In reality the application of knowledge led to the transfer of a technology that already existed. The technologies used in ICU on the whole were not new but were applied to new conditions. For example resuscitation equipment such as the endotracheal tube was introduced in the nineteenth century (for drowning) and ventilators were in use from 1913. These ventilators were simple in design and required the patient to be anaesthetised. It took nearly 50 years before this technology was applied to intensive care. Although ventilation had become efficient and reduced mortality, in cases of polio, the transfer of this technology resulted in new problems, for example, pulmonary oxygen toxicity. This was caused by high levels of oxygen administered to the patient which

resulted in damage to the lungs. Oxygen toxicity was originally discovered by Lorraine Smith in 1899. Excessive oxygen administration was avoided during the polio epidemic, yet pulmonary oxygen toxicity during positive pressure ventilation was not generally acknowledged until 1967 (Nash et al 1967). It was in part due to the ventilator itself. Positive pressure ventilation also resulted in other problems such as a reduced cardiac output. As a consequence the homeostatic mechanisms of the body results in a stress response aimed at preserving the major organs of the body. Blood flow to the kidney is reduced. Prolonged ischaemia (lack of oxygenated blood) causes the kidneys to fail¹¹. Iatrogenesis became a concern for anaesthetists and resulted in the transfer of other technologies such as the renal dialysis machine (or artificial kidney) from other specialities for the treatment of iatrogenic renal failure. Le Fanu attributes the success of the modern ICU to the ventilator whereas in fact introducing the ventilator not only developed ICU but created the conditions for its continued existence.

Much of the literature pertaining to the history of the development of ICU is concerned with the early years and as such there is a gulf from the 1960's with the establishment of ICU following the polio epidemics to the modernisation of ICU to critical care in the new Millennium. Kesecioglu (2000) describes the development of ICU after the treatment of polio in terms of other diseases and the introduction of technology (meaning in this case drugs, therapies and equipment). He pays particular attention to the development of new ventilators by Engstrom and the

¹¹ This is a simplistic account, however an increased intrathoracic pressure as a result of positive pressure ventilation reduces cardiac output. This is compounded by a lack of blood volume, drugs and the patient's underlying condition.

subsequent introduction of Positive End Expiratory Pressure (PEEP) for the treatment of Adult (or Acute) Respiratory Distress Syndrome (ARDS). One of the causes of ARDS was thought to be barotrauma and volutrauma associated with ventilation. As a result intensivists have been searching for ventilation strategies that protect the lung during ventilation. Ventilators have continued to evolve particularly as a result of the introduction of the microchip. Other developments have included the use of the pulmonary artery catheter and the use of drugs such as dopamine in the 1970's to manage cardiac output and renal insufficiency. Renal replacement therapy had become popular in the ICU setting as a treatment for acute renal failure in the 1980's and has continued to develop despite the continued poor prognosis (Kesecioglu 2000). Infection, particularly nosocomial (hospital acquired) infection became a concern for intensivists. Patients were succumbing to infections which led to research into Selective Decontamination of the Digestive Tract (SDD) in the 1980's, applied in the 1990's. Kesecioglu concludes that in the fifty years since the polio epidemic different types of organ failure now exist that did not exist before the development of ICU. Before, when no intensive care facilities were available, patients died of respiratory insufficiency. Now the solving of one problem has led to the creation of another (Ibid.: 156).

Intensive Care in the New Millennium: The Birth of Critical Care

On December 7th 1995 a 10-year-old boy died following a brain haemorrhage whilst being transferred from one hospital in search of an ICU bed. This resulted in enormous media interest which led to questions being asked in parliament (House of Commons Hansard Written Answers for 14.12.95, 6.03.96). There began a prolific response from doctors writing to the British Medical Journal regarding the shortage of paediatric intensive care beds (Carnall 1996, Ryan 1996, Kishen 1996, Sharples & Dearlove 1996). Media pressure led to a Government review of the provision of paediatric intensive care, culminating in the report 'A Bridge to the Future' (DoH 1997). The media interest in intensive care continued and reached a climax during the flu epidemic in the winter of 1999. The flu epidemic resulted in a shortage of adult intensive care beds (Guardian, Oct 27, 1999, Guardian Dec 29, 1999). Following this continued pressure an audit of adult critical care resulted in the publication of the report 'Critical to Success' (Audit Commission 1999). This review was critical of intensive care services, commenting that:

'The development of intensive care has been unplanned and haphazard and has largely relied on the interest of local clinicians to develop it' (Audit Commission 1999: 7).

Furthermore the review went on to say that there was no consistency in the organisation and capacity of critical care services, with wide variation between trusts (Audit Commission 1999: 12). Despite the common label (intensive care unit) units varied greatly in terms of case mix (types of

patients), survival rates, management of patients and unit, cost, scale, configuration and the place of critical care within the 'Trust' (the involvement of the Trust Board) (Audit commission 1999: 5). The cost of maintaining these services was increasing by 5–10% per annum. At the time of the review in 1999, data had never been collected which sufficiently demonstrated that critical care was effective. On average one percent of acute hospital beds are designated for critical care, but this varied across the country. In 1993 the average number of beds per unit was 4. This increased in 1999 to six, ranging from 2–22. One third of Trusts did not have high dependency beds (HDU) in 1999 (Audit Commission 1999: 17 - 18). Critical care patients have a high mortality rate, on average this is 20% (to the end of ICU stay), but this varies from unit to unit, increasing to 60% (Audit Commission 1999: 14). This variation between units together with rising costs, a lack of data and the pressure for more beds resulted in the publication of 'Comprehensive Critical Care' (DoH 2000b). An 'expert' group were convened with the aim of:

'Producing a National Framework for adult critical care which is evidence-based (or based on a clear professional consensus) and which sets out operational standards for staffing and transfer levels in ICU and HDU, which makes recommendations about the level, configuration, mix of and provision of general adult and neurological ICU and HDU services' (DoH 2000b: 6)

Comprehensive Critical Care made 29 recommendations for the modernisation of critical care services. £142.5 million was used to pump-prime the changes. The majority of this money was spent on increasing the number of ICU beds, developing HDU beds and providing an 'outreach' service¹². The time scale for modernisation was 3–5 years. This was the first planned investment in critical care, however it came about from media pressure on the Government and resulted in what Klein (2001: 48) refers to as 'silencing by investment'.

Prior to 2000 Trusts had developed their intensive care units as they saw fit, led by the clinicians on the unit and influenced by the hospital politics and competition for resources (ICS 2003). The modernisation of critical care services is now led and monitored by Critical Care Networks. These networks comprise units from several hospitals in a local geographical area (see appendix 1). Trusts became accountable to Government for the management of these services through Critical Care Delivery Groups and the monitoring of bed occupancy (DoH HSC 2000/017, DoH 2000b: 10). This is the first planned investment in and co-ordination of intensive care services since its inception. Work continues in order to standardise units (through the Modernisation Agency) and for the first time collection of data for the Government is mandatory. Despite this important landmark in the history of the development of critical care, five years on there is a view that critical care has not yet met the targets set out in Comprehensive Critical Care. The Intensive Care society stated that

¹² Outreach services are trained nurses (and other professionals such as physiotherapists and intensivists in some hospitals) who help prevent admissions to ICU, facilitate discharge from ICU and provide support to ward nurses looking after patients with impending critical illness.

'An intensive care unit is essential in all acute hospitals, as the skills there are in demand throughout the hospital. If the intensive care team is to satisfy patients' needs, the speciality of intensive care medicine must continue to advance and evolve' (ICS 2003: 7).

As a result these recommendations have been re-emphasised in a new publication; 'Quality Critical Care: Beyond Comprehensive Critical Care' (DoH 2005). This document describes indicators of quality that should underpin the service that potential or actual critically ill patients should receive throughout the hospital. The document makes 12 recommendations.

The Nursing Contribution to the Development of Critical Care

The histories of the NHS (Webster 2002, Klein 2001 and Rivett 1997) make little, if any, mention of the development of intensive care in England. The history of ICU is mostly authored by physicians and anaesthetists (Hamilton 1963, Ibsen 1966, Hilberman 1975, Pontoppidan et al 1977, Cule 1989, Crocket and Mercer 1995, Gilbertson 1995, Kesecioglu 2000). These accounts emphasise the advances in anaesthetics, technology (as equipment and therapeutics) and surgery and therefore make little reference to the contribution of nursing. Histories of intensive care from America (Zalumas 1995, Fairman & Lynaugh 1998) and Australia (Wiles & Daffurn 2002) have dedicated chapters to the development of intensive care nursing. However these authors treat the

development of ICU as a result of technological advancement in response to what medicine saw as physiological challenges of the time.

‘Its development (intensive care nursing) paralleled the rise of medical specialisation and the rapid emergence of complex technology’ (Zalumas 1995: 20).

Furthermore Wiles and Daffurn (2002) view intensive care nursing as a product of the development of ICU rather than as a condition of that development.

‘Medical and technological developments may have been the instruments that created critical care nursing’ (Wiles & Daffurn 2002: 2).

These views of intensive care nursing serve to reinforce the idea that nursing developed as a response to medical advances and this underplays the role of nursing in the development of intensive care. There is a growing literature on intensive care outcomes and much of this has centred on organisational factors. Carmel & Rowen (2001) reviewed fifty-four published studies and concluded that rigorous evaluation of the optimum way to organise and deliver intensive care is essential. There are no British nursing histories of intensive care and therefore the contribution of nursing in its history and development has remained unclear. This view is reinforced in ‘Comprehensive Critical Care’ (DoH 2000b). In this document it states that intensive care developed as a response to advances in medicine and surgery. The report makes no

mention of the nursing contribution in the treatment of polio and goes on to say that the reduced mortality from polio was a result of:

‘The use of technology, combined with the constant attendance of medical staff and the concentration of these patients in a specific area’ (DoH 2000b: 6).

Reference to the nursing contribution is not made until much later within the section on human resources when the document states:

‘Each critically ill patient, wherever they are located in the hospital should have skilled critical care nursing available to care for them directly or to advise on care required to meet their needs’ (DoH 2000b: 19).

Other documents have implied that having a higher number of nurses to patients than seen on the general ward is what typifies an ICU (BMA 1967). A previous Department of Health document in 1996 stated that ‘adequate nurse–staffing was a pre-requisite for providing intensive care’ (DoH 1996:18). However the Royal College of Nursing (RCN 2003) guidance for nurse staffing in critical care commented that providing the right nursing care for critically ill patients is not simply a matter of applying standard nurse–patient ratios. The report goes on to state:

‘The effective use of experienced critical care nurses can greatly improve patient care and reduce the incidence of complications for patients’ (RCN 2003: 2).

This statement recognises that nurses have an important role to play and furthermore have the potential to improve patient outcomes. The period of modernisation of ICU (DoH 2000b) heralded a new era for critical care nurses. For the first time a Department of Health report set out a programme of action to help secure the nursing contribution to the national critical care programme – Comprehensive Critical Care (DoH 2001). Furthermore it was developed in response to a call from critical care practitioners with the aim of improving the quality of care for patients (DoH 2001: 2). It went on to make explicit that the nursing contribution was:

‘Alleviating the impact of critical illness in terms of the patient’s experience and in preventing further deterioration and complications’ (DoH 2001: 5).

This report fails to make clear how the nursing contribution has affected the development of ICU. So far there is insufficient evidence to demonstrate that nurses not only prevent deterioration but can also expedite patient recovery. The report goes on to say that:

‘Pivotal to change in the future is the establishment of Consultant Nurses (also referred to as nurse consultants). Consultant nurse posts within critical care will help to provide the leadership and direction needed’ (DoH 2001: 6).

This report is the first time the nursing contribution has been made explicit. Its aim was to ensure that the nursing contribution to the

provision of effective patient care is not only recognised but valued in the future (DoH 2001: 11).

A review of the literature concerned with the research evidence defining and quantifying the nursing contribution to patient care and outcome demonstrated there were difficulties (Spilsbury & Meyers 2001). There were a range of methodologies and number of definitions used and different tools employed. The review relied on work related to nursing-sensitive issues (such as the 'doing' component of nursing: washing, hydration etc.), skill mix and changing roles. The authors suggest that there is evidence which reflects the positive impact of nursing care on patient outcome, however this research fails to describe the structure and processes of care that contribute to nursing-sensitive outcomes. Furthermore in the area of skill mix no firm conclusions could be drawn since care is context specific (Spilsbury & Meyers 2004).

The contribution nurses make to the management of critically ill patients is usually appraised through the use of concepts such as 'patient dependency' or 'nursing workload'. According to Ball et al (2004) these concepts 'fail to address the knowledge, skills and experiences of nurses' (Ibid.: 62). The first study to examine the potential nursing contribution to the recovery of the critically ill patient was conducted by Ball & McElligott (2002). The study came about because of a lack of reliable and valid patient dependency tools. The authors concluded that current nursing workload tools and patient nurse ratios were seen to lack validity because they

'do not appraise the context in which care is delivered, define all nurses as equal and concentrate on activity rather than the effect nurses can have on the outcome of the critically ill' (Ball & McElligott 2003: 226).

The study was undertaken in ten critical care units in London. Data collection tools comprised both relative and nurse interviews, participant observation and scenario analysis. It was not possible at the time of the study to determine the views of patients after discharge from ICU however this would add valuable data. The aim of the study was to describe the potential difference nurses make to a patient's recovery, the prevention of deterioration and the support of relatives. More specifically they wanted to establish which, if any, nursing activity could not be undertaken if the ratio of patients to nurses increased and to explore the effect of this on patient recovery. The study therefore was not specific to any one area of nursing care and as such it is difficult to extrapolate specific interpretations. However weaning was an example of a scenario analysis. The scenario analysis was only undertaken by senior nurses who took charge of the unit (grade F, G and H). The aim was to allow reflection on the issues facing nurses and patients when a one to one ratio of nurse to patient was not possible. The results are presented as a model (see appendix 2). Analysis of the results identified there were four distinct but inter-related areas that affected the differences nurses were able to make to the recovery of critically ill patients, the prevention of deterioration and the support of relatives. These were; the geography of the unit, unit activity, patient dependency and skill mix. These form what Ball and McElligott refer to as the 'context' within which the individual

attributes of the nurse have their impact on patient recovery. Both recovery and deterioration can be affected by knowledge, experience and exposure which the authors refer to as 'skill mix'. The geography of the unit and unit activity had a major impact on the attributes nurses needed to exhibit if progress towards recovery was to be attempted. The study demonstrated that the recovery of the patient was affected by nurses' knowledge, experience and exposure to critical care. The presence of these key factors underpinned the individual attributes of the nurse in terms of patient care, proactive management, vigilance, preventing harm, coping with the unexpected and emotional support. These in turn led to a decreased risk and the progression of the patient towards recovery (Ball & McElligott 2002: 42). The authors recognise that they only described the potential difference a nurse can make to a patient's recovery. They go on to recommend further research that demonstrates the actual difference. Key measures would need to be developed before the model can be tested in practice. This research has demonstrated that trying to examine the nursing contribution to care of the critically ill patient (and their relatives) is complex. Whilst the authors have developed a model it has yet to be tested in practice. Nevertheless the description of intensive care units and the activity is representative of many units in the U.K. Although scenarios were used in the study they were not detailed and were aimed at discovering to what extent a change in nurse patient ratios would have on patient care. This was not corroborated in observation which was designed to describe the context in which care was delivered. Within the context of care the effect technology has on the delivery of care is an important concern this is particularly relevant in ICU where the division

of labour is blurred. These were not described or investigated in the study.

Recognition that this is an important area for research has led the RCN to call for more research to determine the exact nature of the contribution that skilled nurses make to a patient's experience and recovery (RCN 2003: 5). Dissatisfied with the lack of a reliable tool that attempts to measure how critically ill patients fluctuate in their recovery and therefore the danger presented by being critically ill Ball et al (2004) developed a tool that attempts to measure risk and the process of risk management undertaken by nurses who coordinate the shifts or lead the nursing team. A pilot study determined the tool to be valid but has yet to determine reliability. Nevertheless it offers a new way of looking at staffing in ICU. They conclude that 'definitive proof that nurses and nursing made a difference in the care of the critically ill remains elusive' (Ball et al 2004: 67).

Conclusion

The development of intensive care can be attributed to a number of factors. A response to the polio epidemic of 1952 provided the impetus for re-organising the care of a large number of patients into a central location in order that they received close and detailed monitoring by nurses. Respiratory units (the precursor of ICU) became a necessity due to the large numbers of patients admitted with respiratory and bulbar palsy (paralysis of the chest and throat) as a result of polio. A failure of the existing technology and a high mortality rate resulted in the transfer

of technologies from the operating theatre. The development of intensive care thereafter was unplanned and ad hoc responding to local developments and iatrogenic complications that arose as a consequence of the treatments (technologies) used. The demand for intensive care beds often exceeded the supply. The tragic death of a 10-year old boy in 1995 followed by the flu epidemic of 1999 resulted in media pressure that forced the government of the day to review the provision of critical care services. What followed was a period of modernisation of critical care services (DoH 2000b).

Intensive care became a new speciality and was re-named 'Critical Care'. This new philosophy is based not on a discrete geographical location but on severity of patient illness. The nursing contribution to the development of ICU until now has not been made clear. By including nurses in the history of critical care this history looks different. Nursing patients together was a technological innovation in itself, what made it successful was the fact that nurses adapted and developed knowledge and skills to enable them to provide the detailed observation of critically ill patients with or without technological adjuncts.

This part of the review has explored the history and development of intensive care and found that one of the contributing factors was a change in the organisation of care and the content of nursing work. When the transfer of technology occurs this has consequences for nursing. The ability to adapt has largely been unrecognised and unexplored in the context of critical care. The next part of the literature review explores how nursing work has changed in health care in general. Some of this has

been in response to professional and political expedients and some of it in response to the use of technology. What becomes apparent is that the nursing contribution to care has been marginalized, undervalued and is difficult to see. This has been examined in the literature and it has been suggested that nursing work has been rendered invisible. I firstly examine what this means and secondly, I refer to the literature on the transfer of technology and the division of labour before going on to examine the nursing relation with technology in order to provide an interpretation.

1.1: The Transfer of Technology and the Division of Labour

Introduction

In the previous section I have demonstrated that the nursing contribution to the development of critical care is unacknowledged. A review of the literature in health care reveals that nurses have adapted and changed their roles in an effort to accommodate the changing needs of health care but that this also remains largely unrecognised (Scholes et al 1999, Scholes & Vaughan 2002). Authors have explored this area in a variety of ways in an effort to demonstrate the nursing contribution to health care (Lawler 1991, Benner 1984, Benner et al 1992, 1997, Allen 1996, Sandelowski 1996, 1997, 1998, 2000b, Manias & Street 2001, Ball & McElligott 2002, 2003, Ball & Cox 2003, Ball & Cox 2004). The nursing contribution is not always explicit and some authors have inferred this to mean that nursing work is therefore 'invisible' (Wolf 1989, Lawler 1991, Benner et al 1997, Liaschenko 1998, Sandelowski 2000b, Manias & Street 2001). This part of the review begins by examining what is meant when the word 'invisible' is used in the literature. Visibility may refer to the ability to be seen, meaning the nurses' presence was valued or recognised, revealed, or made explicit. The invisibility of nurses or nursing work may not be just the case of defining the opposite of visible. In order to explore this further it is necessary to examine the relationship between the transfer of technology and the literature concerning the division of labour. The seminal work of Davina Allen (1996) is used to

examine the changes in nursing work and to illustrate how the devolvement of doctors' tasks to nurses has changed the division of labour and how this has affected the relations between doctors and nurses. I contrast the work of Allen with Sandelowski and suggest that technology is one way to bring to the forefront the nursing contribution in critical care.

The Nursing Contribution to Health Care

The nursing contribution to health care is often hard to see because nurses have difficulty articulating what it is they do. Moreover when they do, they are not acknowledged for their work because it is seen as less important, trivialised or undervalued. It therefore remains hidden, as Allen (2001) states:

‘Nursing has yet to find an adequate language with which to articulate its function and thus elements of it remain invisible to those outside of the occupation, or they get defined in a residual way’ (Allen 2001: 178).

Nurses' ability to speak about their knowledge is constrained by dominant practices, such as medical notes, medical consultation and consequent silencing and invalidation of nursing knowledge within the hospital setting (Sweet & Norman 1995, Parker & Gardner 1992). Liaschenko (1998) describes nurses as the ‘eyes and ears’ of medicine (Ibid.: 15). By this she means that the knowledge that falls outside the parameters of the medical scientific discourse is ignored, trivialised or

denied as knowledge which means that only certain aspects of reality can be seen and heard (Ibid.). Much of the work that nurses do is taken for granted and therefore invisible to the institutional power structure. For example when a nurse spends two hours getting a doctor to prescribe pain relief, this is interpreted by the patient as the doctor ordered an increase in medication and the nurse followed those orders (Ibid.). Wolf (1989) states that nursing work is not only taken for granted, it is also dishonoured and ignored and this causes it to become invisible. Moreover because much of nursing work is seen as women's work which is undervalued, (Garmarnikow 1978) it follows that nursing work too will be seen in the same way. The association with working with the body and its products renders nurses' work as 'dirty' (Hughes 1964). The failure to acknowledge this aspect of nursing work keeps it hidden. Lawler (1991) in her work on the somology of the body stated that:

'Such is the nature of the way our society deals with the body, however, that nurses' knowledge of the body is not well documented, if it is documented at all, because nurses deal with what people do not want to know about. Not only do people not want to know about it, nurses' knowledge of the body has a style and form which to date, has not been representative of what has counted as proper knowledge. It is a practical knowledge and as such is often regarded as a kind of knowledge that does not fit comfortably with theory and research. It is also regarded as the sort of thinking women do – that is, it is perceived as more emotional than rational and not relying heavily on intellect' (Lawler 1991: 226).

Therefore nursing work according to Lawler has been largely invisible, nurses' knowledge has been poorly represented and as an occupation nursing has been minimally understood and poorly valued (Lawler 1991: 227). Lawler's study demonstrated that nurses have a vast knowledge of the body and that this knowledge is anything but irrational and emotional, rather it is complex. However whilst society has construed that the body must be hidden, so will nursing and the work that nurses do (Lawler 1991: 227).

Nurses are rendered invisible by others and can also render themselves invisible. This can be illustrated by examining the interactions between doctors and nurses on the ward round. The ward round is a valuable activity which enables an integrated plan of care to be made, and when there is effective collaboration between health care professions it results in quality patient care (Busby & Gilchrist 1992). This is therefore an area where nurses have an important role to play. Busby and Gilchrist (1992) recognised that the nurses' role had been limited and recommended that nurses become more assertive and participate actively in decision making, whilst doctors relinquish some control. However they failed to recognise the complex power struggles that characterise doctor – nurse relations (Manias & Street 2001). This ethnographic study explored the power relations associated with the ways in which experienced nurses interacted with doctors on a ward round in one intensive care unit in Australia. They found the nursing contribution on an intensive care ward round was marginalized by doctors. Nurses were not considered to be essential, with the consultant designating nursing care as 'house-keeping'. This undervalued both the sophisticated technical knowledge of the nurse and

the experience of being with the patient (knowing the patient). In this way nurses were treated as if they were invisible (Manias & Street 2001). By determining specific times and topics for nurses to contribute to the ward round, the nursing role was tightly regulated by the consultant. The role of the nurse centred on giving information about the patient. This, rather than being seen as essential, was treated as supplementary. Nurses also rendered themselves invisible by either absenting themselves from ward rounds or by acting as passive bystanders (Mallik 1992, Busby & Gilchrist 1992, Whale 1993, Wright et al 1996, Felten et al et al 1997 Manias & Street 2001, Ball & McElligott 2002). Nurses become silenced at the bedside through a process of what Sweet refers to as 'differential visibility' (Sweet & Norman 1995; 51) that is the doctor decides when a nurse becomes visible or invisible to others depending on the person, place, time and forms of symbolic representation.

The Division of Labour

Allen (1996) uses the concept of the negotiated order to explore the division of labour in a medical and a surgical ward in a district general hospital. Drawing on her ethnographic accounts of nursing work she focuses on five key work boundaries: (1) nurse – doctor, (2) nurse – manager, (3) nurse – support worker, (4) nurse – patient and (5) nurse – nurse. A central theme in her research is 'organizational turbulence' (Ibid.: 165). It refers to the constant fluctuations in health care which resulted in an expectation that the ward nurse would absorb new activities into existing work. This meant that nurses were undertaking tasks devolved from doctors and these became extensions of their role. It was

easier than trying to get doctors to change their work and was better for patients (Allen 2001). However as Allen points out in the policy-making arena, there seems to be an assumption that nursing work is 'infinitely elastic' and because nurses represent the largest occupational group, they became 'endlessly absorbent sponge(s) ready to soak up every additional duty' (Ibid.: 165). That is they do whatever is necessary in order to provide the care for their patients. Further more, in her study, Allen found flexibility was an institutionalized expectation of the nursing role (Ibid.) She found that changing the content of nursing work created tensions for nurses. Nurses tried to integrate caring activities into the core profession of the nursing role but this challenged the traditional status of hierarchy that elevated 'technical' over caring work in the provision of health care. This situation created significant jurisdictional ambiguity for both nursing and medical staff (Allen 2001). Nurse practitioner posts were one attempt to realign the formal division of labour between doctors and nurses. This realignment of doctors' and nurses' work roles appeared to be taking place with 'minimal negotiative effort and little explicit conflict' (Allen 2001: 127). Medical staff were happy to devolve certain roles to nurses, such as intravenous drug infusions, but these were limited to technical tasks. Medicine controlled which tasks were devolved and which remained in the jurisdiction of doctoring (Allen 2001). Snelgrove & Hughes (2000) found that doctors were ambivalent about extended roles of the nurse and acknowledged the benefits of delegating routine or burdensome tasks. Conversely they felt the need to exclude nurses from areas such as prescribing and treatment planning, which they perceived as doctors work. Training for expanded roles was rigorous, much more so than the traditional medical method of 'see one, do one and teach one'

(Allen 2001: 129). Medical staff did not need to demonstrate their knowledge. Whilst the plethora of learning packages for nurses demonstrated the nursing contribution and differentiated it from other lower occupational groups, it had the effect of subordinating nurses to technicians. Doctors thought their packages were too detailed, unnecessary when the skill could easily be taught. Doctors downgraded tasks devolved to nurses by emphasising the repetitive and practical nature of the task (Allen 2001).

The devolvement of activities to nurses had a double-edged effect. It improved patient care but increased nursing workload to the extent that patient contact, regarded as central to nursing, was reduced (Allen 2001). However, jurisdictional shifts were managed because nurses felt that they had control over their work and could prioritise nursing care over expanded or devolved tasks (Allen 2001). Snelgrove & Hughes (2000) found nurses' accounts of their work were dominated by their claims to know the patient as a person. Nurses' detailed knowledge of the patient as an individual gave them a position of strength in their negotiations with doctors. Nurses employed these knowledge claims to redefine occupational boundaries and establish areas of professional jurisdiction not controlled by doctors. In contrast Allen found that knowing the patient resulted in intra – occupational tensions. Senior nurses found they were expected to know the patient, yet work pressures meant it was almost impossible to do so, but not to know the patient threatened their professional competence (Allen 2001).

The boundaries between the groups were developed and maintained through claims of competence in dealing with different problems and in this process differences rather than similarities were stressed (Snelgrove & Hughes 2000). When nurses took on the role of patient advocate this gave them the jurisdiction to challenge the medical staff as they could use the information about the patient to express their views. Allen found nurses managed strains by undertaking a range of activities that fell beyond their usual boundaries. It led them to violate organisational policies by undertaking medical work, for example, giving additional intravenous infusions when the prescription had run out, and ordering tests. Allen refers to this as boundary blurring that took place to maintain the continuity of patient care and to ensure co-ordination of work. It occurred when nurses extended their roles without explicit permission. Nurses did this when the doctor was unavailable but returned to boundary working when the doctor was present. Boundary blurring gave nurses greater local autonomy over their work, it also improved patient care and avoided inter-personal tensions. Boundary management was an important but overlooked skill. Snelgrove & Hughes found role blurring occurred when work pressures increased, was dependent upon the locale of nursing and changing health policy which led to the informal crossing of boundaries (Snelgrove & Hughes 2000).

Nurses did much to adapt and change to meet the demands of health care. Furthermore these changes were often imposed, labelled for the benefit of patient care which left nurses little choice but to embrace this changing shape of nursing work. As a result tensions were created when nurses tried to reconcile professional models of care with the workforce reality

of hospital nursing, subjecting nurses to conflicting and ambiguous ideologies (Allen 2001). The most intolerable strains were those that profoundly affected their sense of professional identity and were manifested in the nurses' ability to manage the content and control of nursing work and those elements that came between the nurse and caring work (Allen 2001).

Doctor – Nurse Relations

Allen's work has identified how a change in nursing work affected the doctor – nurse relations. A review of the literature, exploring doctor – nurse relations cannot overlook the important contribution of the work conducted by Stein (1967). This work demonstrated doctor – nurse relations were characterised by game playing which enabled the nurse to inform and advise the doctor without challenging his / her position. Hughes (1988) examined the doctor – nurse relation within a British Accident and Emergency department and found that the nurse's influence was greater and more overt than had previously been reported by Stein. Nursing involvement in decision-making was open and deliberate but was not officially sanctioned (Hughes 1988). Porter (1991) in his participant observational study of an intensive care unit and a general medical ward found that the doctor (junior) – nurse relation described by Stein (1967) was not evident and suggested the relationship between the doctor and nurse had become more equitable and this was reinforced by Stein et al in a later study (Stein et al 1990). Nurses frequently used formal overt decision making strategies but this did not mean that there was equal power between them. However this relationship was not evident in the

interactions between medical consultant and nurse (Porter 1991). This is an important factor as nurses in ICU work closely with consultants.

Svensson (1996) stated that traditional models of exploring medical dominance were deterministic and were not appropriate to explore doctor – nurse relations in a contemporary hospital setting. He suggested a negotiated order perspective was more appropriate and used this to examine doctor – nurse relations in five Swedish hospitals (Svensson 1996). He notes that these relationships had changed over the last decade and were influenced by three key changes. Firstly an increase in chronic disease had created a shift from preventing death to handling life. Secondly, the move from task allocation to team nursing allowed a closer nurse – patient relationship and thirdly, the way ward rounds were conducted allowed nurses more scope to influence patient management decisions. These changes had given nurses in Sweden an opportunity to influence patient care decisions but these results were not seen in the work conducted by Manias and Street (2001). Thus the ability to see nursing work, according to Manias and Street is influenced by power differences (among others such as class, gender, researcher's own) between doctors and nurses and their place within the traditional hierarchical paradigm.

Technology: Making Nurses' Work Visible?

The devolvement of doctors' tasks to nursing is the transfer of technology. Nurses' willingness to undertake these tasks is often underestimated and overlooked yet nursing has negotiated these changes

in order to adapt to the changing needs of health care often resulting in tensions and role blurring. Despite this, nurses have the ability to use technology to make visible their contribution to health care. Technology can be paradoxical: it can be used to make visible what nurses do and also render their work invisible (Sandelowski 1997). The use and control of technology is an important factor in the visibility of nurses' work. Simply using technology does not necessarily make nurses' work visible. Technology becomes controlling when those who use it do so to subordinate others. Bijker, Hughes and Pinch (1989) use radiography as an example and state that doctors designed technology that was to be used by others and this may have the effect of rendering the work of those who use the technology as invisible because it is seen as less important. Control can also mean the absence of key people in the design and implementation of technology. Pasveer (1989) found that, in the introduction of computerised records in two renal units, nurses were not included in the steering groups yet they were one of the professional groups using it. The nursing contribution remains invisible because nurses are absented from the design and manufacture of the technology. Technology can also be controlling when a professional group controls the use of the technology by others (Sandelowski 2000, the thermometer; Tjora 2000, computerised screening tool; Child et al 1984, General Practitioners and diagnosis of hypertension). Another expression of control is the development of expert knowledge. This, according to Scarbrough & Corbett (1992), increases power for those who have knowledge and prohibits the use of technology by others, whereas Reverby (1987) stated that technical skill and knowledge do not directly translate into control over work (ibid.: 204). Cooper (1993) states that the

dominance of technology renders many experiences of care invisible or at best obscured. As ICU has been traditionally defined by technology and according to Cooper (1993) does not value the caring element, nursing work therefore remains invisible. This is in agreement with Walters (1995b) who states that technology has the potential to render invisible humanistic nursing practice. Nursing expertise and judgement are often overruled by medical instructions. Often nurses are forced to accept responsibility for patient care based on equipment (Purnell 1998). This may give the impression of making nursing work invisible. Nurses can, however use technology to make their work visible. Sandelowski (2000a) describes the implementation and use of electronic fetal monitoring by nurses as a way of making visible what they did (the practice of nursing). However what nurses did to make electronic fetal monitoring work (the introduction of technology, gaining patient acceptance and compliance) for patients, doctors and the hospital remained largely invisible.

Conclusion

An examination of the literature has revealed that political and professional imperatives have resulted in the devolvement of (transfer of) junior doctors' tasks to nurses resulting in the extension and expansion of nursing roles or the creation of new roles. The fact that this is happening with little negotiation and conflict does not mean nurses have not always accepted this without dissent. Tensions for nurses have resulted as they try to combine all the elements of their role. It has resulted in boundary working and boundary blurring (Allen 1996). This contribution to health care at one level often goes unrecognised. The literature uses the term

invisible to describe how nursing is put in the background, that is their work is hidden, unrecognised or devalued. On another level nursing work is clearly visible but is taken for granted and as a profession nursing has remained marginalized. As Allen reminds us

‘The content of nursing practice is constantly changing, if nurses are to shape and re-shape their work for the benefits of patients, they need to find a way of communicating their contribution’ (Allen 2001: 179).

I have chosen to explore the works of Allen (1996) and Sandelowski (2000) because they approach the subject of ‘nursing work’ from different standpoints. Sandelowski employs a social constructionist approach to study the nursing – technology relation. She uses an historical perspective to trace this relationship and in doing so illuminates key moments in the history of nursing. Allen adopts a sociological perspective and studies the division of labour from a negotiated order. Whilst both these perspectives are important they come from very different positions. Both authors demonstrate that the nursing contribution to health care can be rendered invisible. Allen (1996) demonstrated that nurses used boundary blurring when doctors were absent in order to provide continuity of patient care but reverted to boundary working when doctors were present. These jurisdictional shifts were managed with minimal negotiation and little explicit conflict (Allen 2001). This was achieved when nurses had control over their work and could prioritise nursing care over doctor-devolved work (transferred) but concluded that changing the content of nursing work created tensions for

nurses. Sandelowski's primary concern was to demonstrate how technology had shaped nursing practice and how nursing practice had shaped technology. In doing so she reveals how this has affected the division of labour in health care. Both Allen and Sandelowski demonstrated that doctors were happy to devolve certain tasks to nurses but retained control over them by differentiating what nurses did from what doctors did. Doctors subordinated nurses to technicians and downgraded tasks devolved to nurses as simple and as a skill that could be easily taught. Both Allen and Sandelowski demonstrate that nurses tried to retain their cultural identity but this created tensions in the care - cure debate. Sandelowski suggests that some technologies transferred from medicine may not fit with the values of nursing and nurses should question if they have a place at all in nursing.

The first part of the literature review chronicled the development of critical care. One of the contributing factors to this development was the transfer of technology. Nurses accommodated this technology into their practice but this has the effect of marginalizing the nursing contribution. The second part examined the changing roles of nurses and central to this was the transfer of technologies from medical staff. The next part of the review examines the nursing – technology relation and in particular examines the work of Sandelowski. She alludes to the transfer of technology (from doctor to nurse) but does not develop this. I will develop two concepts: technology transferred and technology transformed.

1.2 The Nursing – Technology Relation: Making Visible the Nursing Contribution

Introduction

This section focuses on the work of Sandelowski who is an internationally recognised authority on the nursing - technology relation. Sandelowski views technology as a neutral object, acquiring values or non-neutrality by virtue of how human beings use or abuse it (for example 'guns do not kill people, people do' Sandelowski 1996: 11). Any one technology therefore can hold many meanings to various human users (Sandelowski 2000a). Sandelowski analyses key events in the history of nursing such as the use of the thermometer and electronic fetal monitor to illuminate the nursing - technology relation. She examines how nurses have perceived and used technologies, how technology has shaped nursing practice and how technology has been shaped by nursing practice.

Whilst Sandelowski alludes to technologies being transferred or transformed she never makes a clear distinction between them. Building on her work, this section examines these concepts further. This part of the literature review begins by exploring a number of definitions of technology before going on to examine the main philosophies. This is followed by an examination of the literature concerned with the nursing – technology relation, focusing on the dual role of technology which on the

one hand makes visible the nursing contribution to patient care and on the other renders it invisible.

Definition of Technology

Different perspectives and philosophies have ascribed different meanings to technology. Sandelowski examines the history of technology from the perspective of nursing and asserts that most health care workers view technology as the drugs, devices and procedures used in clinical practice (Sandelowski 2000a). She analyses the trajectory of the thermometer and notes that few nurses would describe the thermometer as a technology, let alone revolutionary, yet according to Sandelowski this was among the technological advances that transformed the world and work of the late 19th and 20th century nurse (Ibid.: 83) This in part is due to how commonplace the technology has become and this changes how it is viewed. Sachs (1972) describes technologies as 'made at home', once they become part of every day practice. Fairman (1992) established that intensive care nurses in America did not view familiar machines and equipment (such as the ventilator) as technology. Technologies according to Beheny (1989) include not only the drugs, devices, medical and surgical procedures used in medical care but the organisational and supportive systems within which such care is delivered (Beheny 1989: 759). The same technology can also have different meanings at different times. The ventilator, for example in the case of Karen Ann Quinlan became a symbol of both the advanced technology of modern health care and the ambivalence towards it (Reiser & Anbar 1984: 14). This was a landmark case in the USA in which Karen Ann Quinlan, a patient in a

coma, was attached to the ventilator. It became necessary to approach the courts in order to remove the ventilator when there was thought to be no hope of recovery. Karen Ann lived for some time after the ventilator was removed. The ventilator, originally applied as a life-saving technology, became a technology, not of saving life but of prolonging death, and in some cases prompted the redefinition of death itself (Lock 2002). The same technology acquires a different meaning when applied in a different time and in different user contexts.

‘Once turned on the ventilator seemed autonomous, its power to save life matched its power to torment life’ (Reiser & Anbar 1984: 14).

Locker and Kaufert (1988) in their case study of patients with respiratory failure following poliomyelitis concentrated on the users perspective and found that instead of being a liberating force, technology produced dependence and fear. There was a trading off between the benefits of technology and the problems associated with it. Sandelowski demonstrates that the use of the thermometer was different depending upon whether a doctor used it to diagnose or a nurse used it as a method of surveillance (Sandelowski 2000a). Sandelowski’s orientation to technology ‘emphasises the material and social world of the nurse around “equipment-embodied” technologies, as opposed to any process, system or other means to achieve desired ends that might be defined as technology’ (Sandelowski 2000: 18). Whilst Sandelowski views technology as a value-free object Mackensie and Wacjman (1985) approach the definition of technology by distinguishing between three

layers of meaning. The first layer is technology as a physical object or artefact, the second layer refers to activities or practices and the third layer refers to what people know as well as what they do. This definition encompasses technology as a process, of which equipment, machinery etc. are objects used in that (social) process. This is not to say that Sandelowski does not recognise or acknowledge the social, cultural or symbolic significance of technology but rather she appears to position herself between the perspectives of technological determinism and social constructivism. She refers to technology as being an object, with 'inclinations of its own' but also as socially constructed. Technology is both shaped by culture and shapes culture.

Theoretical Perspectives and Philosophies of Technology

Barnard states that contemporary nursing will benefit from philosophical inquiry that places technology as a primary focus of attention, resulting in improved clinical practice (Barnard 2002: 24). Broadly speaking the debate about the relationship between technology and society in the technological literature can be divided into three main theoretical perspectives: technological determinism, social essentialism or constructivism and technology in action.

Technological Determinism

Technological determinism reflects one extreme of the technological literature. Technology is seen as the driving force in modern society. Technology in this sense determines society and is given super powers.

These may be used as a means of social control. Bijker, Hughes and Pinch (1989) use radiography to illustrate this and state that doctors designed technology that was to be used by others. The introduction of computerised records in two renal units (Pasveer 1989), computerised screening tool Tjora (2000), general practitioners and diagnosis of hypertension Child et al (1984) are other examples. Conrad (1979) explored the ways medicine functioned as an institution of social control, where technology was used to coerce and control. Timmermans and Berg (2003) criticise Conrad's conceptualisation of technology as limited. What is missing from this perspective is how technology got there in the first place and the power relations in existence. The introduction of computerised medical diagnosis of hypertension is an example. Nurses could have operated this system but the fact that it was not used in this way is attributed to the professional interests of the medical staff. The medical profession's exclusive control of the technology rested on the claim that expert medical judgement was required to gauge the truthfulness of the patient's response (Child et al 1984). If we look at the history of ICU we see that technology was transferred from one geographical place to another, in this way technology could be seen to have created intensive care. The development of ICU thereafter could be seen as a direct result of the technological advancements and the view that has helped to shape the culture of ICU as a 'high-tech' environment prevails. However this view is contested in this thesis as potentially misleading. What technology was introduced, when and how effective was determined not in a planned and rationale way but was determined by political, economic and professional ideals of the time. A determinist

perspective does not take into account the history of technology and therefore treats it in a vacuum.

There is an assumption that technology is harmful: for example advanced resuscitation technologies have been associated with an undignified death. Timmermans (1998) states that a technological determinist orientation rests upon romanticised notions of dignified death in impoverished eras and cultures. He argues that in some cases the use of technology is inappropriate. In western cultures resuscitation techniques can be interpreted as providing a passage from the end of life to death and a vehicle for health care staff to prepare relatives for impending death (Timmermans 1998). He went on to summarise that the potential and power of a technological device is not pre-given but is realized in practice; it is therefore user dependent. According to Timmermans and Berg (2003) technological determinism is not about analysing technology but more about constructing a symbolic case against medical hegemony.

One criticism of technological determinism is that it is reductionist and ascribes super powers to the technology itself. The intensive care setting has become synonymous with technology and the ventilator has become known as 'life – support', as if the ventilator itself has the power to save life. It could be argued that it is the users of this technology who have the power. The user in this context could exert his power by removing the ventilator. Power, gender, social class etc. are important issues in the analysis of technology but are treated as consequences of technology from a deterministic view. The determinist view of technology ignores gender as an influential factor in the development of technology.

Wacjman (1991) states the gender of the workforce and the relations between the sexes profoundly influences the direction and pace of technological change. As the workforce of critical care is predominately female (nurses) but those who assert power are male (doctors) this has implications for the design, implementation and use of technology. Nurses in critical care were absented from the design of technology but were frequently left to implement it. Doctors retained control over technology by differentiating what they did from nurses. Within the intensive care setting there is a hierarchy of power but this is not determined by the technology per se but is historical and gender based. Intensivists (anaesthetists) have been attributed with the knowledge and skills regarding ventilation and therefore the ventilator was seen to be their domain. The ventilator originated from the operating room and was brought into ICU in order to treat new and different conditions. The transfer of this technology has been insidious. Nurses have monitored the ventilator, recording observations and titrating settings according to parameters set by the medical staff. In recent years nurses have begun to alter ventilator settings to allow the weaning of patients and even discontinuation from the ventilator. A determinist analysis of technology does not take into account how or why these changes have occurred only that they were inevitable. Scarbrough and Corbett ask whether this is a result of 'technology push or demand pull' (Ibid.: 7).

The technological determinist perspective suggests the adoption of a given technical system requires the creation and maintenance of a particular set of social conditions as the operating environment of that system. According to Scarbrough and Corbett (1992) organisations

therefore have little choice but to adapt their skills and organisation of work to the requirements of technology. They go on to ask if organisations are 'passive receivers of predetermined technological artefacts or autonomous controllers of technological change?' They conclude by stating 'organisations shape the technological process at the same time it shapes them' (Ibid.:7). The question therefore is: was ICU shaped by technology or has ICU shaped technology? A determinist view would answer that technology has been the driving force in the development of ICU and as such shaped the social processes and culture that prevails. This view that technology alone has resulted in what exists today ignores the trajectory of the development of the NHS of which critical care is a small part. Another view is the social essentialist or constructivist perspectives.

Social Essentialism/Constructivism

Social essentialism views technology as a blank slate to be interpreted and rendered meaningful by culture (Timmermans and Berg 2003). Technology is thus seen as a social catalyst: passive tools that generate social meaning but do not act or evolve. Viewed in this way technology can be seen as a dominant force in the intensive care environment taking on meanings that are specific to ICU such as 'life saving' and 'cure'. It has become a convincing notion that intensive care should be equipped with the latest state of the art equipment. Critical care therefore is socially constructed and its development a result of social forces.

Social essentialism is seen as a weak form of social constructivism. (For constructivist approaches see Pinch & Bijker 1987, Bijker, Hughes and Pinch 1989, Bijker and Law 1992 and Elston 1997). Technology is socially constructed. Machines have meaning ascribed to them and any one technology can have a different meaning depending on what Don Ihde refers to as 'use-contexts' which Pinch and Bijker (1987) refer to as the 'interpretative flexibility' of machines. However Sandelowski (2000) states it is misleading to think of technological objects as wholly dependent on their user contexts, as having unlimited interpretive flexibility. She states they are not totally plastic but have 'inclinations' of their own. By virtue of both form and function objects have a valence, that is, they are what they are because of what they are. For example the ventilator is designed to help the patient breathe. It cannot be used for anything else. The social meaning this has is related to how it is used and the user context. For example to the patient the ventilator is a restraining device, uncomfortable and noisy, to relatives life-support, to staff a commonplace piece of machinery.

Much constructivist research is concerned with the processes and interactions that lead to the general acceptance of technological designs or facts. A criticism of this approach is the lack of attention paid to natural language distinctions made by the people who work with the technology. Bijker et al (1989) argue that the social constructivist view is over-idealised, relating science to the discovery of truth through technology. The Social Construction of Technology (SCOT) approach does not intend to present a view of technology from the users' perspective but how users get involved in the design of technology (Tjora

2000). The constructivist approach puts issues of power and conflict in the foreground. Technology is socially constructed or as Mackenzie and Wajcman (1999) refer to as 'shaped'.

Technology in Action

Technology in action (Latour 1987) has resulted from the shortfall of both technological determinism and social essentialism and originated from the field of science and technology studies. Timmermans and Berg (2003) explain that medical technology is located ethnographically or historically in the practice of designing or using the technology. It differs from technological determinism in that it does not have any super powers. Technology is only one actor among many. It is also different from social essentialism in that it is not a blank slate to be interpreted. Unlike determinism, technology is embedded in the actions of health care workers and other devices. The purpose of the technology in action approach according to Timmermans and Berg (2003) is to explore what technology does and what becomes relevant depends on how it is transformed during technological practice. In these terms technology in ICU represents dominant ideologies, these on the whole, have been medically led and concerned with issues of power and control. Within the context of ICU nurses have not been involved in the design of technologies. Choice of what machine to buy is limited to one of several options wider choices are usually determined by the medical staff (that is what type of machine will be tested). Thus technologies represent the values of the creators.

Latour (1987) argues that in order to get a full understanding of technology it must be seen in action. He does this in two main ways: through the scrutiny of academic literature, which he calls 'the anatomy of scientific papers' and by watching where science is made: in the laboratory. In the laboratory technology assumes a more powerful presence (than in the literature) because experiments can be seen and re-enacted. In this way the relationship between science and society can be understood. The recent literature of technology in practice has become known as workplace studies (Timmermans 1998, Dent 1990, Tjora 2000, Sandelowski 2000). Timmermans investigates resuscitation in action in order to contextualise life-saving technology in practice. There still remains a dearth of work place studies despite the widespread deployment of technology in health care. Heath, Luff and Svensson (2003) call for more research of this nature in critical care areas.

A Philosophy of Technology: The Perspective of Ihde (1979, 1990)

Sandelowski leans towards the writings of Ihde (1979). Ihde views technology from two broad perspectives; utopian and dystopian. The utopian perspective sees knowledge as a means of gaining power. Human limitation could be overcome by using this power. The dystopian perspective views people becoming entrapped by technology which eventually threatens the survival of human existence. Technology can magnify the objective aspects of human life whilst reducing the subjective qualities. Ihde views the human – technology relationship as 'embodied', that is, it occurs when human perceptual and bodily experiences are enhanced and transformed. Sandelowski analyses

technology as 'object'. She states that this is a necessary position in order to draw attention to and garner respect for the independent force that objects exert in human - machine interactions. It also helps clarify the relationship between technology and nursing (Sandelowski 1996: 5). She states that objects are never free from the biographical, historical and socio-cultural contexts in which they are made and used; they can nevertheless be said to have 'inclinations' (Ihde 1979) of their own . Sandelowski states

'it is necessary to truly understand and meet the challenge that technology poses for nursing practice to look at how the things we use bend us to their will and even alter our desires' (Sandelowski 1996: 7).

Sandelowski appears to present us with a contradiction, on the one hand, technologies are value free objects that acquire their value from society and on the other they are not entirely passive instruments but are 'tools at our hand's end', the question she asks is 'whose hand is being extended and toward what end?' (Sandelowski 1996: 7). By this she refers to the relationship between technology and power. According to Scarbrough and Corbett (1992) seeing technology as a process involves not just the hardware but also the flows of knowledge associated with that hardware. In this way the political factors emerge, such as control and power. By determining the flows of knowledge from which technology emerges and by shaping the context for its user, powerful groups according to Scarbrough and Corbett, are able to assert their own interests into the technological process. They can do this in a number of ways such as

presenting oneself as an 'expert', or acting as a 'technical gatekeeper' controlling the flow of information (Scarborough & Corbett 1992: 9). Within critical care the intensivists are seen as the 'experts' in ventilation and they determine what equipment is used, how and when.

The relationship between technology and science is a contested one. One view is that nature poses questions for science, science reveals the answers and in turn provides the basis for technology which is then used to reveal nature. This relationship can be expressed thus:

Nature₁ – Science – Technology – Nature₂

Ihde prioritises technology (over science) and emphasises the transformation of nature (or reality or the world) by the technology used to reveal it. Thus the relationship can be seen as:

Nature₁ – Technology – Science – Nature₂

Therefore Ihde argues it is not technology that is the product of science, rather, science is the product of technology. Technological objects 'allow scientists to see what they see' as such nature is technologically constructed (Sandelowski 2000: 34). Nature therefore is more made than found, this Sandelowski refers to as 'secondhand' knowledge. Technology, according to Sandelowski, reveals and transforms nature but also conceals how it reveals and transforms, this she refers to as the 'duality of technology' (Sandelowski 2000: 43). She uses this concept to describe the nursing - technology relation.

Technology Transferred

Technology transferred refers to the use of technology, previously the domain of one professional group, by another. This is most commonly seen in nursing as tasks devolved from doctors to nurses for example the giving of intravenous drugs¹³. The transfer of a technology can also occur between geographical locations, for example the ventilator from the operating theatre to critical care. Because technology is never free from the values and beliefs of those who use it the transfer of technology can be problematic. Sandelowski (2000) states

‘Technology transferred is not simply the hardware component but also the values, norms and practices that may be in conflict with the receiving culture. Receiving cultures may in turn alter (transform¹⁴) technologies to the extent that they are no longer the same as that which was transferred’ (Sandelowski 2000: 15).

Nurses in the 1970s troubled by the depiction of technology in nursing, began to view the transfer of technology as an intrusion into the care of their patient (Sandelowski 1996). Technology changed the work of nurses and they saw nursing and technology in opposition (Sandelowski 2000: 9). Purnell (1998) argues that technological discord, which she refers to as ‘the incompatibility of reductionist aspects of medical technology and

¹³ The definition of technology transferred and its characteristics are to be explored in this study. For a comprehensive account see chapter 4.4.

¹⁴ My use of this term, Sandelowski never uses the term ‘transformed’ and never goes as far as distinguishing between technologies that are transferred and technologies that are transformed.

holistic nursing intention', becomes apparent when nurses attempt to transform 'medical technologies' that are incongruent with nursing into 'nursing technologies' (Purnell 1998: 15). Purnell views technology or at least 'medical technology' from the determinist perspective and perceived in this way reduces the patient to a set of problems to be solved. She views technologies used in health care as ordered by the physician (and therefore medical) but used by the nurse in practice. Furthermore she states that in caring for patients the nurse is forced to accept responsibility for decisions about patient care based on equipment rather than nursing expertise. As such the nurse is at variance with the nursing philosophy of holism. The problem lies with the design and implementation of technology. Purnell argues that technology cannot be value neutral because technology embodies the values of its designers and this influences its use. 'Medical technology' therefore cannot be regarded as 'nursing technology'. There is an assumption that if medical technologies are said to embody the values of the medical profession they are contrary to nursing values. It is, according to Sandelowski, therefore difficult to see. She asks

' To what extent can a device originally conceived to fulfil medical purposes become a device fulfilling nursing purposes?' (Sandelowski 1996: 12).

However this is contrary to Sandelowski's own views that technology acquires meaning through its users. The implication is that medical devices are designed by or for doctors and therefore incongruent with nursing values. What is important is what happens to the technology after

it has been transferred. Technologic consonance in nursing may be realised in the influence and expression of the caring nurse in the design, engineering and ownership and use of what Purnell describes as 'nursing technologies' (Purnell 1998: 22). She does not however define this term.

Some nurses have used technology to define nursing whilst other nurses have used the care – cure distinction to differentiate between the professions, claiming that technology is opposed to humane care and therefore is irreconcilable with nursing (Zwolski 1989, Carroll 1995). As nurses adopted new technologies into their practice it became apparent that much time was indeed spent tending the machines (Barnard 2000) and as a consequence nurses found themselves in a dilemma. Some nurses saw technology as an adjunct to nursing care, a simple tool to extend human observation (Sandelowski 1997: 171). Those nurses who used technology to depict nursing as a scientifically based profession were criticised, often from within the profession, for 'losing touch' with patients (Sandelowski 1996). Technology had changed the work of nurses from 'hands on' to 'hands off' care and as a result some nurses turned against technology polarising it from humane care. Nurses began to question whose benefit the technology served, physician or nurse? (Ibid.). This irreconcilability with technology, according to Sandelowski, may be in part a function of how devices are used by humans and in what particular contexts (Sandelowski 1997). Barnard and Sandelowski (2001) argue that like technology, humane care is itself a socially constructed entity. The power any technology exerts derives from how it acts in any given situation and from its meaningfulness (Barnard & Sandelowski 2001: 374). They state that technology is not simply or necessarily a

paradigm of care opposed to touch, but rather an agent and object of touch (Ibid.: 373). The emphasis on the differences between nursing and technology according to Sandelowski (1997) has tended to obliterate the unity between them, and instead nurses should emphasise the essential qualities of technology and nursing in order to obliterate the differences (Sandelowski 1997: 175). Barnard and Sandelowski (2001) question the presumed boundary between technology and humane care: they argue that

‘what determines whether a technology dehumanises, depersonalises or objectifies is not the technology per se, but rather how individual technologies operate in specific user contexts, the meanings attributed to them and how any one individual or cultural group defines what is human’ (Barnard & Sandelowski 2001: 374).

They go on to say:

‘That technology is not necessarily opposed to humanised care, but rather it is specifically and deliberately enrolled in the service of that care’ (Barnard & Sandelowski 2001: 369).

Their position is that the continued polarisation of technology and humane care may comprise a discourse that is more in the service of maintaining a distinctive professional identity than of improving nursing care (Barnard & Sandelowski 2001). Sandelowski argues that

‘ the “(ir)reconcilability” of nursing and technology may be a function of their “(ir)reconcilability” with nursing in actual use, or, the “(ir)reconcilability” of views of technology in nursing’ (Sandelowski 1997: 175).

In an effort to reconcile this polarisation between care and technology some nurses have defined technology as caring. Ray (1987) defines the process of caring in critical care nursing as a technology and states that nurses can use technology to care. Furthermore caring was seen as technical competence and, far from being opposed to touch, incorporated it. Loscin (1998) stated that simply being technologically competent is not caring but technologic competence as caring can be expressed through critical care nursing. Schoenhofer & Boykin (1998) saw technology as an extension of self as a caring person. When technology and nursing are in concert, nurses viewed technology not as more work but as labour saving (Sandelowski 1998). Technology also made practice more scientific and elevated their position (Sandelowski 1998). In areas such as intensive care these nurses became known as the elite because of their mastery of technology (Fairman 1992, Zalumas 1995). Technology also became a tool to extend their skills such as observation. Walters (1995a) using a Heideggarian analysis of the practice of critical care nursing states that nurses use all the technology available to them in order to care for the critically ill. Walters (1995a) views technology and nursing as integrated. In this analysis Walters describes nurses as passive recipients of technology, he fails to appreciate that some technologies are in discordance with nursing and that nurses will use deceit and guile in

order to prevent their use which Purnell (1998) describes as 'covert defiance'.

Technology Transformed: The Development of a Nursing Technology?

Whilst Sandelowski's work has brought to the forefront the nursing – technology relation she has not developed the concepts technology transfer or technology transformed. Several authors have attempted to differentiate between medical technologies and nursing technologies but have failed to define the latter adequately (Ray 1987, Purnell 1998). There has also been an assumption that medical technologies and nursing technologies are different and that the transfer of a technology used by doctors cannot be used without discord by nurses. There have been several attempts to reconcile nursing with technology (Minckley 1968, Benner 1984, Ray 1987, Bosque 1995, Fairman 1992, Jones & Alexander 1993, Locsin 1998, Schoenhofer & Boykin 1998, Bernardo 1998, Sandelowski 1998). Ray (1987) found that caring was seen by critical care nurses as a technology, requiring them to interpret monitors and ascribe meaning and act on judgements. Furthermore caring was seen as technical competence and was a combination of technology and touch. Locsin (1998) demonstrated that the co-existence of technology and caring in critical care nursing was expressed through technologic competence. In this way technology is viewed as part of nursing and incorporated into practice. There is also a view that only nurses care and as such this is what differentiates nurses from doctors. However these authors do not make explicit that these are nursing technologies and

therefore do not make an attempt to define them. A definition is offered by Alexander & Kroposki (2001) who define a nursing technology as

‘the nursing care processes used to change the status of an individual from a patient to a person no longer requiring nursing care’ (Alexander & Kroposki 2001: 778).

These authors conducted a ten-year longitudinal study with the aim of measuring the dimensions of nursing technology in a nursing unit in South Carolina. Three dimensions of nursing technology were tested: instability, uncertainty and variability. Instability referred to the degree to which unpredictable fluctuations in work techniques and practices occurred. Uncertainty was the degree to which work performed was complex and difficult to understand. Variability referred to the degree to which the nurses engaged in a variety of tasks resulting from differences among patients. The authors found that over a ten-year period, over all, levels of instability and uncertainty increased whilst variability decreased. They concluded that nursing technology changes over time; they were not consistent among units. They suggested nurse managers need to periodically re-evaluate nursing technology in order to plan for the changing nature of technology and adjust for changes. For example, they suggest if the condition of a patient becomes less stable over time, more variable and more uncertain, nurses will need to be highly educated and experienced and nurse managers would need to plan for this.

Alexander and Kroposki (2001) list three attributes of a nursing technology: raw materials (the patient), knowledge (specialised

knowledge of the nurse) and the process of changing raw materials into practical results (improving a patients' health status). They conclude that a nursing technology is

'the total of all the work accomplished by a group of nurses to achieve the goals of the nursing unit' (Alexander and Kroposki 2001: 780).

This definition assumes that all nursing work therefore is a nursing technology. It fails to distinguish adequately the differences between a 'medical technology' transferred to nurses (from medicine) and a 'nursing technology'. This is reiterated by Purnell (1998) who stresses that 'technology in nursing' is not necessarily 'nursing technology'. She goes on to say that nursing should rid the profession of those medical technologies that do not fit or are incongruent with the practice of nursing. However she fails to define what is meant by a nursing technology and there is the assumption that unless nurses have been instrumental in the design and implementation then these (medical) technologies remain incongruent with nursing values. This may prove difficult at a time in the NHS when nurses are under pressure to take on the roles formerly undertaken by junior doctors and which largely encompasses the transfer of medical technologies. A concern for nursing is that not all technologies may be congruent with the values of nursing and are therefore difficult for nurses to embrace. Sandelowski states

'the use of devices in the workplace suggest the relationship of pushing and pulling. Different devices by virtue of their

purposes and inclinations, more or less push nurses in certain directions. Nurses in turn, by virtue of their purposes and inclinations, more or less pull back in other directions. Nurses need to ascertain which devices create the greatest pull away from what we conceive as our purpose in the world and which ones move us closer. Which devices are, or can be, authentic tools of the nursing trade' (Sandelowski 1996: 13).

Sandelowski appears to indicate the need for nurses to transform those technologies transferred to them from doctors and to determine those that cannot be reconciled to nursing but gives no indication how this can be achieved in practice. A review of the literature therefore has revealed there is no adequate distinction between technologies that are transferred and technologies that become transformed. Definitions are lacking and there is an assumption that technologies become either medical or nursing.

The Duality of Technology: Making Visible the Nursing Contribution to Care?

Throughout the history of nursing, Sandelowski states that nurses have been seen (by others and by nurses themselves) as objects or instruments of medicine (Sandelowski 1996) becoming the physical extension of the physicians' senses, their 'third eye' and 'third hand' (Sandelowski 2000: 3). Using nurse's skills of observation has resulted in them becoming incorporated into the 'body of medicine', which renders them invisible (Sandelowski 1996: 10). References to machines as servants and nurses

as technological instruments resulted in reducing the status of nursing to servants whose work is 'immediately consumed or exhausted' and this renders it invisible (Sandelowski 2000: 8). Nurses have also described themselves in technological terms referring to the nurse as thermometers, monitors and information processors. However defining nursing in these technological terms has reinforced the idea that nursing is nothing more than the 'mindless application of medical science on orders from the physicians' (Sandelowski 2000: 7). On the other hand, technology can indeed raise the status of nursing by making their work overt and therefore visible (Sandelowski 2000b). In analysing how the electronic fetal monitor (EFM) was used in practice, Sandelowski demonstrated that nurses used this technology in order to improve the observation of pregnant women. It raised the status of obstetric nursing to that of other high tech areas such as intensive care and elevated their position with patients from 'bedside nurse to professional nurse' (Sandelowski 2000b: 318). This device proved the 'knowledge between the ears' of the nurse and made visible the accuracy of the nurses' intuition and observation (Sandelowski 2000: 142). Sandelowski argued that nurses have a pivotal role in putting technologies into use. Because nurses used EFM as a tool of 'true nursing', nurses worked to make things fit that did not initially fit well. Nurses 'retrofitted' EFM to both childbearing and nursing, however much of this work was invisible. The cultural tendency, she argues is not to see the work of putting a device into practice as requiring skill or creativity (Sandelowski 2000b: 322). The duality or paradox of technology is a key feature in Sandelowski's writing.

‘The irony in the history of the nursing – technology relation is that nurses have turned to technology to make nursing more visible, to validate and showcase it, but the very nature of the work they perform as the interface between technology and the patient maintains their invisibility’ (Sandelowski 2000b: 322).

The introduction of technology also changed the relationship between physician and nurse. Whilst on the one hand technology enhanced the role and status of nursing, it also reinforced the unequal relationship that existed between them (Sandelowski 2000: 129). Some nurses viewed technology as moving them closer socially and professionally to physicians, and this was thought to create a more equal relationship between them (Fairman 1992). However according to Koenig (1988), incorporating a new technology in to practice only temporarily equalised the nurse – physician relationship, which reverted to its typical unequal character once that technology became routine (Koenig 1988) or the skill became feminised and therefore degraded (Sandelowski 2000). As Sandelowski states

‘in nursing there has been an historical trend to consider a skill complex when a physician does it but easy enough when the nurse does it’ (Sandelowski 2000a: 83).

Thermometry was transferred from the physician to the nurse, but physicians still regained control by distinguishing between nurses’ work (taking and recording) and the physicians’ work (interpreting and making

diagnoses) thereby reinforcing the unequal nature of the relationship (Sandelowski 2000a). Technology had the effect of enhancing communication between the physician and nurse, for example the electronic fetal monitor offered a 'more precise language' (Sandelowski 2000 141). Sandelowski (1998) suggests caution, stating that by embracing technology nurses have been seduced into believing that technology will empower them. Barnard (2000) found that the daily practice of nursing was altered by the demands of the equipment. Technology became a form of medical dominance. The requirement to use it was more for meeting the needs of medicine than nursing and served only to distract nurses from nursing (Barnard 2000). Technology was also seen to increase the responsibility but not the autonomy of nursing, making them no more than physicians' assistants (Sandelowski 1997). The transfer of technology from physician to nurse was a double-edged sword. On the one hand it was seen to reinforce the subordination of nursing to medicine and therefore impeded the development of nursing as a valued province of knowledge and practice. On the other hand it raised the status of nursing where often the expertise of the nurse exceeded that of the physician (Sandelowski 2000). The transfer of technology as a concept is not well defined and this results in confusion in the interpretation of accounts where nurses are using technology.

An analysis of the literature has revealed that there is confusion over the terms 'medical technology and 'nursing technology'. This has resulted because they are not clearly defined in the literature and as such are used interchangeably and indiscriminately. Furthermore Sandelowski fails to make clear the concepts technology transferred and transformed instead

she describes the difficulties nurses have had in reconciling technology into their practice. Sandelowski's view is that it is not the technology but rather the way technologies are used in practice. This may seem a rather simplistic viewpoint. It is my view that it is necessary to define and differentiate between these concepts in order to develop an understanding of how nurses use and perceive technology in the workplace.

I intend to employ a number of core ideas from a review of the nursing – technology literature for my study. These are as follows:

1. Technology is seen as a socially constructed phenomena. Taking a social constructivist approach the definition of technology therefore is not fixed but means different things to different people. In this study I employ the definition proposed by Mackenzie & Wacjman who approach technology by distinguishing between three layers of meaning. The first layer is technology as a physical object or artefact, the second layer refers to activities or practices and the third layer refers to what people know as well as what they do. This definition encompasses technology as a process, of which equipment, machinery etc. are objects used in that (social) process (Mackenzie and Wacjman 1985).
2. Technology shapes culture and culture shapes technology. When analysing technology in the work place the distinction between technology as inanimate object (technical) and social process (society) is not a useful one.

3. Technology is paradoxical; that is it can both reveal and hide nurses' work, however by bringing technology to the foreground this study examines whether it is possible to demonstrate the nursing contribution to critical care in the new millennium.

4. The concept 'technology transfer' is examined to in the literature but needs further discussion and relevance to the context of critical care. Technology transformed is an idea derived from but not well developed in the literature and as such I posit this as a central issue to be explored in the empirical research. The definition of a 'nursing technology' in the literature is not well defined and requires further exploration and development.

Conclusion

Sandelowski views technology as a neutral object or device, acquiring values from its users or cultural contexts. It is also said to have 'inclinations' of its own because of what it is (for example a gun) (Sandelowski 2000b: 42). Central to the analysis of technology in nursing is the transfer of technology from medicine. Sandelowski alludes to the transfer and transformation of technology but never goes so far as to clearly distinguish between them or develop these important concepts further. The transfer of technology from medicine to nursing has created tensions in nursing. Sandelowski describes nursing as 'both at one and at odds with technology' (1997: 170) describing the relationship as 'pulling and pushing' (1996: 13). She has illuminated the areas where nurses have trouble reconciling technology to nursing practice suggesting this may be

'a function of how devices are used by humans in particular user contexts' (1997: 7). One way of reconciling technology with nursing is to transform those technologies that are congruent with nursing values in to 'nursing technologies' however the literature so far has failed to adequately define this term. Furthermore it is not clear whether a technology 'transformed' is or can become a 'nursing technology'.

A key feature in Sandelowski's writing is the duality or paradox of technology. Technology has a dual function in demonstrating the role and status of nursing in health care. On the one hand technology functions to showcase and promote nursing practice and on the other hand it also renders nurses and their work 'invisible'. Sandelowski's work provides the theoretical basis for this study. The aim is to examine the nursing – technology relation in critical care. One technology: weaning from mechanical ventilation will be used to examine in depth the nursing – technology relation. This technology is in the process of being transferred to nurses from doctors. I shall therefore use Sandelowski as my theoretical basis of the study but will follow in the tradition of workplace studies in order to illuminate the nursing - technology relation. It is hoped this study will demonstrate the nursing contribution to the development of critical care. Furthermore it will determine whether weaning from ventilation is a technology transferred or can become a technology transformed. In order to fully appreciate weaning as a technology it is necessary to examine the body of literature. The final part of the literature

review is a critical analysis of the literature on weaning¹⁵ focusing on the role of the nurse.

¹⁵ Only the literature on weaning from mechanical ventilation is considered here and does not include non – invasive ventilation. The latter is an important area but there is no space to cover this expanding field in detail.

1.3. Weaning from Mechanical Ventilation

Introduction

This section explores the medical and nursing literature on weaning from mechanical ventilation. This technology is in the process of being transferred from medicine to nursing (Modernisation Agency 2002, Crocker 2002, Blackwood 2003, Gelsthorpe & Crocker 2004). It begins with an overview of the importance of weaning in critical care followed by a review of the literature and ends with an examination of the nursing role.

Weaning from mechanical ventilation is defined in the literature as the process of assisting the patient to breathe unaided (Knebel 1991) or the transition from ventilatory support to spontaneous breathing (Mancebo 1996). This process can take hours, days or weeks and in some patients months. Weaning from mechanical ventilation is not a new problem, but has now gained a higher priority in intensive care largely as a result of the economic burden placed upon intensive care units of long-term patients who were weaning (Modernisation Agency 2002). This has provided the impetus for critical care units to review the weaning of patients from mechanical ventilation and presents an opportunity for nurses to develop their role.

Weaning was previously the exclusive domain of the intensivist and has resulted in a number of randomised controlled trials in an effort to

develop a body of evidence to support the systematic weaning of patients (Tomlinson et al 1989, Yang & Tobin 1991, Brochard et al 1994, Esteban et al 1995, Burns et al 1995, Howie 1999, Burns et al 2000, Meade, Guyatt, Griffiths, Booker, Randall & Cook 2001). A systematic review of the literature demonstrated that there was no superior method of weaning (Butler et al 1999). Furthermore differences in clinicians' intuitive threshold for the reduction or discontinuation of ventilatory support appears to have a greater impact on the failure of spontaneous breathing trials, or on reintubation, than do modes of weaning (Meade, Guyatt, Griffith, Booker & Cook 2001). The literature therefore switched from examining methods of weaning to the use of protocols and a concentration on the health care professional (Webster 2000, Lowe et al 2001, Fulbrook et al 2004, Crocker 2002, Blackwood 2003, Gelsthorpe & Crocker 2004, Blackwood et al 2004). An examination of the role of nurses in weaning revealed there was a limited number of studies available (Thorens et al 1995, Wood et al 1995, Kollef et al 1997, Djunaedi et al 1997). Nursing has yet to formally establish a role in weaning in the U.K., however it has the potential to make a valuable contribution to patient care through the reduction of weaning time (Crocker 2002), reduced length of stay, reduced costs to the organisation and an improved experience for the patient (Jenny & Logan 1992).

The Extent of the Problem

It is estimated that 2400 patients are likely to be chronically ventilator-dependent in the U.K. in the future (Modernisation Agency 2002: 11). A number of studies have estimated the incidence of prolonged ventilation

in ICU to be between 5.5% and 15% (Ely et al 1996, Brochard et al 1994, Nevins 2001). The hospital mortality of patients receiving prolonged mechanical ventilation is high, between 43% and 61% (Seneff 1996, Kurek 1997). Long term, ventilated patients are a major resource user within critical care. A survey in North America established that 6% of ICU admissions were ventilated for 7 or more days yet consumed 37% of resources during their stay (Wagner 1989). The 'economic burden' (Modernisation Agency 2002: 13) of caring for patients on prolonged ventilation in an intensive care setting has yet to be calculated but it has been estimated that a 20% – 60% reduction in the daily cost of chronically ventilated patients can be made when they are treated in a non- intensive care environment (Criner 1995). Data from this study has been used to estimate that a 50% cost saving per patient day could be made in the U.K. by caring for the chronically ventilated patient in a level 2 (HDU) setting rather than a level three setting (ICU) (Modernisation Agency 2002).

A Review of the Literature

A literature search revealed that weaning was approached in three ways: firstly; the methods of weaning (Tomlinson et al 1989, Brochard et al 1994, Esteban et al 1995) secondly, the predictors of weaning success (Yang & Tobin 1991, Howie 1999, Burns et al 2000) and thirdly the use of measuring tools to determine a patient's readiness to wean (Burns et al 1995). Different techniques have been suggested that will accelerate the weaning process, but individual studies have been conflicting (Tomlinson et al 1989, Brochard et al 1994, Esteban et al 1995). This has left

intensivists to adopt their own view of the literature and as a consequence weaning has become uncoordinated. The extensive literature has not been consistent in its design with four main methodological differences. Firstly the selection of patients has been inconsistent, including patients who were ventilated for both short term and long term. Moreover the patient group were not homogenous and included both those following surgery and those with chronic disease. Secondly, the definition of successful weaning varied from 2hrs to 48 hours post separation from the ventilator, with some studies including extubation (removal of artificial airway) as a criterion. Thirdly, weaning failure was inconsistently defined and fourthly, outcome measures were not consistently applied. The most sensitive way to test for differences in weaning is to use survival analysis (Brochard et al 1994, Esteban et al 1995). A less sensitive measure is the average weaning time. Because the distribution of weaning time is likely to be skewed, the median (and range) should be used to compare groups (Butler et al 1999).

A systematic review of the literature in difficult -to- wean patients (Butler et al 1999) was undertaken in order to ascertain which of the three commonly used techniques of weaning (T-piece, Synchronised Intermittent Mandatory Ventilation (SIMV) or Pressure Support Ventilation (PSV)) leads to the highest proportion of successfully weaned patients in the shortest time. Difficult-to-wean patients were determined by length of time on the ventilator (over 72 hours) or a failed trial of spontaneous breathing after 24 hours of ventilation. The review demonstrated that there was a lack of randomised, controlled trials designed to determine the most effective technique of patients who were

weaning. Only four out of 667 identified studies met the criteria for the review¹⁶. Although individual trials reported outcomes in favour of a specific weaning mode, no mode was demonstrated as being consistently superior to the other two. The results of the review indicated that there was insufficient evidence to identify a clearly superior mode for weaning this group of patients. Two of the 4 studies gave conflicting results Brochard et al (1994) supporting PSV and Esteban et al (1995) supporting T- piece as the optimum method of weaning. Pooling of the results only highlighted the heterogeneity of the study design. The conclusion of this review was that one method could not be determined as superior to any other. Furthermore Butler et al (1999) stated that the manner in which the mode of weaning is applied may have a greater effect on the likelihood of weaning than the mode itself (Butler et al 1999: 2332). Meade et al (2001) revealed, in a systematic review of the evidence base for weaning, a number of problems. The definition of weaning is not consistent and this is a confounding factor in determining when to start weaning. Another factor was the differences in individual clinicians approach to weaning. When clinicians set a high threshold, many patients who could tolerate weaning continue to receive mechanical ventilatory support for longer than is necessary.

The dominance in the literature of randomised, controlled trials has attempted to refine the weaning process and make it predictable. Therefore the role of the patient has been overlooked. An analysis of the

¹⁶ Criteria for review: 1. ventilation > 72 hrs or failed trial of spontaneous breathing > 24 hours, 2. at least 2 of the three modes of weaning were compared, 3. outcomes based on one of the following were applied; weaning time (time from initiation of weaning to extubation), successful weaning rate (successfully off the ventilator for > 48 hrs) and 4. controlled clinical trial.

literature suggests that patients are not seen as individuals rather as research subjects that act in a predetermined way. It is now possible to monitor all minutiae of a patient's progress. The ventilator can read a patient's effort, rate and depth of breathing. There are other forms of surveillance that monitor a patient's reaction to ventilation through chemical processes such as arterial oxygenation and acid base balance. In addition to this is the cardiac monitor that monitors the stress response to ventilation through changes in heart rate and blood pressure. In fact much can be gleaned about the patient and their progress without actually asking them. The patient in this sense assumes the role of passive object to which ventilation is applied: weaning begun when the experts feel the patient is ready, and discontinued when the patient has been 'normalised'. Exclusive use of the ventilator and the development of a body of 'scientific' knowledge has defined the 'expert' as the intensivist. This ownership of knowledge has made it possible for intensivists to define what is 'the norm'. Patients must conform to 'normal' blood gases and 'normal' tidal volumes and have their breathing 'normalised'. This process of 'normalising' and examination by experts is designed round a highly ritualised and highly structured use of power. Patients are identified (as problem weaners), categorised and subjected to surveillance, screening and diagnosis ('weaning failure'). This dominant view that science will prevail has shaped the process of weaning for the last 30 years.

The nursing literature has been concerned with aspects such as patient communication whilst being ventilated (Bergbom – Engberg et al 1989, Hafsteindottir 1996), patients' recollections of stressful experiences

whilst being ventilated (Gries et al 1988, Jablonski 1994, Rotundi et al 2002) or patients' perceptions of fatigue (Higgins 1998). The patients' view of weaning is under-investigated in intensive care until recently (Cook, Meade, & Perry 2001). Cook et al revealed there were only 5 qualitative studies to date (2001) that were concerned with the patient's experiences of weaning (Mendal & Khan 1980, Jablonski 1994, Jenny & Logan 1996, Logan & Jenny 1997, Wunderlich 1999). In a Canadian study of 20 patients undergoing ventilation and weaning it was revealed that patients were actively engaged in a variety of physical, cognitive and emotional activities that contributed to successful weaning. These activities patients called work (Logan and Jenny 1997). The authors concluded that patients' work should be understood and supported by clinicians (nurses) in order to facilitate recovery from mechanical ventilation and weaning (Logan & Jenny 1997: 140). In a more recent study, Johnson (2004) interviewed 9 Australian ICU patients undergoing weaning and identified 4 themes. Reclaiming the every day world (the only theme discussed) meant re-engaging with staff (and families) in ICU, seeking control over treatments and attempting to communicate, question and interpret the environment (Johnson 2004). She concluded that:

'Nurses need to be cognisant of the importance of maintaining a close and supportive presence with the patient, and ensure that they apply technologies and treatments in a way that recognises, and is sensitive to the lived experience of individual patients' (Johnson 2004: 197).

There is an urgent need to explore the patient's experience of weaning. This 'missing voice of the critically ill' is reiterated in a personal account by Rier (2000). In order for nurses to contribute to patient care they need to understand the patient perspective and in doing so this will give nursing the opportunity to meet the needs of patients. This is one way of developing their role in practice.

The Transfer of Weaning as a Technology from Medicine to Nursing

Until very recently the role of nursing (in the U.K.) in weaning from mechanical ventilation has been limited. The lack of consensus regarding the method of weaning has resulted in a change of focus in the literature to the use of protocols (Knebel 1996, Djunaedi et al 1997, Blackwood et al 2004, Tonnelier et al 2005), and the role of the health care professional in weaning. (Marelich et al 2000, Webster 2000, Norton 2000, Ely et al 1999, Kollef et al 1997, Thorens et al 1995, Wood et al 1995, Matrensson & Fridlund 2002, Gelsthorpe & Crocker 2004). The role of nurses (and indeed other health care professionals) in weaning is under- investigated. Thorens et al (1995) was the first paper (Swiss) to investigate the influence of the quality of nursing on the duration of weaning from mechanical ventilation in patients with chronic respiratory disease. The study design used a prospective cohort of patients (over one year) and compared this to a retrospective cohort of patients (over five years). An 'index of nursing' was developed comparing the effective workforce of nurses (indicated by the number of nurses and their qualifications) with the ideal workforce required by the number of patients and their severity of disease. This index of nursing was compared to the duration of

weaning from mechanical ventilation. During the first five years the duration of mechanical ventilation increased. There was a significant inverse correlation between the duration of mechanical ventilation and nursing index ($P = 0.025$). In the sixth and comparative year, the number of nurses increased and the duration of mechanical ventilation decreased. The study concluded that the quality of nursing appeared to be a measurable and critical factor in patients who were weaning with chronic respiratory disease. During the study time there were a number of changes, including an increase in medical staff and beds. These and other factors such as nurse education were not explored and these may have had bearings on the study. Despite this important research there has not been any attempt to replicate or extend this work.

Kollef et al (1997) conducted a randomised controlled study comparing protocol-directed versus physician-directed weaning in 2 medical and 2 surgical intensive care units in two hospitals. The protocol-directed group was led by nurses and respiratory therapists. The study revealed that nurses and respiratory therapists using protocols weaned patients safely and more quickly and initiated weaning earlier than the physician-directed group. There was no blinding to the study and this may have caused a difference, especially in terms of the initiation of weaning. There was no single protocol. Physicians were allowed to draw up their own protocols and these varied between the units. The different protocols were not examined in the study. Despite many references to reducing weaning times using protocols, it is not clear whether nurse-led weaning strategies hasten weaning from mechanical ventilation compared to physician-led strategies. A systematic review of the literature (Price

2001) identified three studies. Only two of these showed a significant difference (Kollef et al 1997, Wood et al 1995). Price argues there is no evidence that nurses are leading weaning and therefore reducing weaning time. Price suggests that it is the use of protocols rather than the person leading the weaning process that makes the difference (Price 2001). Recent research compared a prospective protocol-led weaning by nurses to an historical matched cohort in a French intensive care unit. It showed that nurse protocol-directed weaning reduced duration of mechanical ventilation and length of stay in ICU. Ventilator-associated pneumonia, ventilator discontinuation failure rates and ICU mortality were similar in both groups (Tonnelier et al 2005). This may be explained by the inclusion of 'difficult to wean' patients. The average duration of mechanical ventilation was 16 days. In previous research the average time spent on the ventilator was 5 days (Ely et al 1996). Evidence of weaning effectiveness on its own does not guarantee that protocols will be used in practice (Blackwood 2003). The use of protocols or nurse-led weaning is not yet common practice in ICU in England (Blackwood 2003). A survey demonstrated that clinicians (doctors) were leading weaning in 152 units with only 33 (17%) units using protocols (Modernisation Agency 2002: 16). Blackwood identified that the uptake of protocolised weaning in the U.K. is much slower than in the U.S.A. Blackwood (2001)¹⁷ identified that intensivists had concerns about the use of structured protocols used by nurses. They thought they would be followed too strictly by inexperienced nurses. Furthermore they thought

¹⁷ Blackwood B (2001) ICU consultants' perceptions about protocolised weaning from mechanical ventilation. Conference proceedings. BACCN annual conference, Bournemouth, England.

protocols were too difficult to develop due to the unpredictability of patients' illnesses (Blackwood et al 2004).

Fairman and Lynaugh (1998) found in their study of American intensive care nurses that the use of protocols strictly limited the scope of nurse's patient care decisions, but represented an enormous change in doctor – nurse relationships. Where protocols did not exist, nurses and doctors continued to make informal contracts defining boundaries of nurse's authority and responsibility. Protocols may be seen as a form of restraint applied by the intensivists. Nurses may appear happy to accept the use of protocols in order to extend their decision making, which was previously limited (Crocker 2002). This was not found to be the case in a recent pilot study (Gelsthorpe & Crocker 2004). The authors demonstrated that nurses based the decision to wean on their professional judgement and disregarded the weaning protocols¹⁸. The authors suggested that the use of protocolised weaning may not be useful in the decision to commence weaning as individual judgement may override the protocol and cause variance in weaning (Gelsthorpe & Crocker 2004). The use of protocols in weaning may be a form of control and therefore their use may be seen as not only limiting nurses' powers of decision making but reducing it to not much more than following a set of guidelines. However nurses may not be in a position to accept this transfer of technology. Gelsthorpe & Crocker (2004) show that nurses were delegating the responsibility for weaning to the medical staff. Experience was an influential factor in establishing the decision to wean, with less-experienced staff erring on

¹⁸ In this study nurse-led weaning had been established for 3 years and this may have a bearing on the use of judgement rather than protocols.

the side of caution and delaying weaning. The study demonstrated that weaning followed a medical paradigm (systems approach) with a concentration on physiological factors which influenced the decision to wean. Blackwood et al (2004) identified that physicians in ICU had reservations regarding the use of protocols in weaning because of the variability of nursing experience and indicated that doctors should retain control over weaning. The transfer of technology from medicine to nursing therefore is not a simple one.

Conclusion

Despite the number of randomised, controlled clinical trials, there is a lack of evidence confirming a superior method of weaning (Butler et al 1999, Meade et al 2001). This has resulted in clinicians re-focussing from the methods of weaning to the use of protocols and the role of healthcare professionals. There are a limited number of studies which indicate that nurses have made a significant contribution to patient care (Thorens et al 1995, Kollef et al 1997, Tonnelier et al 2005) by reducing length of ventilator time, but the use of protocolised weaning has recently undermined this (Price 2001). The role of the nurse in weaning is unclear.

There is little research investigating the experiences of patients undergoing weaning. The role of the patient appears to be one of passive recipient of care. One way that nurses can increase their contribution to patient care is by examining the patient role in weaning. Weaning has been slow to be taken up by nurses in the United Kingdom. The transfer

of this technology from medicine to nursing has been problematic (Gelsthorpe & Crocker 2004).

The first part of the literature review revealed that pivotal to the development of ICU was the transfer of technologies from the operating theatre. What helped to make this successful was the grouping together of patients who were observed by skilled nurses. However this contribution by nurses has been marginalised. The second part explored how nurses adapted their roles and changed the content of their work in order to accommodate these technologies. This has been explored in the literature in a number of ways but two are examined in depth. Allen (1996) studied the changing shape of nursing through the division of labour and Sandelowski (2000) explored the nursing – technology relation. The literature identified the concept technology transferred but this requires further exploration in the context of critical care. I suggest that there is a relationship between a medical technology that is transferred to nurses and the transformation of a technology. This has not been examined in the literature. I therefore posit this as a theoretical position to be explored in this study. An exploration of weaning as a technology is required in order to identify and bring to the forefront the nursing contribution to the development of critical care in the new millennium.

CHAPTER TWO

Method, Methodology and Theoretical Perspective

2.0 Introduction

In this chapter I report on the methodology of the study. I begin with a reflection of the journey I took in order to narrow down the focus of my study. I continue with a description of the background of the study, to include the history of the 'Trust' and the development of the intensive care and high dependency units (critical care) in order to put the research in context.

The next section of this chapter is concerned with the justification of ethnography used as a method of inquiry and subsequently participant observation and unstructured interviews as methods of data collection. I was surprised that there were no rigid guidelines for doing ethnography and found that this was very much what Coffey (1999) describes as a personal journal of self - discovery. I agree with Hammersley & Atkinson (1995: 23) that this type of research cannot be programmed, that its practice is replete with the unexpected, and my reading of the many published research biographies confirmed this. This chapter is written from a personal perspective drawing on many reflective and reflexive accounts that are used to increase the plausibility or rigour of ethnographic research (Pellat 2003). I spend some time examining my

dual role as a nurse consultant researching a social group of which I am a member and the tension this created between strangeness and over-identification.

2.1 The study's Focus and Theoretical Perspective

The proposal I submitted for my PhD looked very different to the study I present here. My first interest came from my experience of working for 20 years in intensive care. I was initially interested in the socialization of nurses in intensive care. This interest came about as a result of a period of time spent as a lecturer in critical care nursing. It was then I began to see subtle differences between intensive care units as presented to me by the nurses themselves. I began by reading about the socialization of medical students through Becker's study 'Boys in White' (Becker, Geer, Hughes & Strauss 1961) the socialization of nurses through Melia's work 'The occupational socialization of Nurses' (Melia 1984) and Boyle's study which was related to intensive care (Boyle 1996). I recognised nurses were socialized in training but this did not stop once they came to ICU. In noting the differences between intensive care units I began to explore the history of intensive care in England as a background for the study. During my reading I realised that nursing and the role of nurses in the development of ICU was a neglected area. I then decided to concentrate on the history and development of intensive care. The medical literature concentrated on equipment and therapies often highlighting key moments in history such as the polio epidemic or key people such as Koch (dialysis machine) and Engstrom (ventilator). At the same time the National

Service Framework for intensive care was published (DoH 2000b). It set out recommendations for the way intensive care was organised and delivered. It seemed timely that I concentrated on the history and development of intensive care.

I thought I had found the focus of my study and began to research the hospital archives. Talking to staff on the unit who had been there since the unit opened in 1971 revealed information that would not be found in archives or other written accounts. I began then to think about the nursing contribution to the development of intensive care and how this could be explored. It was through the exploration of the development of ICU and the role mechanical ventilation played in this that I began to think it would be useful to explore the role of technology in ICU. I began to explore the sociological literature on technology and was drawn to Latour's (1987) work on technology in action. I then narrowed my reading down to explore technology in nursing and found the work of Margarete Sandelowski most inspiring. This work would be used to underpin my theoretical framework. Sandelowski examines the polarity between technology and practice revealing the complex and multi-faceted relationship that exists between nurses and technology (Sandelowski 1996, Sandelowski 1997, Sandelowski 1998, Sandelowski 2000, Sandelowski 2000a, Sandelowski 2000b, Barnard & Sandelowski 2001).

I had introduced nurse-led weaning into the intensive care unit in 2001 and it appeared that this was still not embedded in practice. This led me to think what the reasons for this might be. It is argued that research in

nursing must be of value to practice. Leininger (1987) described a method of ethnonursing, which has the goal of discovering new nursing knowledge as perceived and experienced by nurses and patients. If I was to truly contribute to nursing knowledge then this would be an area that would benefit from a study of this type. I decided that the focus of my study would be nursing technology through the observation of nurses in practice. I had not lost sight of my original thought that the nursing contribution to the history and development of intensive care was hidden. I wanted to make visible this contribution and it seemed the best way to achieve this would be an examination of nurses in practice using technology or what Heath, Luff & Svensson (2003) refer to as 'workplace studies'.

An in-depth review of Sandelowski's work helped me to achieve a focus for my study. A review of the literature revealed there were gaps. There did not appear to be a satisfactory definition of a 'nursing technology'. Furthermore there was no clear distinction between a technology transferred and a technology transformed. What was evident was that technology could be used to make visible the nursing contribution (Sandelowski 2000).

Theoretical Perspective

The study's theoretical starting point draws on the workplace research tradition (Heath & Luff 2000, Heath, Luff & Svensson 2003). The literature is replete with examples specific to technology in healthcare (Pasveer 1989, Dent 1990, Prout 1996, Timmermans 1998, Tjora 2000,

Sandelowski 2000). More recently there has been a growing interest in intensive care as a workplace worthy of study (Porter 1991, Manias & Street 2001, Wilkstrom & Larsson 2003). Not surprisingly this highly technical environment would provide a rich source of information where relations between technology and the social group could be explored. To date the only study published is a Swedish study exploring how technology intervenes and challenges intensive care staff's knowing in practice (Wilkstrom & Larsson 2004).

2.2 Research Aims

Given that ICU is taken to be the personification of high-tech medicine and also given the perceived wisdom that this has come about through medical innovation, I want to show that this view has marginalized the nursing contribution to the development of ICU. The transfer of technology, usually from the operating room, was a response to the conditions that created intensive care. Nurses responded to those conditions. There is an assumption that nurses have taken on technology transferred from doctors and used it without dissent. Through observation I aim to show how nurses used and perceived one technology: weaning from ventilation as a case study to demonstrate the nursing contribution to the development of ICU in the new millennium.

The Research Question is:

What is the nursing contribution to the development of critical care in the new millennium?

The Aims of the Study are:

1. To identify what critical care nurses mean by 'technology' and explore how technology is used in practice.
2. Determine whether one technology, weaning from mechanical ventilation, can be used to demonstrate the nursing contribution to the development of critical care.
3. Define a 'nursing technology' and explore the conditions under which technology can be transformed.

The aims of this study reflect my epistemological and ontological standpoint. I recognise the participants in the study act as interactive commentators. What they do and what they say they do are equally important. Ethnography therefore appeared the most appealing method of enquiry. As a nurse consultant in critical care I come to this research with assumptions and preconceived ideas about critical care and the technology within it. I am influenced by my experiences of working for over 20 years in critical care and being engaged with the literature I focus on in the study and that which has informed my practice. There were

many challenges but many of them centred on conducting research from a dual role as researcher as participant observer in my own unit whilst working as a senior nurse. As a novice ethnographer I found it relatively easy to observe others but extremely difficult to observe myself. My own influences on practice (and therefore the research) were often dismissed whilst I tried to concentrate on observing others at work. It is therefore important to describe the context of the research and to lay bare, as much as one can, the conditions under which the research was conducted. I now go on to describe the back ground to the study and the context of the research.

2.3 Background to the Study

Nurse-Led Weaning

In January 2001 I was appointed as a nurse consultant in critical care. One of my objectives was to improve patient outcomes; I therefore introduced nurse- led weaning from mechanical ventilation. The impetus came from a retrospective audit of patients who were ventilated for 7 or more days. This length of time was considered to be higher than average (Crocker 2002). The mean length of ventilation for this group was 16.8 days. At that time the intensivists led weaning and this was proving to be inconsistent. As nurses provide 24-hour care it was decided that weaning from mechanical ventilation would be protocol driven (see appendix 3) and nurse led. In reality this meant nurses would decide when a patient was ready to wean and would commence weaning the patient according

to the protocols. Daily plans of care were to be written for individual patients.

2.4 Context of the Research: The ‘Trust’ and the Place of Critical Care

The ‘Trust’ serves a population of 250,000 people in one major city. It is one of two large teaching hospitals and has 1300 beds. The hospital specialises in cardio–thoracic surgery, burns and plastics, renal medicine (including transplantation and dialysis) and haematology. The hospital is over one hundred years old. This history is of particular importance in relation to the siting and development of the general intensive care unit. It is therefore relevant to briefly describe the history of the development of the hospital from an isolation hospital in 1882 to a large teaching hospital in 2006 before going on to discuss the history of the intensive care unit.

The ‘Trust’ began in 1892 as an Isolation hospital and Sanatorium. The hospital mainly cared for patients with diphtheria, enteric fever, smallpox, scarlet fever and tuberculosis. Acquisition of land resulted in the opening of a Workhouse in 1903, originally described as ‘a palace for paupers’. In 1930 further buildings were erected and this became the City’s Infirmary. The building went on to be renamed the ‘Trust’ in 1937.

The Development of Specialist Services

Up until the Second World War, the Trust had been dependent on specialist medical and surgical advice from visiting doctors, usually from the General Hospital (this no longer exists). The City and County Local Authorities recognised the need for skilled surgeons to operate on patients suffering from pulmonary tuberculosis and other chest disorders, and in 1936 the first thoracic surgeon, was appointed. The thoracic unit became widely known for its oesophageal work. Not until 1947 did the 'Trust' have a full time thoracic surgeon; a second full time thoracic surgeon was appointed in 1952. There was a vast increase in thoracic surgery in the 1940s due to mass radiography. This led to an increase in demand from neighbouring authorities. As a result patients were nursed in wards all over the hospital, which was felt to be unsatisfactory. Thoracic wards needed to be close to X-Ray and theatre. It was considered to be more convenient for the thoracic surgeon to concentrate in one particular place in the hospital rather than go to several wards to see patients. (From the report to the visiting Health Committee 12th Jan 1945 hospital archives). Following the development of the BCG vaccine there was a decline in Tuberculosis. Thoracic surgery work was predominately concerned with carcinomas of the lung. The thoracic department gained an international reputation in 1976 with the appointment of a further surgeon. The thoracic unit retains its international reputation to this day. Interesting to note that the development of the ICU was predominately in response to thoracic surgery.

Other specialist services such as burns and plastics joined the 'Trust' with the appointment of a plastic surgeon in 1955. In 1967 the first 'artificial kidney' dialysis machine was presented to the hospital, with the renal / kidney unit opening in 1975 (the first kidney transplant took place in 1974). The 1970's saw much expansion with an increasing number of theatres and facilities to support patient care. There was no cardiac surgery in the 'Trust' until the opening of the cardiac intensive care unit in 1995. Closed cardiac surgery had been performed from 1951 but this had long stopped with the development of a regional unit at a major nearby city. The cardiac intensive care unit remains separate to the general unit in terms of staffing, location and management.

The Development of the General Intensive Care Unit

During the period 1956 – 1957 the thoracic surgeon and the anaesthetist to the thoracic unit developed a four-bedded respiratory support unit solely for post-operative thoracic cases until its separation in the early 1970s. The Hospital Board's plan for 1972 / 1973 stated:

'The need to separate the intensive care facilities from thoracic surgery is considered extremely important' (The Trust and District Hospital Management Committee; Statement of Policies and Priorities 20th May 1970 from hospital archives).

The development of ICU parallels the development of specialist cases in the hospital, in particular the development of thoracic surgery which has

an international reputation for excellence. Four beds in the 10-bedded HDU are ring fenced for thoracic cases. This was thought to relate to funding however on closer examination this was never the case and was a 'word of mouth' agreement that has never been challenged. The thoracic surgeons act as the gate-keepers for these beds and are thought to use them as an 'extension of the ward' (anecdotal information from staff in critical care). Permission from the thoracic surgeons to use their 'empty' beds must be gained before admitting another non-thoracic patient. One, of the three, thoracic surgeons does not use the HDU facilities instead he prefers to admit his patients to monitored beds on the thoracic ward. Until the development of HDU (in 2000) there has been little investment and development in critical care services. The ICU is not purpose built and as such does not comply with HBN 57, 2003 (building regulations for Critical Care). It is sited at the end of a ward (previously a thoracic ward), until this was developed into the cardiac ICU.

The first admission book for intensive care dates from February 1971. Data entry is not accurately recorded and there is a minimum of available information, such as the patient's name, age, admitting illness and outcome (or disposal as it was recorded).

Critical Care in the New Millennium

Intensive care became known as the Critical Care Directorate after the publication of Comprehensive Critical Care (DoH 2000b) and consisted of a brand new 10 bedded High Dependency Unit (HDU) and the existing 7 bedded intensive care unit (for differences between an ICU and HDU

see appendix 4). There was no room available in the existing hospital structure and with a plan for a new build within the next 10 years, the HDU was sited in a series of portacabins adjacent to the ICU. The total bed stock therefore increased from 7 ICU beds (level 3) to 17 critical care beds (10 level 2 and 7 level 3).

General Layout

The intensive care unit is accessed off the main corridor of the hospital and has seven beds, consisting of three bays each with two beds and a separate cubicle. There is a small nurses' station opposite the second bay. There is no central monitoring and viewing all the patients is not possible from any one point in the unit. The bays are divided by a wall and it is therefore not possible to view patients in another bay without standing in the main corridor of the unit. Views are thus limited (see figure 1 for a photograph of a typical bed space in ICU and figure 2 for 'Trust' ICU bed space). It is clear from the differences in the two pictures that the unit is not purpose built and there has been little investment in critical care.

Figure 1. A Typical Bed Space in ICU (HBN 57: 25 NHS Estates 2003)

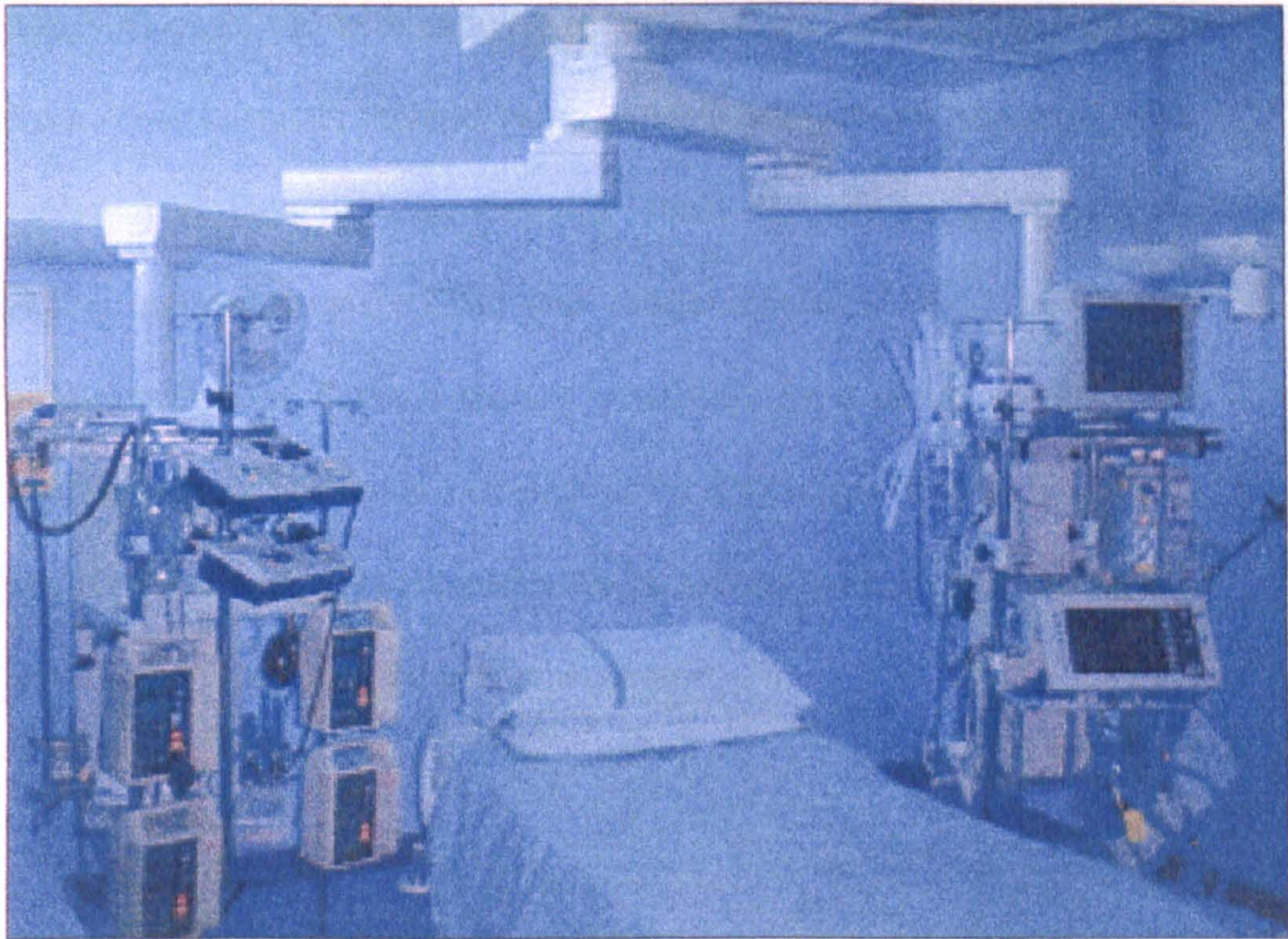
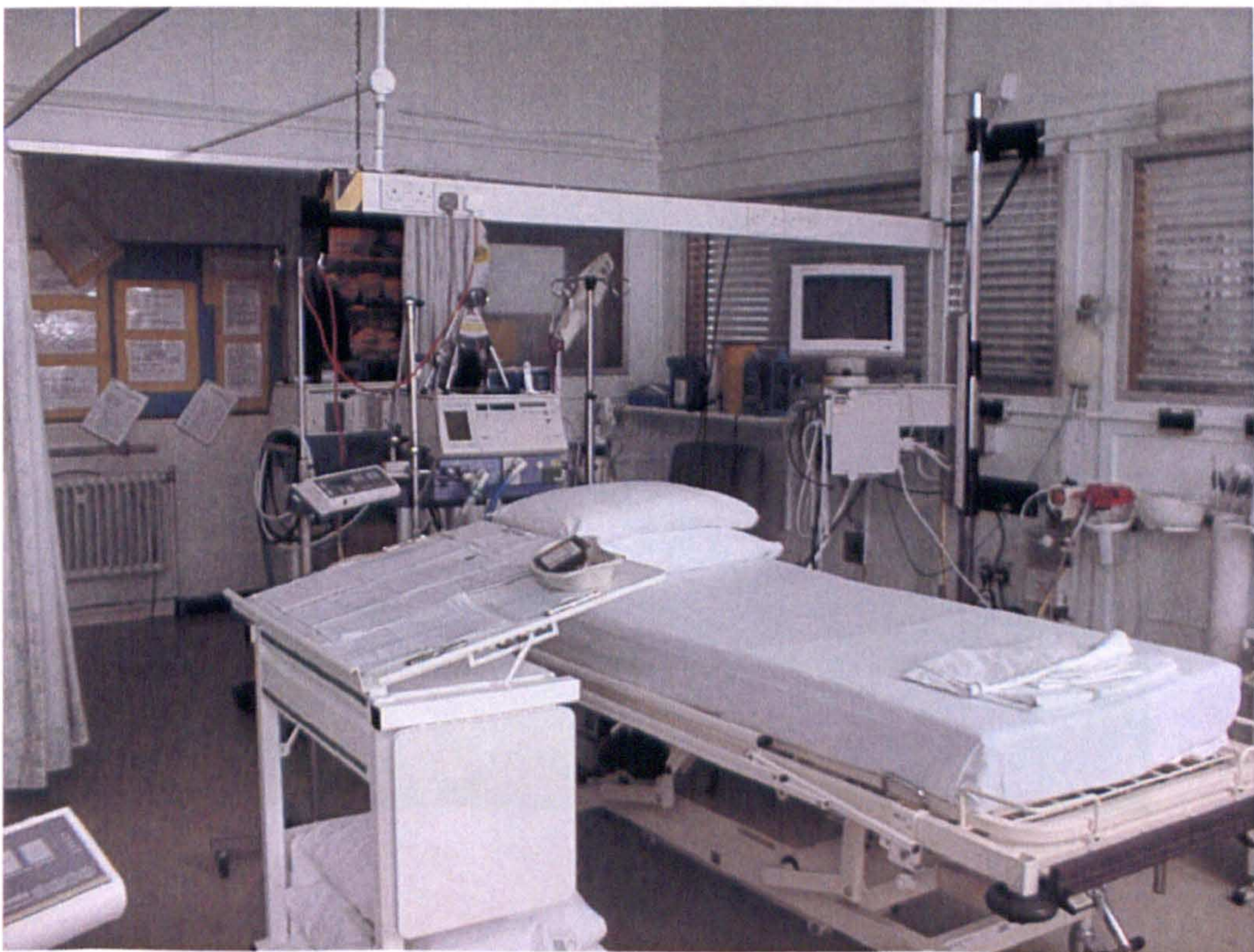


Figure 2. Trust ICU Bed Space 2005



Patient Case Mix

There are on average 400 patients admitted to ICU per year. The average age is 63 years old with an average length of stay of 4.2 days. Referrals from other hospitals include burns patients and patients requiring renal replacement therapy (e.g. dialysis). Main specialities are respiratory (40%), gastrointestinal (28%) and cardiovascular (23%). The average mortality is 20%. Patients require ventilation for a period of time. The method of ventilation is different from HDU (see figure 3 for ICU ventilator) and requires the patient to be sedated with an artificial airway in situ (endo-tracheal tube or tracheostomy).

Figure 3. ICU Ventilator



Staffing

The intensive care unit is staffed in a traditional way with a ratio of one nurse to one patient plus a nurse in charge known as the shift coordinator. A senior nurse with management responsibility, known as a 'modern matron' or clinical nurse manager, assumes the management responsibility for nursing. This post was created in 2002. The professional lead is a nurse consultant. This post was created in 2001. There are two clinical educators and a clinical governance nurse. All these nurses have responsibility for the whole Critical Care Directorate (ICU and HDU).

Medical staffing consists of 7 intensivists. They mostly cover ICU. The clinical director is an intensivist and has the overall responsibility for the management of the unit. The patients are managed by the intensivists, however the parent teams (surgeons or physicians) visit the patient daily, this is known as 'shared care'. Junior doctors (Senior House Officer and above) assigned to the ICU are on a rotational basis and may be on a surgical, medical or anaesthetic rotation. They come to the unit for a period of one month to 6 months. Other junior grades are not part of the medical establishment.

Table 2. Staffing in Critical Care

Staffing	HDU	ICU	Critical Care Directorate
Intensivists	4 sessions	10 sessions	7
Senior Nursing staff			Nurse Consultant, I grade Matron (clinical nurse manager), H grade clinical educator,
G Grade (sister / charge nurse)	1	4	8 outreach professional development nurse, clinical governance nurse, competency assessor
F grade	4	5	
E grade	24	28	
D grade	8	11	
A grade	2	2	
Ward assistants (No contact with patients)	1	1	
Professions Allied to Medicine			1 pharmacist and 1 dietician, physiotherapists are rostered
Administration			2 secretaries, 1 audit clerk, business manager and accountant

Professions Allied to Medicine

The unit does not have any designated full time allied health professional groups. Physiotherapists visit the unit twice a day to give patients regular physiotherapy. Other professional groups such as radiographers, speech and language therapists and occupational therapists visit the unit when asked to do so or when an X-Ray is requested for example. There is a designated pharmacist and dietetic service.

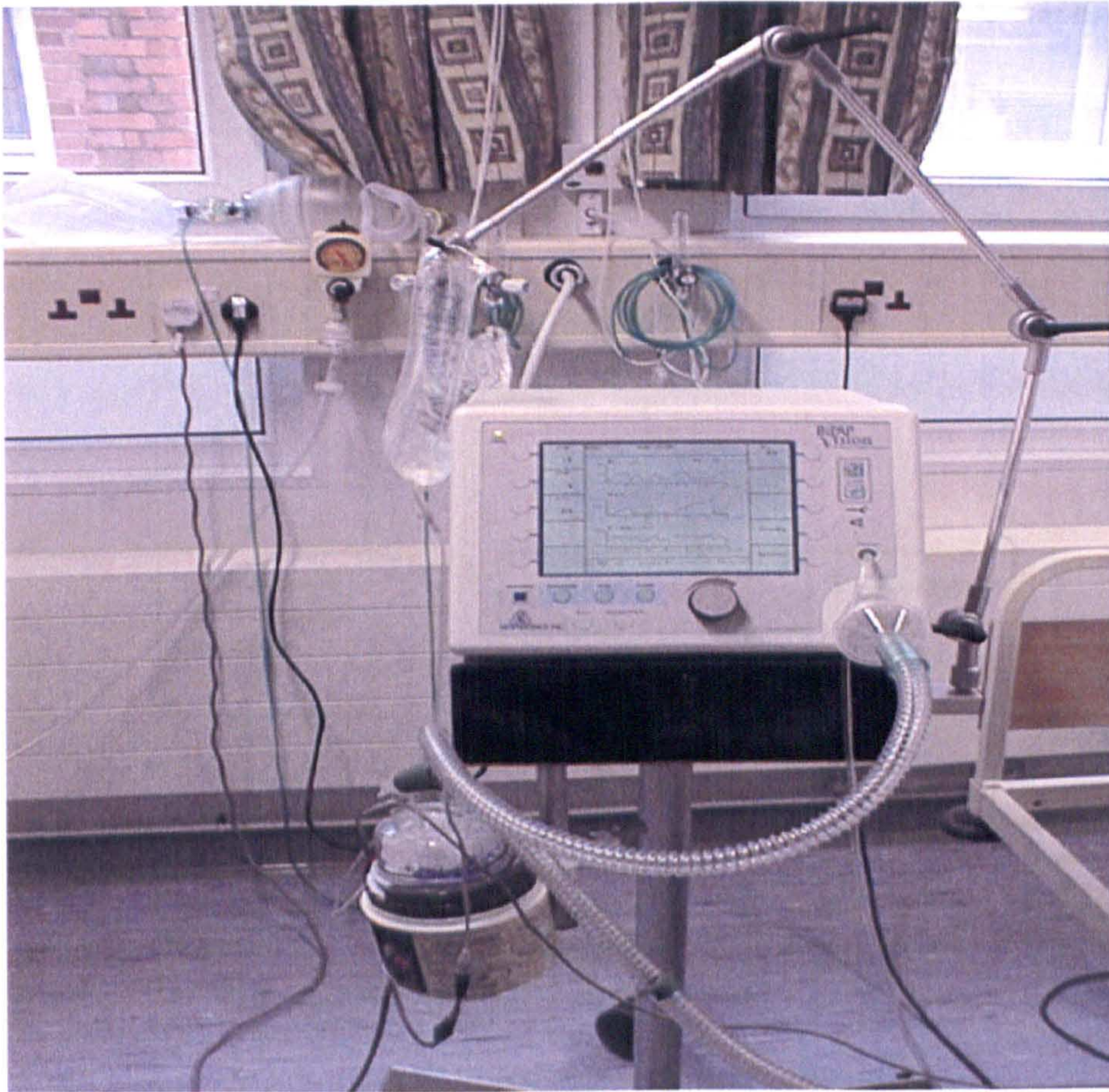
The High Dependency Unit

The 10 bedded high dependency unit opened in 2000. The ratio of nurses to patients is 1:2. There are three designated intensivists' sessions, increased to four in September 2004. There are no designated junior medical staff on HDU. The parent teams are expected to visit the patient on a daily basis and prescribe treatment. The unit is geographically discrete from ICU and differs in terms of patient acuity and patient case mix.

Patient Case Mix and Acuity

High dependency units are designated for patients who require level 2 care that is those patients with single organ failure and who need closer monitoring than is available on the ward. It was never intended for patients who required mechanical ventilation (and are classed as level 3). Patients are nursed on the unit with non-invasive ventilation (NIV BiPAP see figure 4). The intention was to continue patients who were weaning who were on mechanical ventilation in ICU on NIV BiPAP on HDU once they were stable. High dependency is used as a 'step down' facility for patients who no longer require intensive care but are too sick to go back to the ward. The unit admits predominately elective surgical patients as well as emergency medical admissions.

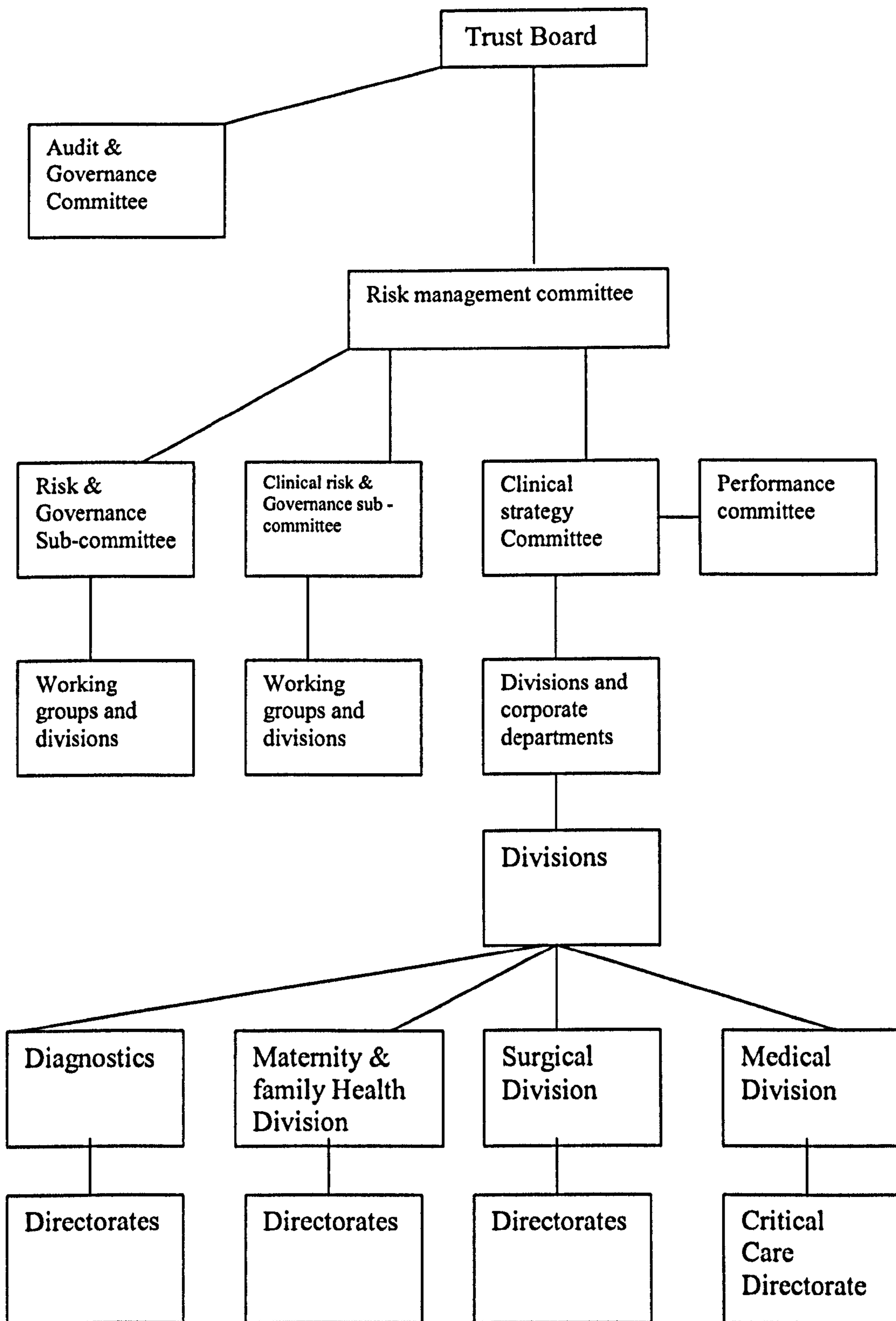
Figure 4. Non – Invasive Ventilator Used in HDU (for Patients who are able to breathe but need assistance)



The place of Critical Care within the ‘Trust’

The Trust was restructured in 2002 and comprises 4 divisions: medical, surgical, family health and diagnostics. Within the divisional structure are directorates. The Critical Care Directorate is sited in the medical division (See Figure 5).

Figure 5. The Management Structure of the Trust



2.5: Ethnography and Representation of the Native's Point of View

Ethnography, according to Spradley, (1980) is a description of culture (Ibid.: 3) or selected aspects of culture (Van Maanen 1988: 1). However how 'culture' is represented is dependent upon the style and genre of the ethnography. It is an attempt to understand the meaning behind the actions and beliefs of those they study (Laugharne 1995) in their natural environment, referred to as the field. In order to adequately represent the participant's view the researcher must become part of it, or, as Malinowski states, 'learn the native's point of view' (Malinowski 1961: 25). However, learning the native's point of view may not be entirely possible. This would mean placing the researcher in the exact position of the native, being exposed to the same experiences as the native and this can probably never be achieved. However this assumes that the researcher can never be part of the group under study. Representing the native's point of view is a subject of much debate and is reflected in the researcher's epistemological and ontological position.

Philosophical Standpoint

Streubert and Carpenter state that it is essential that researchers define their philosophical position before embarking on an ethnographic study. Furthermore this determines what the researcher will study as well as the framework for data collection and analysis (Streubert & Carpenter 1999: 146). There is no single standard form of ethnography. Boyle (1994)

argues that the style and method of ethnography are a function of the ethnographer. Furthermore there are a number of terms used to describe the different styles or genres of ethnography. According to Muecke (1994) there are four types of ethnography and, which ever is chosen by the researcher, represents their philosophical position. They are: classical, systematic, interpretative (or hermeneutic) and critical. Classical ethnography requires that the study includes a description of behaviour and demonstrates why and under what conditions the behaviour took place. The aim is to describe everything about the culture. Systematic ethnography aims to define the structure of culture, rather than a description of the people and their social interaction, emotions and materials. Interpretive ethnography aims to discover the meanings of observed social interactions. Ethnographers study the culture through analysis of differences and implications found in behaviour. Critical ethnographers do not believe there is a culture out there to be known, but rather, researchers and members of a culture together create a cultural schema. Others like Van Maanen, distinguish between three main genres: realist tales, confessional tales and impressionist tales. Ethnographic genres according to Van Maanen (1988) 'are best thought of as ways of working, telling, of writing, of doing ethnography. They are embedded in the practices of the ethnographer. The first, realist 'tales' (of fieldwork accounts or ethnographic writing) are the most common and provide a direct, matter-of-fact portrait of a culture unconcerned with how the fieldworker produced the account. They represent the ethnographer as an impersonal channel through which information about the field is conveyed to the reader. Realist ethnographers are at pains to produce the native's point of view. Characteristic of these tales are extensive, closely

edited quotations conveying to the reader that the views put forward are not those of the fieldworker but are representative of the people under study. Furthermore realist tales do not just observe and record they also interpret. Secondly, in contrast, confessional tales focus more on the fieldworker than the culture and include the researcher's personal experiences and methodological confessions alongside, but separate from, the descriptive fieldwork account. In confessional tales the point of view being presented is that of the fieldworker. This takes the form of 'tacking back and forth between an insider's passionate perspective and an outsider's dispassionate one' (Van Maanen 1988: 77). Both of these genres maintain the ethnographer's authority as interpreter. The final genre, impressionist tales are personalised accounts of fleeting moments of fieldwork cast in dramatic form. Impressionist tales encompass elements of both confessional and realist writing. Whereas impressionist tales move the reader back in time to events that might have later given rise to understanding, it is the fieldworker's reading of these events at the time they occurred that matters. Ethnographers in impressionist tales 'are anything but simple scribes, absorbent sponges or academic ciphers' (Van Maanen 1988: 105) rather these ethnographies are written in a literary sense, a story, filled with suspense and emotion unfolds. In portraying the native's point of view these tales assume the fieldworker knows more about the culture than the native. However one way of representing both the fieldworker and the native's view is to use 'jointly told tales'. According to Van Maanen (1988) 'the production of 'jointly authored texts' opens up for readers the discursive and shared character of all cultural descriptions' (Ibid.: 136).

I come to this research from the interpretive position which describes culture as a description of the people and the social processes. For the purposes of this ethnography I locate myself between the genres of realist and confessionalist tales. Confessionalist tales because I represent the views of the fieldworker, editing and interpreting using my expertise in nursing the critically ill and my extensive experience in the field. Realist in so much that I present a rather matter-of-fact account often hiding my position of researcher which I found extremely difficult to write in this ethnography.

Streubert and Carpenter (1999) describe 6 fundamental characteristics of ethnographic research:

1. Researcher as instrument
2. Reflexivity
3. Field work
4. Cyclic nature of data collection and analysis
5. Focus on culture
6. Cultural immersion

The last three characteristics according to Streubert & Carpenter (1999) should be considered foundational to ethnographic research but are not exclusive to ethnography.

Researcher as Instrument

The researcher becomes the 'instrument' of the research, immersed in the culture through periods of observation in the field (Streubert & Carpenter 1999). The study of culture requires the researcher to become intimate with the participants who are part of the culture. The researcher becomes 'the conduit for information shared by the group' (Streubert & Carpenter 1999: 148). The primary way, according to Streubert and Carpenter, that researchers become the instrument is through observation and the recording of cultural data (ibid.). Observation allows researchers to observe practice and this assists with validation and interpretation of information from the participants during subsequent interviews (Morse & Field 1996). Though the researcher becomes more than just an observer, they become a participant in the cultural scene, developing an intimacy with members of the culture. The role therefore of the researcher according to Streubert and Carpenter (1999) is to identify, interpret and analyse the culture. As Hammersley and Atkinson (1995) point out, what is important is the understanding of that culture through the values of the group and not the values of the researcher. This may not always be possible however, particularly if the observer is already a member of the social group but has a position of power or a different status. Several strategies can be adopted to ensure the data is nevertheless trustworthy and attempts to represent reality. One way is through reflexivity.

Reflexivity

The different ways of approaching the writing of field notes has called into question the use of 'self' (Mulhall 2003). Some ethnographers use their own emotional experiences of fieldwork to enrich and enlighten their notes and subsequent ethnographies, whereas others do not advocate this. This also raises questions about the position of the researcher in the study known as reflexivity. I was working as a member of the team both during and after the study was completed. I was also expected to share my findings with those I had studied and as such I wanted to approach my writing as sympathetically as possible. I in no way wanted to convey criticism of the people or practices under study. As an insider and participant observer I felt I was advantaged. At one level I shared the experiences of the participants because I was part of the team under study. On another level, I recognised that I had a senior role and as such I may have felt like one of the participants but they may not have seen me in this way.

Definitions of reflexivity are varied. Coffey (1999) defines it as 'having an ongoing conversation about experience whilst simultaneously living the moment'. Streubert & Carpenter (1999) describe reflexivity as 'the struggle between the researcher and becoming a member of the culture' (ibid.: 150). They go on to say that at some level the researcher becomes a member of the culture but also alters the culture and have the potential to become less objective because of the prolonged period of time in the field. Pellat (2003) states that reflexivity means the researcher is intimately interacting with texts to make some sort of sense of the

meaning. The way in which the researcher affects both the research process and outcomes needs to be communicated to the reader. How researchers represent themselves in the writing of ethnographies can affect the trustworthiness of data (Smith 2006). I was concerned about my level of intervention and the effect this would have on the research process. I introduced nurse-led weaning and therefore as such was seen as the expert in this field (as nurse consultant). I was often consulted about patients and asked to review them and give an opinion regarding their weaning. This was not a problem after writing this up in my field notes it became part of the study. However I needed to differentiate between intervention which was the result of a professional and moral obligation (being a nurse) and intervention which I needed to record as reflexivity (being a researcher). At first I found this difficult to separate out. For example I found myself intervening in patient weaning when I felt weaning was not going as well as it could. For example I stopped one patient's weaning as I thought it was inappropriate to wean the patient so aggressively (not at the request of the nurse). The bedside nurse had written a plan, and executed this but my clinical judgement led me to believe it was inappropriate and the patient was too sick to wean. I could not sit back in the role of observer and ignore what was happening as this would affect the quality of patient care and outcome. I later reflected on this event and wrote 'nurses are not acting on patient cues'. Streubert & Carpenter recommend 'bracketing', that is putting to one side one's own beliefs and suspending judgements about what the researcher has seen and heard, thereby remaining open to data as they are revealed (Streubert & Carpenter 1999). This degree of 'bracketing' is dependant upon the researcher's philosophical position. Using confessional tales the voice of

the researcher is emphasised in contrast to realist tales where the voice of the researcher is silent. It is intended to show how each particular work came into being and to reveal the tensions and dilemmas inherent in the process. Confessional tales do not replace realist tales but should stand along side them (Smith 2006). This was extremely difficult to achieve as an insider and a novice ethnographer and I found it useful to record my personal notes about my experiences and judgements separately from the descriptive observations made in the field.

Researcher as Nurse

In undertaking research which employs participant observation in nursing it is important to balance the dual roles of being a nurse and being a researcher (Gerrish 1997). In my case I was a nurse in the field I was studying and moreover held a senior position (nurse consultant). Nurses therefore may worry about being observed by a senior person for fear that their actions would be communicated to management and as a result sanctions would be applied. I had also introduced nurse-led weaning to the unit and my presence would affect the way nurses weaned patients. Being a member of the social group I was studying or an 'insider' and being a participant meant staff were used to me being in the field and were familiar with the ways in which I worked. I had planned not to alter this during the study.

The Researcher as 'Insider' (Emic)

As a participant observer the researcher becomes part of the social group under study. In this sense the researcher has already become an 'insider'. This has a number of advantages. The most important is to have experience of the culture. At first I thought I understood the culture in fact I came to write that what I thought I knew about the culture was being challenged. It is important to understand this difference. The ability to 'fit in' and cause little disruption as a researcher is important. However this is dependent upon the role of the observer and is never quite so straight forward. The insider allows the process rather than the outcome of practice to be explored. Being an insider also allows for easier access, and establishing a rapport with the participants. For me this meant I did not have lengthy negotiations gaining access. I was already known to all the participants and had an established rapport. I was familiar with the physical layout of the unit and understood the organisational structures in place. I did not need to spend time orientating myself to the field or introducing myself to the participants. I, like Bonner & Tolhurst (2002), was able to recognise when a participant altered their behaviour. I also had insider knowledge about practices, in particular weaning, and could therefore ascertain the level of knowledge and skill of the nursing staff. I would notice if there were omissions such as the non-recording of changes in ventilation. I could also challenge practices. If a nurse told me there was no one weaning today (as one frequently did) I could see for myself if this was indeed the case. I could with confidence question the decisions of senior nursing and medical staff. I understood the

complexities of care for a patient who was weaning and therefore what this would mean when a junior nurse was allocated to look after them.

However there are disadvantages of being an insider. Kite, (1999) in her study of intensive care felt it was important to 'make the familiar strange'. It is possible that the researcher can go 'native', at this point the researcher has difficulty distinguishing between the role as researcher and the role as participant in the group. Everyday activities become commonplace, it becomes difficult to see any thing. I remember thinking, when writing in my field notes, how little at first I was entering. At first I had not really taken much note of the use of language for example, the way people communicated and the use of non-verbal interactions. I soon realised I needed to pay much more attention to this, making notes of conversations verbatim. I made notes in my pocket book as I went along and transcribed my notes at the end of each day. This was useful in that I had to reflect every day and I found as I did more came to mind. For example on one occasion I did not make much of the fact that a new and junior nurse was allocated to look after a complex weaning patient who had been with us for a long time. The patient was extremely anxious and there were a lot of investigations that had been scheduled for the previous day but had not been carried out. This had an impact on weaning. I really only reflected on this when I transcribed my notes. Looking back I was able to add much more to the notes and make a personal note to follow this up the next day. It is often difficult for the researcher to write everything as it happens and therefore I employed several strategies in order to capture as much data as possible (see section on field notes).

Strategies to minimise the disadvantages of being an insider were used. These included, reflecting after each period of observation, checking out my assumptions with the participants through interview and keeping personal memos. I gave regular feedback to the participants through PowerPoint presentations such as the Clinical Leader and Directorate time out days. These I expected would be challenged, but in fact a pharmacist commented that she had observed the same practices whilst working on the unit (Field notes 30.04.04). The Clinical Leaders group are senior members of the nursing team, whilst the Directorate team are members of all disciplines and all levels. Some members of the team may not have felt able to speak out or contradict my findings. I also presented at conferences and as such the audience were more vocal. Some would challenge, in particular my interpretation of the ritual of the wash. Whilst others agreed this was how it was in their unit.

There is always the possibility that the importance of some information may not be recognised until the period of analysis begins. Although analysis and data collection is simultaneous and cyclic in nature, it was not until I analysed all my data in its entirety that this became apparent to me. I remember thinking about several events that I had only alluded to in my field notes yet now they seemed significant. I was able to expand from memory on the field notes I had written and in some instances I contacted the participants again either verbally or by email to clarify and explain. This is an advantage of working and researching in the same place. For example I remember a nurse speaking to me as we passed in the corridor. She was frustrated with a doctor. They had had a disagreement about a patient's treatment. The patient was deteriorating

and required to be moved from HDU to ICU for escalation of treatment (ventilation). I had made no note of this in my field notes at the time. After reading all the data in its entirety I found many instances of doctor - nurse tension and therefore felt the need to add to my field notes. The danger is that, when the researcher remains in the same workplace, what can appear 'every day' or commonplace may be over looked. The process of reflexivity continues throughout the whole of the research and this helps to reduce this.

The Researcher as 'Outsider' (etic)

The outsider or etic perspective is when the researcher is a complete stranger to the social group under study. The advantages are that the participants may feel they are able to act and speak naturally without fear of reprisal. The researcher can also see subtle differences between practices. The outsider merely observes rather than judges and therefore is said to be more objective. Tolhurst's experience of being an outsider allowed her to observe the implicit differences within specialities, this allowed her to take advantage of 'seemingly ordinary events' and to reflect on those in research memos (Bonner & Tolhurst 2002). However it could be argued that as an outsider the researcher could not understand the complexities and intricacies of intensive care nursing, in particular weaning. For example, weaning often is done by the turn of a dial and takes seconds to do, however when nurses undertook physical tasks for patients they would not wean at the same time. An outsider, if told the reason why a patient's weaning had been delayed was because he had vomited and the nurse had been busy changing the sheets, may not

understand that this is not a reason for delaying weaning. In fact the two procedures could be done simultaneously but this would need to be judged at the time.

Ethnographers draw on their own biographies in the research process. I was instrumental in setting up nurse-led weaning at the intensive care unit and have a national reputation for this work. I work as a nurse consultant in the unit and therefore I felt I was in a strong position to understand the culture and social action in context. However on reflection I have found I was indeed part of the culture but also because of my senior position felt on occasions outside of it.

Access and Feeling Resistance

Working on the unit as a nurse consultant and in a position of relative power and authority gave me special privileges. One was access to the field. I never had problems with initial access to the research field but some time into the study I had not anticipated the reaction I got. I had been on the unit regularly and began to feel some resistance both from the medical and nursing staff. One form of resistance I thought at the time was not to carry out my instructions such as writing a weaning plan or transferring a patient to HDU. I later re – interpreted this as being part of the intra - occupational boundary tensions and sited my observations in the division of labour and nursing - technology relation chapters. I began to understand why nursing staff may be feeling anxious and showing some resistance after a remark made to me after the Clinical Leaders time out day.

'I presented my findings as they are emerging to the clinical leaders (F and G grades) and am surprised no one has challenged me. Afterwards I mention this to a colleague and she informs me that one of the G grades had told the F's that they could expect a hard time and they were to fight their corner. I was surprised at first, thinking what have I done to make them behave this way? It occurred to me my seniority and observing has made them feel insecure and they are worried that I will be critical. I am therefore careful what I write and how this may come across to others. It is not my intention to be critical, however I cannot ignore care or practices which fall below standard' (field notes 30.04.04).

Focus on Culture and Cultural Immersion

Culture, according to Van Maanen (1988) is created, as is the reader's view of it, by the active construction of a text, the ethnography. Ethnography, as methodology, requires the researcher to immerse him or her self in the culture. Whether this is totally possible is debatable or as Van Maanen (1988) states the ethnographer requires as a minimum some understanding of what he refers to as 'the stuff of culture' (Ibid.: 13). By this he means language, concepts, categories, practices, rules and beliefs used by the group under study. It has occurred to me that having worked on the unit for over three years what I thought I knew about the culture of the unit was being challenged. When I introduced nurse-led weaning I thought it would be a relatively simple task. Once up and running, given time it would soon be embedded in practice. However this was not the

case. Staff felt I should be present on the unit to help them wean patients from mechanical ventilation. It was almost that they expected me to take responsibility for weaning yet it has been over 2 years since it was introduced. I remember thinking 'Why are the staff not doing this'? You cannot get this level of meaning from textbooks, you have to experience it first hand in order to learn the process, to know what it is like 'to do ethnography'. It may not be possible to describe the whole culture and as such a mini or sub culture is presented (Baillie 1995). In my ethnography I chose to focus on the nursing staff. Whilst I was able to observe how they interacted with other members of the multi-professional team, patients and relatives I can really only present this sub-culture and as such focused my observations on and chose to interview nurses.

The Benefits of Using Ethnography in Nursing

Ethnography allows the collection of observational data in situ, it captures what people say they do as well as what they actually do. In focusing my enquiry on nurses in critical care this led to a high degree of realism (Baillie 1995). Furthermore, according to Baillie (1995), ethnography may increasingly be used to examine concepts critical to the provision of nursing care. This ethnography revealed the role of the patient who was weaning. The allocation of junior nurses to patients who were weaning gave an illuminating view of how nurses saw this group of patients. It also clarified the role of the nurse consultant in critical care. Using ethnography, the researcher, can enter an unknown situation in order to describe, interpret and analyse that situation. Given the aims of the study were to identify what nurses meant by 'technology' and

describe how this was used in practice ethnography enabled the study of nurses in the workplace, the benefits of ethnography outweighed the difficulties and therefore was an appropriate way of studying nurses at work.

2. 6 Data Collection

Data was collected through participant observation and focused interviews. Documents such as weaning protocols and educational packages were also utilised as data. An essential part of ethnography is the use of field notes.

Participant Observation

There is no single agreed meaning of participant observation and most accounts of participant observation are described on a spectrum of observation (Savage 2000a). Participant observation is often described as both methodology and a method. It is method as it incorporates a range of approaches to data collection including what Savage refers to as 'participative observation in which physical involvement in the field cannot be divorced from the researcher's theoretical or epistemological suppositions' (Savage 2000a: 324). Savage refers to participative observation as a methodology deriving knowledge using all the senses. Participant observation and ethnography are often used interchangeably. In this thesis I refer to ethnography as methodology and participant observation as method. Some definitions stress the role of the observer whereas others give less importance to the observational and more emphasis on the involvement of the researcher. The role of the researcher can take the form of complete observer, with no contact with the participants, for example through one way mirrors, to complete participant, where the researcher acts as an ordinary member of the

group. This can be done in either a covert or overt manner. I chose to employ participant observation. The issue of being a participant is a contentious one. Participation needs to be clarified and distinctions made between participant in the social group or participant as one of the social group. The question of 'how far can a researcher truly participate?' were sentiments expressed by Kite (1999) in her observation in intensive care. Although she was a nurse and had worked in intensive care some years before the study she felt she did not act as a participant in the true sense of the word as she did not take on the responsibility of patient care. Rather she helped other nurses with activities or as she refers to it as 'playacting' and being on the periphery. In my case being employed by the hospital as a nurse meant I acted as a nurse and was working and researching at the same time. In this way I did not alter the way I worked for the purposes of the study.

Methods of Observation

There were several methods of observing I could employ. One method was to observe one patient continuously, working alongside the bedside nurse. This had the advantage that I would be included in providing care for the patient and therefore able to observe continuously and in those activities (such as performing a bed bath) where some researchers may be asked to leave in order to ensure privacy and dignity of the patient. The disadvantage was I could get too involved in the care of the patient and alter the behaviour of the bed side nurse who may ask me for advice or expect me to give direction regarding weaning. This method may also be intimidating for the individual nurse. Another method was to observe all

the patients, spending a short amount of time at each bedside before moving to another. The morning shift was the most difficult to observe as a number of nurses would wash their patient at the same time. This meant the curtains round the bed were closed and I would not have access to the patients' bed areas. There were a variety of other tasks such as the medical ward rounds, physiotherapy and X-Ray that were also completed in the morning. The morning therefore was a frenetic time for the nursing staff. This meant observation could be patchy; however I kept going back to the patient and asking the nurse 'how are things going?' or 'what is your plan for weaning today?' I was confident I was not missing too much. An alternative method of observing was to follow one patient over a number of days. One patient had been on the unit over a month. Observing him meant I could follow the progress of his weaning but with several different nurses and this I did from day 20 to day 47 of his stay. It also meant I could follow the same patient from ICU to HDU and examine the differences in weaning from one area to another. I also observed by attending the medical ward round, in this way I saw all the patients on the units and observed how nurses interacted with the medical staff. I was particularly interested in their discussions about weaning, paying particular attention to who led weaning and how a plan was made.

I observed during the period from 7am to 5pm, Monday to Friday. I had thought about coming in over the weekend. This would have been difficult for me to do, however on reflection I felt it would be advantageous not to. There is limited intensivists cover over the weekend. Without me there I felt I would get a picture of what weaning occurred (retrospectively) in my absence. I also observed intensivists ward rounds,

weaning meetings and teaching sessions. In my field notes I have written down any event that I thought relevant to weaning, that included a conference I attended and any conversations with staff outside of the unit. I also included any events related to weaning that occurred outside my formal observation period.

Participant Observation: The Professional Dilemmas

Being in the position of a senior nurse in my own unit and a researcher posed several professional dilemmas. The first was witnessing practices that did not fully comply with policy. Examples were recording of changes in ventilation during weaning and checking the ventilator. Issues surrounding documentation of weaning were among the subjects I took to supervision. At first the frequent lack of documentation caused me some concern. I therefore had a professional duty to remind staff that they were obligated, according to unit policy, to record changes in ventilation. The difficulty this posed was concerned with influencing the nursing-technology relation and as a result my results could be contaminated. As time went by I realised this was in fact a common occurrence and of particular relevance to my study. It raised themes that I could pursue in the collection of data during observation and could be followed up at interview. I remember making notes to my self such as

‘N.B. Next interviews I will check this assumption out –

‘What are the responsibilities associated with nurse-led weaning and who is responsible?’

At times it was difficult being a participant observer. I needed to get the trust of the staff in order that I could observe without altering their practices, however I had a responsibility to the patient, Unit, Trust and my Professional body (NMC) to act if I witnessed what I considered to be poor practice. I was worried that if I reported every thing I did not agree with to a senior member of staff I could be seen as 'spying' on the staff and as a consequence I would lose their trust and willingness to participate. However as a senior member of staff I had to decide what I needed to act on and how I did this. There were two events when I did this and these are recorded in my field notes.

Interviews

Ethnography often employs the unstructured interview technique. It illuminates the researcher's understanding of the observed by allowing the researcher to interpret the significance of what has been observed and place the observed scene in context. I decided to interview nurses only as I was interested in the nursing – technology relationship and as such wanted to represent a sub-culture or partial culture. My sample was drawn from a range of nursing grades and experiences. The intention at first was to interview a selection of nurses I had observed. The interviews would be structured, as much as they could, from events I had observed and from personal memos in my field notes. My decision to interview nurses was based on the research aims. I wanted to observe nurses using technology. I also included participants I had not observed but who could offer me explanations for the themes that were emerging or had a significant role on the unit and could offer a different perspective (such as

the clinical governance nurse) this therefore is a purposeful (also referred to as purposive) sample. I interviewed 12 nurses. These lasted from 25 minutes to 45 minutes. During the process of analysis I was able to contact these participants again when I needed clarification or asked them to expand on something they had mentioned at interview. Three participants were contacted again formerly by email and asked to clarify or develop issues raised in interview. I deliberated towards the end of the study if I should interview the intensivists and other members of the multi-professional team. On reflection I felt that to pursue this was more about feeling that I may have missed something vital and little to do with the aims of the study. I therefore made the deliberate decision not to include them.

Interviews were unstructured but focused and were conducted either immediately after a period of observation or when an informant was available. Not all participants were observed weaning, for example the clinical nurse manager did not work clinically in the sense of providing hands-on care. At first I focussed the interviews on key events during observation or would ask the informant to tell me how they thought their patient's weaning had progressed. Later as I had developed themes in the periods of observation I would ask the informant to express an opinion on these themes during the interview, in order to check out my interpretation, seek clarification and meaning. The interviews were open-ended in character. May (2001) states this allows the preconceptions of the researcher to be challenged as well as to enable the informant to answer questions within their own frame of reference (Ibid.: 124). However it could be regarded that this allows the researcher to influence

the interview and impose their understanding of the situation under study. What themes the researcher decides to discuss and what they decide to omit or see as less important will no doubt have the potential to skew the data. It was always important to bear in mind the aims of the study when conducting the interviews for fear that the interview could lead to a 'nice chat' but have little bearing on the research. However I never found this to be the case, indeed as May states

'Flexibility and the discovery of meaning, rather than standardisation, or a concern to compare through constraining replies by a set interview schedule, characterise this method'

(May 2001: 125).

Pahl (1995) in his study on stress and anxiety preferred the term 'restructured'. His interview transcripts were sent to the participants for comments and amendments and the purpose for which the data were collected was altered both during and after the interviews (Pahl 1995 in May 2001: 125). After transcribing the interviews myself I sent these to the participants in order that they could check for accuracy. I preferred to transcribe the interviews personally in order to become immersed in the data and this allowed for concurrent analysis. Memos were written in the field notes.

Field notes

Field notes are the traditional means of recording observational data in ethnography. Notes are taken as a continual source of reflection in the

field and consist of relatively concrete descriptions of social processes and their contexts. The aim is to capture these in their integrity in order to enhance the understanding of the researcher and the validity of the research (Hammersley & Atkinson 1995). What is recorded will in some sense depend on what is relevant to the research. However what is and what is not relevant will depend on the interpretation of the researcher. According to Hammersley and Atkinson, the recording of field notes constitutes a central research activity and should be carried out with as much care and self-conscious awareness as possible (Hammersley & Atkinson 1995). As Hammersley & Atkinson (1995) describes

‘A research project can be as well organised and as theoretically sophisticated as you like, but with inadequate note-taking the exercise will be like using an expensive camera with poor quality film. In both cases, the resolution will prove unsatisfactory, and the results will be poor. Only foggy pictures will result’ (Hammersley & Atkinson 1995: 175).

Field notes aim to record the routine. ‘A recognition of what is routine is best established through watching and listening to what people do rather than asking them directly’ (Silverman 2005: 174). Silverman goes on to say that a researcher needs to think about what he or she sees as well as what is heard and to expand field notes beyond the immediate observation. During the period of observation it is easy to get absorbed in the field and the development of deeper and meaningful field notes can be

overlooked. Spradley (1979) suggests that observers keep four separate sets of notes:

1. Short notes made at the time
2. Expanded notes made as soon as possible after each field session
3. A field work journal to record problems and ideas
4. A provisional running record of analysis and interpretation

This systematic approach to making and recording field notes improves reliability. I made notes at several different stages. Firstly I would arrive early to describe the scene thereby detailing the method of observation and setting the context. Secondly I would take notes during observation at convenient moments. For example during my break in the coffee room, at the end of the ward round at the nurse's station, or back in my office at the end of the observation period. At the end of every day I would develop these notes, adding to memos or making comments about emerging concepts to be picked up either the next day or at interview. It was then that I determined who would be interviewed. I tried to transcribe the field notes on a daily basis and this allowed me to add description or explanation or raised questions or points of clarity. It was difficult at times to set aside time to recording of field notes in case one should miss something valuable. I noted as time went on my field notes became more detailed and far longer.

These notes are used as part of the analysis and are a valuable source of data. It also allows the position of the researcher to be known and this is developed through reflexivity. Because the researcher cannot be

separated from the research it is important to understand the relationship between observation and interpretation.

'Leaning to do Ethnography'

As a critical care nurse observing is second nature however observing in the capacity of researcher meant I had to think carefully how I should approach this. I decided quickly the first thing to do was to find out how many patients were weaning and start with the first. My dilemma was should I find one patient and stick to the nurse like glue or do I follow the shift coordinator, or go from one patient to another? It occurred to me I did not have experience of doing ethnography and I should have to 'learn how to do it'.

The recording of data, the how, how much, in what style, in what detail was confusing at first. Being familiar with the setting meant at times I was not recording the setting or context, because it was so ordinary. I had to think about what is referred to as 'making the familiar strange' and noting the details, almost like constructing a picture in the mind. This was hard to do. At first I would write short sentences such as 'four patients weaning, one plan in place, curtains drawn at two beds, washing in progress, medical ward round about to start'. These were more like brief jottings as described by Hammersley and Atkinson (1995). I would then progress to recording who was on the ward round etc. I noticed more detail was required. I had to think what would an outsider be writing? Anthropological field notes may be seen as private and personal, which means for the novice ethnographer there is no model to follow and little

advice available. The making of field notes is 'part of an invisible oral tradition of craft-knowledge, and many who embark on their first project have to find their own way of doing things' (Hammersley & Atkinson 1995: 176).

I developed an informal schedule to help me collect and record data. For example on describing the ward round I would note:

Who was present and who was missing?

What time did it take place and how long did it last?

Where did the round take place (bedside, coffee room, away from the bed)?

Who led the ward round?

What was the level of participation (nurses)?

Was weaning discussed?

How was weaning addressed?

What was the outcome?

Was the patient involved?

What language was used between doctor and nurse?

What was the style of interaction?

After a period of data collection I began to make analytical memos in a separate book. These referred to the reading of field notes and my thoughts after interviews or memos made at the end of each day about some thing significant. For example I had intended to observe conventional weaning on ICU only until my work as nurse consultant took me to HDU daily I began to think why am I not observing here to?

There was one occasion when one of the respiratory physicians arrived to see a patient who was weaning from NIV. His approach was quite different from the intensivists and I noted this as significant. This is what Hammersley and Atkinson refer to as avoiding 'thinking as usual' (Hammersley & Atkinson 1995: 192).

Being a participant observer created difficulties whilst researching. I was a senior member of staff and I also had a job to do. Managing the two was more a process of juggling commitments to work and commitments to the research. I therefore had to be realistic about what I could achieve in the time available and think of the best way I could achieve this. I tried to clear my diary as much as possible for six months and in that time I tried to keep the mornings free to be on the unit. I therefore combined my work as a nurse consultant and researcher. In the afternoons I was usually at meetings, teaching, or in the office working, but as far as possible I would spend as much time on the unit, or try and combine the two with the research. For example I attended a Network conference the subject of which was weaning so I was able to use that time to record field notes.

Missing Data

The worry that the researcher may have missed something or is being too selective in their observations or even too general is reiterated by May (2001: 161). The concern that I was failing to capture everything during data collection led me to discuss this in supervision and even thinking about returning to the field in order to collect more data. Bruyn (1966 in May 2001) states that this can be overcome by using what he refers to as

'subjective adequacy' in order to enhance the understanding of the researcher and the validity of the research. He lists 6 indices of subjective adequacy. This includes time, place, social circumstances, language, intimacy and social consensus (Bruyn 1966 in May 2001: 161). The more time spent in the field, the greater the adequacy achieved. I had spent 6 months from Monday to Friday observing in the field. Apart from a 2-week break for holiday I was there most days. My concern was not how long I was in the field but in what capacity. I did not have the luxury of taking 6 months off work and observing as a researcher, I had to fit in my full time job as well. This inevitably meant juggling my work schedule, and time in the field, although in most parts continuous, was occasionally fragmented. Place refers to the physical environment where the actions took place. In my work as a nurse consultant I went to HDU on a daily basis either before or after my data collection on ICU. After a period of time in the field it occurred to me there were differences between the two units with regard to weaning that would have an important bearing on my study. It was not my original intention to observe in HDU, but it became apparent that this was an area worthy of study. Data collection in HDU therefore commenced in June. Familiarity with the language was not a problem indeed this was an advantage in that I immediately understood all the jargon, expressions and medical language. Intimacy is achieved with greater personal involvement with the group and the researcher therefore has more understanding of the actions and their meanings. It could be argued that real intimacy can never be achieved particularly if the researcher is an outsider. I had worked in the unit for over three years and I was already part of the social group. However my role as nurse consultant may have prevented me from gaining real intimacy when I

assumed a senior role associated with status and power. Social consensus refers to the extent to which the observer is able to indicate how the meanings within the culture are employed and shared among the group. It is facilitated by exposure over time to the culture. Although I had only worked in this unit for 3 years I had worked in intensive care for the last 17 years. It became apparent to me in discussion about my findings with my supervisor that I was able to describe the culture for example in discussing 'doing the wash' I was able to communicate to my supervisor why this was important to nurses and what meaning it conveyed.

2.7 Sample

There are three major dimensions that affect the sampling process, time, people and context (May 2001). Sampling is inherently associated with validity but often mistakenly assessed by the degree of generalizability and the potential for replication (Mackensie 1994). The description of the sample and fieldwork procedures is more appropriate.

Time

Weaning from mechanical ventilation usually ceases at night, giving the patient a period of rest. The majority of interactions among health care staff occurred within the time period of 7am to 5pm. Therefore observation periods occurred within this time frame. Time in the field is also important. I observed for periods of 1 hour to 7.5 hours at a time. The longer one spends in the field the more field notes are generated and

this can be difficult to manage. Participants may feel 'put off' by the researcher's constant note taking and worry that ever thing they say is 'taken down'. I could spend all my time with one patient or divide my time between all the patients, moving from bed to bed. The total time spent in the field was 6 months, formal documented time was over 150 hours but this did not include meetings, teaching, conferences and visits to the units. In total this was 250 hours.

People

The sampling of people may be undertaken in terms of what Hammersley and Atkinson (1995: 50) refer to as 'member-identified categories'¹⁹: those identified by the participants, and 'observer-identified categories': those identified by the researcher after the construction of hypothetical categories based on fieldwork. The process is linked to the development of analytical ideas and the collection of data. I observed any and all nurses who were caring for patients who were weaning. I therefore observed all the interactions that nurses had with other members of the team. I also observed the shift coordinator. The decision to interview was based on periods of observation and a need to check out my assumptions and gain clarity of a situation. All the participants were identified by me. I included some of the nurses I observed and others were chosen because they were senior members of staff or were influential in the weaning process, such as the education staff, those instrumental in leading weaning or the manager of the unit. They were chosen in order to add clarity to observational data, to check out assumptions or to further

¹⁹ I refer to these as themes rather than categories throughout this thesis.

explore emerging themes, ideas and concepts. The participants therefore emerged from the data obtained from observation in the field. This method of sampling is referred to as purposeful (Lincoln & Guba 1985) but is also called theoretical sampling (Glaser & Strauss 1967). Both of these terms refer to the data collection from participants who have experience of the culture or phenomena of interest. All the participants interviewed were nurses and this was deliberate. The focus of my research was to understand what nurses meant by technology and to describe how they used and perceived it in the work place. Although interesting to explore the views of the medical staff and other health care professionals such as physiotherapists and even more so the views of patients I decided against this. Whilst acknowledging that there are many actors in the field and these are influential in the way nurses used technology I was interested to find out how nurses experienced weaning. I elicited how this technology affected the division of labour and the role of the patient through observation in the field and through the interview accounts from those nurses I interviewed.

Context

Taking into account variations in context is as important as sampling across time and people (Hammersley & Atkinson 1995). Within a setting, people may distinguish between a number of different contexts that require different kinds of behaviour, for example the coffee room and the bedside. I observed at the bedside, in the coffee room, in offices and in the classroom. In fact I took every opportunity open to me to observe. At the end of a period of observation I would go back to my office and catch

up with my work. I would encounter several other nurses also in their offices and would often discuss the events of the day. Staff would ask about the long term patients who were weaning. Although these staff may not have been working in the unit that day they still were engaged in weaning through their informal questions and the concerns they expressed about weaning in general.

Saturation refers to the repetition of discovered information and confirmation of previously collected data. The researcher is interested in repetition and confirmation of previously collected data. However reaching saturation may never be achieved. The best a researcher can hope for is to saturate the specific culture of phenomena at a particular time (Streubert & Carpenter 1995).

Table 3. Details of Participants (interviews)

Grade	ICU/HDU	Title / Experience
E	ICU	Bedside staff nurse, 5 years experience
G	ICU	Shift coordinator, 20 years experience
E	ICU	Bedside staff nurse, 2 years experience
F	ICU	Bedside nurse 8 years experience
E	ICU	Bedside nurse, 2 years experience
D	ICU	Bedside nurse, 6 months experience
E	ICU	Bedside nurse 4 years experience
G	BOTH	Practice development nurse 7 years experience. Further interview by email for clarification
F	HDU	Shift coordinator 4 years experience
I	BOTH	Clinical Nurse Manager, 10 years experience
G	HDU	Ward manager, 13 years previous experience in ICU. Further interview by email for clarification
F	HDU	Shift coordinator, health lecturer, joint appointment with university, 4 years experience

2.8 Ethical Considerations

Informed Consent

The study involved observing nurses patients who were weaning from mechanical ventilation. As this study took part in the clinical area it involved all the nursing staff engaged in weaning as well as other health

care workers who either work on the unit or came to visit patients on the unit. Gaining informed consent from all people involved can be problematic. Johnson (1992) questioned if it was truly possible to inform all participants in the same way, with the same level of understanding. Patients were not the subject of observation and patient details were never collected; however, in order to observe the nurse inevitably the patient was also observed. Patients and their relatives were not asked for written consent but rather agreement that their care would be observed. The researcher went to great pains to clarify this difference. A number of strategies were put in place in order to minimise the potential problems. Written information for staff was displayed on the unit in advance of the study. Leaflets were left in the relatives' waiting room in order to ensure they also had an opportunity to become acquainted with the research. Information about the study was presented informally through unit meetings and at handovers. All the intensivists were written to, explaining the study. The Clinical Director and Ward Manager were given written information and were asked for consent. All staff on the unit were emailed with information about the project in advance of the study. They were also emailed at the end of the observation period to thank them for taking part but also to inform them the study had finished. It is important when the researcher is a member of the team to let the participants know in what capacity they are working. Staff on the unit were asked for written consent at the beginning of the study and verbal consent on a daily basis. This was to ensure that any member of staff who either did not wish to take part or wished to withdraw from the study would be able to do so. For those staff that came to the unit in a visiting capacity whilst observation was taking place the researcher informed them about the

study. They were not asked for their consent but were given an opportunity to voice any objections, no one did. It was not always possible to speak to every one individually but regular visiting doctors soon became aware of the study as information leaflets were distributed to every bed area. Moore and Savage (2002) argue that it is not possible to gain informed consent from all that enter the research field. All the patients being weaned were conscious it was possible to obtain their verbal agreement for their care to be observed. Relatives and friends were also approached for agreement to have the care of the patient observed. Written consent for the interviews was obtained.

Privacy and Dignity

Observation can be intrusive for patients and their families. Every effort was taken to respect patient privacy, dignity and confidentiality. Observation ceased if the patient condition meant it was no longer appropriate to observe or if the bedside nurse asked the researcher to withdraw for any reason. The researcher respected the wishes of those being observed and withdrew at times when asked to do so. On one occasion one patient's details and the circumstances of their admission to the unit had been on the local television news. I thought this, together with the family dynamics, meant it would be inappropriate for me to observe so made no attempt to do so, and explained to the nurses caring for this patient the reasons why.

Confidentiality

Participant confidentiality was maintained. All names and participant details were anonymised or removed from the data. Transcripts of the data refer to grade of nurse or participant and doctors are referred to as intensivist, or respiratory physician (see section on rigour for a discussion of the complexities of maintaining confidentiality). The hospital is referred to as the 'Trust' and the name of the hospital is omitted from any policies and protocols that are referred to. However it is difficult when participants were purposefully chosen for interview not to identify them, in particular when demographic data (such as grade and title) are used to identify particular participants. The decision to remove the number allocated to the individual was made in order to preserve confidentiality. Demographic data is preserved in order to describe the sample however this information is not used specifically in the analysis.

Ambiguity of Roles

Participant observation in this context involved working as a registered nurse and a researcher. The researcher is a nurse consultant and recognised her influence and the potential risk of coercion as a result of this seniority. A premise of consent is that the participant should be free from coercion; (Moore & Savage 2002) however if staff felt uncomfortable or unable to refuse to participate it was not transparent. Only one staff nurse refused to take part at the beginning of the study but later agreed. It could be argued that the researcher should not have approached the participant again but the nature of the study inevitably

meant revisiting consent with nurses on a daily basis. At the end of the study unit staff were informed the study had been completed. All information about the study, posters etc. were removed from the unit. For the first week after the study I was at pains to inform staff I was no longer observing and reinforced the completion of data collection.

There are ethical dilemmas being a complete participant, observing in one's own place of work. Staff may feel there is a blurring of roles and this may cause ambiguity. This was compounded by my senior role. Junior staff in particular may have felt overwhelmed and unable to refuse to participate in the study. This was potentially difficult for them as we worked together. I was aware that some staff may feel this way and attempted to communicate this to them giving them opportunities to refuse should they wish to. Observing several patients at one time made it easier for staff as they did not feel under such pressure compared to observing one patient for the whole shift and I tried to be sensitive to the needs of staff. For example I would not observe at a bed area where there were particular difficulties. One example is when a patient was admitted and the police were involved, another occurred when the family were thought to be challenging. I understood that nurses would have much to contend with without the extra burden of being observed. I was also able to give feedback to nurses about their weaning as some asked for this. On other occasions I would use the opportunities presented to me to help the nurse or teach them. More senior staff were more relaxed and welcomed my observation, it gave them a chance to show me what they did and one nurse who was supervising a junior nurse commented 'I am so glad you have come to our bed area we were waiting for you'.

The Local Research Ethics Committee (LREC) was approached and approval was given (see appendix 7). The hospital's Research and Development department was formally approached and approval for the study was given.

Conclusion

The course of ethnography cannot be predetermined but this does not imply that the ethnographers' approach will be haphazard (Baillie 1995). The quality and credibility of ethnographic research can be enhanced if a thorough approach to data collection is taken. Therefore a detailed account of fieldwork is an essential element of this method. There are many benefits of ethnography but the main one was the opportunity for me as nurse to study my social group in the workplace. There were dilemmas and tensions as a participant observer as well as role conflict being a nurse researching other nurses. Living in these two worlds at times was a strain and I constantly had to reflect and focus.

Terms such as validity and reliability are often discussed in relation to quantitative research. Different criteria are used in ethnography to determine the credibility of results. The trustworthiness of data is a more appropriate term and relates to the extent to which the data provides insights, knowledge and an understanding of the meanings, attributes and characteristics of the people under study (Leininger 1985). Some research studies, whilst providing an ample description of the methods of analysis, gloss over the process. The next chapter is concerned with both the

method and the process of analysis in an effort to determine, as much as it can, the trustworthiness of the data.

CHAPTER THREE

Analysis of Data

3.0 Introduction

This chapter is concerned with the analysis of data and is split into two parts. The first describes the method of analysis whilst the second is concerned with describing the process of analysis and is illustrated with excerpts from the transcripts. Whilst a number of stages have been condensed for the purpose of writing up it is essential to make transparent the whole method and process of analysis in order to demonstrate confidence in the data. I will therefore discuss the concepts of rigour in qualitative data and discuss the strategies I used to ensure data was trustworthy whilst also protecting the confidentiality of the participants. I do not claim to present ‘the whole picture’ rather I acknowledge my data is partial (Silverman 2005) however the researcher needs to identify rigorous methods of assessing truth and consistency as a means of ensuring the reality of data (Tobin & Begley 2004).

3.1 Method and Process of Analysis

The aim of observation is to categorise and collect data in order that events, relationships and interactions observed may be understood or

explained within the context of a developed theoretical framework (May 2001). In ethnography the aim is to describe a group or culture (or sub-culture). I have employed content analysis as a method of analysing text using the constant comparative method.

Rigour and the Search for Truth

The issue of rigour in qualitative research refers to 'validity' and 'reliability' but these terms are 'borrowed' (Koch & Harrington 1998) from the quantitative paradigm and applying them to another paradigm is problematic. Rolfe (2006) states that we are still no nearer a consensus regarding how one should judge the quality of qualitative research. Researchers have debated the terms validity and reliability in qualitative research as Avis (1995) points out

'Validity is an important concept in establishing the credibility of research findings. However the current debate about the criteria used to substantiate claims for validity of research evidence is largely based on a set of distinctions between qualitative and quantitative methodology which are outdated and misleading'.

This has resulted in a divide between those writers who believe qualitative research should be judged according to the same set of criteria as quantitative research, those who believe a different set of criteria is required and lastly those who question the appropriateness of any predetermined criteria for judging qualitative research (Rolfe 2006).

Rolfe argues that there is no unified qualitative research paradigm and therefore it makes no sense to attempt to establish a set of generic criteria for making quality judgements about research studies. He suggests that

‘We need to either acknowledge that the commonly perceived quantitative-qualitative dichotomy is in fact a continuum which requires a continuum of quality criteria, or to recognise that each study is individual and unique, and that the task of producing frameworks and predetermined criteria for assessing the quality of research studies is futile’ (Rolfe 2006: 305).

Several writers therefore have tended not to use the terms validity and reliability, instead rigour has been judged by assessing trustworthiness. Lincoln & Guba (1985) argue instead for an alternative constructionist paradigm and in answering the question ‘what makes for trustworthiness of the data?’ use the terms: credibility, dependability, transferability and confirmability. Credibility assesses the ‘fit’ between the participant’s views and the researcher’s representation of them. Rolfe goes on to ask does the explanation fit the description and is the description credible? (ibid.). Avis (1995) argues there can be no formal set of criteria with which to judge the validity of qualitative research findings, rather the credibility of research findings should be judged on the usefulness of the research report. The way a research study is legitimated depends upon the paradigm within which a given study is conducted, for example the exploration of the conditions and philosophical underpinnings and

assumptions within the research (Avis 1995). Sandelowski (1993) regards reliability / dependability as a threat to validity / credibility and questions many of the reliability tests used. She goes on to say that one should not expect participants or other researchers to arrive at the same themes and categories as the researcher if reality is assumed to be multiple and constructed.

There are number of strategies used to establish rigour (credibility) and determine trustworthiness of the data. These are: member checking, peer briefing, prolonged engagement in the field, persistent observation and audibility (or audit trails). Member checking involves returning to the participants following data analysis in order to check out the themes identified by the researcher are agreed by the participants. As reported by Tetley this is fraught with difficulties (2006)²⁰ participants may have moved or be unable to remember. Peer briefing refers to sharing the researcher's analysis with peers with the aim of refuting or confirming the evidence as a representation of reality. I chose to present my findings as they emerged both to the participants and my peers (other nurse consultants within critical care). I did this in two ways, firstly I would ask the informant at interview to comment on my observations and the way in which I had interpreted them. For example, I began to notice during observation the lack of continuity of care was emerging as a theme. I therefore asked directly at subsequent interviews whether the participants agreed. I explored with the participants their view of why this was the case. In the genre of confessional tales the fieldworker acts as interpreter

²⁰ Oral presentation 'issues analysing qualitative data' at the RCN Research Conference, York, March 2006.

and therefore I did not return to the participants to check the emerging themes rather to elucidate facts and add clarity. Secondly, I shared my analysis and gave examples from field notes and interview transcripts at presentations and invited participants to discuss my findings. The one area that generated much discussion was concerned with what I had referred to as the 'ritual of the wash'. Nurses felt compelled to debate not my findings but the reasons why this representation of reality was as it was. I had to be careful in the way I presented my findings that this did not appear a criticism but an observation and my interpretation.

'Nurses in the audience of one conference presentation were quite vociferous when I concluded the theme of the bed bath. Many explanations were given for reasons why the bed bath was done in the way it was. One such example was because patients expect it. I could see that this caused a level of debate. I turned the question back to them with the comment "how much is this because they have come to expect it because this is the usual routine?" The answer was 'the relatives expect it' and the debate continued' (Conference presentation).

'I presented to the nurse consultants from the local critical care network my emerging findings. I gave examples of 'evidence' from my field notes and interview transcripts. With out exception they all agreed this was a true representation of reality and we discussed in detail the reasons why issues such as the wash had become a ritual and

what factors were important in explaining this. We felt as nurse consultants we were trailblazers, battling against resistance on a daily basis. It wasn't that nurses did not want to change practice, it was more they did not see the need to change practices' (Field notes – analysis 1.09.04)

Another method of developing rigour was to ask what I have called 'a critical friend' to help me with interpretations. I had a number of critical friends two had experience of critical care and one did not. At the point of developing themes I would share my interpretations and transcripts in order to have a discussion regarding my interpretation or to give advice where I was having difficulty making sense of my observations.

'I have asked 'a critical friend' to help me make sense of my findings. We discuss at length what I am beginning to see and what possible explanations there are. We discuss several possible explanations for example why nurses reduce the level and frequency of observations on patients who are weaning. We discussed who is weaning what? Maybe the nurses are weaning off technology was one suggestion. I make a personal memo: 'Weaning nurses off technology' this is interesting, how does this fit?' (Field notes – analysis 21.09.04).

Prolonged engagement in the field and persistent observation are other strategies for developing rigour. I had spent 250 hours observing nurses using technology in critical care including meetings, conferences and

recording casual conversations in offices, corridors etc. I had tried to capture the 'routine' and the extraordinary often following up participants through email or conversations in the field in order to add clarity or aid with my interpretation. I felt, within the confines of the time I had available and my dual role as part-time researcher and full-time nurse I was able, as far as one can, reach saturation.

Audibility or an audit trail during analysis helps orientate the reader to the process of analysis and increases the trustworthiness of the data. The collection and analysis of data is a simultaneous process and therefore helps structure later encounters with the group under study. 'Analysis is a search for patterns' (Spradley 1980: 85) and 'these patterns make up the culture' (Streubert & Carpenter 1999: 161). Streubert and Carpenter therefore advocate the use of what they refer to as a 'domain analysis' in order that the culture can be discovered (Ibid.: 162) also referred to as 'concept maps'. On entering ICU my focus was to observe nurses patients who were weaning from mechanical ventilation. An example of a domain analysis / concept map is seen in figure 6a (and developed in 6b, 6c). This map demonstrates that during observation of nurses caring for patients who are weaning I note that there is a method of allocating patients who were weaning at handover (see section on context of the Trust). I also note over a number of days the number of different nurses allocated to an individual patient (described as multiple caregivers in the literature) and this raises the question of 'continuity of care'. Once the concept map has been completed this theme is explored and developed in subsequent observations and at interview (Streubert & Carpenter 1999). In observing nurses I discover how they interact with patients and note that junior

nurses are allocated to patients who are weaning. This raises the question of 'how do nurses view the patient who is weaning?' I look for patterns in the data which help illuminate this. At first the map is littered with observations and questions which eventually become refined and more manageable as observation continues and patterns emerge. These may move to other themes or are collapsed under the existing theme. Finally themes are selected and relationships between the themes are explored. During the audit trail therefore it is important to signpost the reader so that they can follow how the themes were derived. Examples from interviews and field notes are used to provide evidence.

'Weaning failure', this is a term used frequently in conversations between staff, mostly used by medical staff rather than nurses however I have noted the language is an important consideration and how this is used in the context of weaning. Whose failure is it? The patient, the technology or the staff? Certainly at a recent network conference Dr John Shnearson (lead for weaning centre at Papworth) stated 'technology does not wean patients, patients do'. I wonder therefore what the role of the nurse is (Field notes – analysis 24.06.04).

From this I begin to examine the role of the patient in weaning and question how far do we allow patients to control their own weaning?

Method of Analysis

Data were analysed using the method of content analysis. In content analysis, researchers establish a set of categories (which I refer to as themes), and then code the corpus of data to see how many instances fall into each category. These categories or themes are also shaped by the existing literature. It is imperative that the themes are sufficiently precise to allow different coders to arrive at the same results when the same data is examined (Silverman 2001). However it is important to note that researchers have their own biographies and approaches therefore this may only be aspirational. One criticism of this method is that the coding schemes that emerge can be used to produce a 'conceptual grid'. Whilst this grid is helpful in organising the data analysis it also deflects attention away from the uncategorised activities (Silverman 2001: 123). There is a tendency that categories are determined too early and with little thought, once determined they stick fast. For example in defining the theme 'knowing the patient' I was able to develop sub-themes based on the literature which identified a number of factors involved in knowing (ways of knowing, continuity of care).

The analysis of data followed several steps commencing with the careful reading and re-reading of transcripts in their entirety (known as the corpus of data). After immersion in the data the researcher identifies themes, these are at first not well defined but rather a loose collection of concepts. Further steps identify the central concepts, which are then clarified and their meaning explored. Relationships with other themes are

explored using what Glaser and Strauss (1967) refer to as the 'constant comparative method'. This method requires the researcher to attempt to find another case through which to test the provisional hypothesis. However this would have meant observing in another critical care unit. Comparing two critical care units was always an option but this would have been at the expense of the depth and breadth I was able to achieve in one unit. Comparison was possible by comparing the data from observation with interviews (Glaser & Strauss 1967). This allows similarities and differences to be noted. From here clearly defined themes emerge with the identification of sub-themes.

Process of Analysis

Throughout data collection analysis was concurrent and I found it useful to keep track of the emerging themes by developing a grid and matching these to the interviews and observations. From here I developed concept maps (for an example see figure 6a, 6b, 6c). This was important as it suggested areas that I may like to observe in the field or develop further at interviews. However a cautionary note is made here that the development of themes early on in the collection of data may force the researcher to look for these in subsequent data collection and in a way the researcher 'puts the cart before the horse'.

An example from the interview data is shown in table 4. As can be seen from the grid there were many recurring themes emerging from the first 5 interviews and in tabulating these I was mindful not to fall into the trap I

have outlined above. In deed this helped to structure observation and to check out issues raised at interview but did not become the focus. Examples from the transcripts are given to illustrate this.

‘Continuity is a bit of a problem when it comes to weaning...I think it’s because of the allocation to be honest, really they (shift coordinator) keep swapping’ (patients) (Interview P: 1).

The nurse talks about the difficulties putting together a picture about the patient when handovers are so brief and there have been a number of nurses allocated to look after the patient over the last week, she continues

‘...It would be better if I was back (with the patient) tomorrow, yes continuity is a bit of a problem when it comes to weaning’ (Interview P: 1).

This was picked up in 4 of the 5 first interviews (in 9 of the 12 interviews). Nurses themselves used the word continuity of care and suggested the system of allocation was a concern. However once the theme has been identified the researcher then looks for this in subsequent observations and interviews.

Table 4. Example of Analysis of Data

Theme	P1	P2	P3	P4	P5
Knowing the patient	✓	✓	✓		✓
Making weaning a priority	✓	✓	✓		✓
Communicating with the team	✓	✓	✓		
Uncertainty	✓				
Delay in medical treatment	✓	✓		✓	
Continuity of care	✓	✓	✓	✓	
MDT working	✓	✓	✓	✓	
Knowledge		✓	✓		✓
Conflict with doctors	✓	✓	✓	✓	✓
Holistic view of the patient	✓	✓	✓		
Task orientated care				✓	✓
Nursing visibility	✓	✓	✓	✓	

It was noted at interview that the first three participants talked about holistic care. However during the following two interviews this was not mentioned. It is important to note similarities and differences. I then compared the interviews with field notes. There were occasions when what was said at interview was contradicted in observation and this gave me an opportunity to explore this in more detail. The next excerpt demonstrates how the nurse talked of seeing the patient as a whole, coming together as a team to discuss the patient but in actual fact observation of the same nurse revealed this was not the case in practice.

'I would like to say that as a general point of view, patients like him need a case conference with regards to looking at him holistically and how we manage him because he quite complex, he has been here for a number of weeks and he is not going to be an easy weaner' (Interview P: 2).

'I attended the ward round to find the nurse was busy around the bed area and did not stop to take part in the round. She missed vital information about the patient. The doctors were discussing the patient which included previous medical history, physical status prior to operation all of which had a bearing on the patient's ability to wean. The nurse did not contribute at all and the doctors did not ask. I mentioned this to her at interview and asked he was she aware of the plan the medical staff had made as they had discussed it but not communicated it to her. She was not aware' (Field notes 8.03.04).

On two occasions, the nurses were reluctant to transfer patients out of the unit. Yet in another instance they were very eager to transfer a long-term patient to a ward as soon as it became possible to do so (Field notes 28.04.04, 11.05.04).

Stage One

This was concerned with the careful reading and re-reading of the corpus of data, making notes each time on every interview or observation record.

Times and the context of events were not important at this stage. The data is unstructured and takes the form of open-ended verbal descriptions in field notes and transcriptions of audio-taped interviews. At this stage according to Hammersley and Atkinson (1995), the researcher may not know *why* what is happening, is happening or even understand *what* is going on (emphasis in the original). The aim

‘...is not just to make the data intelligible but to do so in an analytic way that provides a novel perspective to the phenomena we are concerned with or which promises to tell us much about other phenomena of similar types’
(Hammersley & Atkinson 1995: 209).

I noted 18 themes. Initially 12 of these were identified from the analysis of the interviews and 6 from the analysis of the observation data. Six in both the interviews and observation were identical. I collapsed these down initially to 10:

1. Role of the bedside nurse
2. Role of the shift coordinator (role models or lack of them)
3. *Task orientation care versus patient focused care
4. Responsibility for weaning
5. *Continuity of care
6. Scientific approach to weaning
7. *Nursing visibility
8. Technology transferred but not responsibility

9. Confidence, exposure, knowledge and skill
10. *Knowing the patient
11. Making weaning a priority
12. Communicating with the team
13. Holistic view of the patient
14. Nursing and medical knowledge
15. *Delay in medical treatment
16. *Conflict with doctors
17. Uncertainty
18. Multidisciplinary team working

(* refers to those 6 themes identical in interviews and field notes from observation).

Two examples of the themes are given below:

I noted that nurses had a routine. In particular I observed the wash to be done between 8.30 and 10.00 hours. During the handover at the bedside nurses would make lists of jobs / tasks for the morning. In HDU where nurses had two patients to look after I observed how they managed their work. The nurse would go to one bed area and begin the order of tasks, finishing around 8am with the drugs then move on to the next bed to repeat the process. The patients would then be washed, one after the other. Following on with the list of tasks on their paper. Other tasks may include dressings or line changes or instructions from medical staff. There was an order to these tasks and I therefore developed the theme **Task-Orientated Care Versus Patient-Centred Care**. At this stage of

the analysis I was unsure why the routine was a prominent part of the nurse's work. Few nurses appeared to deviate from this routine even when a patient's condition required them to do so. For example in HDU I noted a patient's blood pressure was low and had been recorded as such for a number of hours during the night. Despite this the nurse who was looking after two patients continued her routine with her first patient leaving this patient until after she had completed her tasks on the first patient (Field notes HDU 22.07.04).

'The morning begins with handover, after which nurses are allocated to patients and a more in-depth handover at the bedside occurs. During which time the day nurse makes a list of jobs that need to be completed or communications noted. Following on from here the nurse begins to check the bed area checking the infusions, how much is left, what rate is set and tracing back the lines ensuring they are connected appropriately. At some point the nurse will communicate with the patient, introducing herself and explaining what she is doing. Next the ventilator is checked, alarms set and observations recorded on the 24-hour chart. At this point the nurse will examine the patient. The nurse then scans the drug chart and prepares the 8am drugs. Once these are given the nurse fetches every thing she needs to perform the bed bath. It is now 8.30 and the nurse pulls the curtains and begins to wash the patient' (Field notes ICU 8.03.04).

'The routine of the shift is an important one and there is an order in which tasks are performed. Weaning appears to be at the bottom of this. Weaning appears not to be a priority for some nurses. Weaning is fitted in around the tasks and breaks. After a frenetic activity of the morning patients may be too tired to wean and this does not appear to be taken into account. There is no difference between shift patterns' (Field notes – analysis)

Under this theme I put delay in medical treatments and procedures such as burns dressings these were always done at the convenience of nursing staff, usually the burns nurses (I later reassigned the bed bath or wash to 'making visible nurses' work' in stage 2).

Observation revealed that long-term patients who were weaning had a number of nurses allocated to look after them. It appeared a different one each shift, this was corroborated when I looked on the observation charts (the names of the nurses are written down).

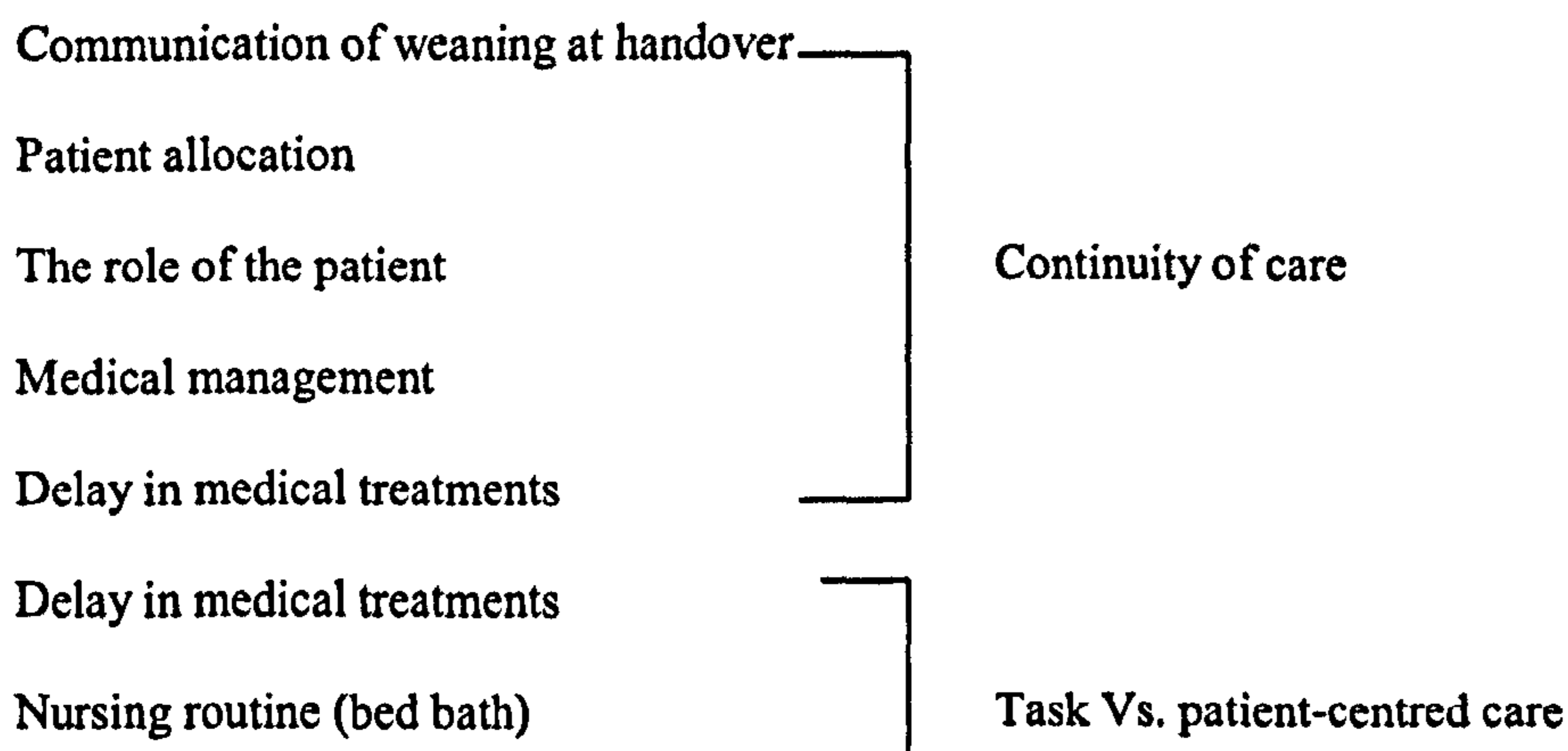
'To be honest it is the first time I have met him (the patient) this morning....I have not looked after him before and I know he has been here a few weeks....' (Interview: P1).

'There are a number of shift patterns a nurse can work. Most nurses chose to work the 12-hour shifts or long days, usually no more 2 consecutive shifts. There is also a system of patient allocation which seems to contribute to a lack of continuity of

care, with some nurses on a long day being relieved at lunch time. I can see how communication is affecting weaning. Observation of handovers demonstrate there is insufficient attention given to weaning. In particular information about the patient's response to weaning is not communicated' (Field notes – analysis).

I assigned the allocation of patients to nurses under the theme **Continuity of Care**. Within this theme were the medical management of the patient and delays in medical treatment. At this stage it is possible the same concepts fit into a number of possible themes. For example 'delays in medical treatment' was assigned to both 'continuity of care' and 'task versus patient-centred care'.

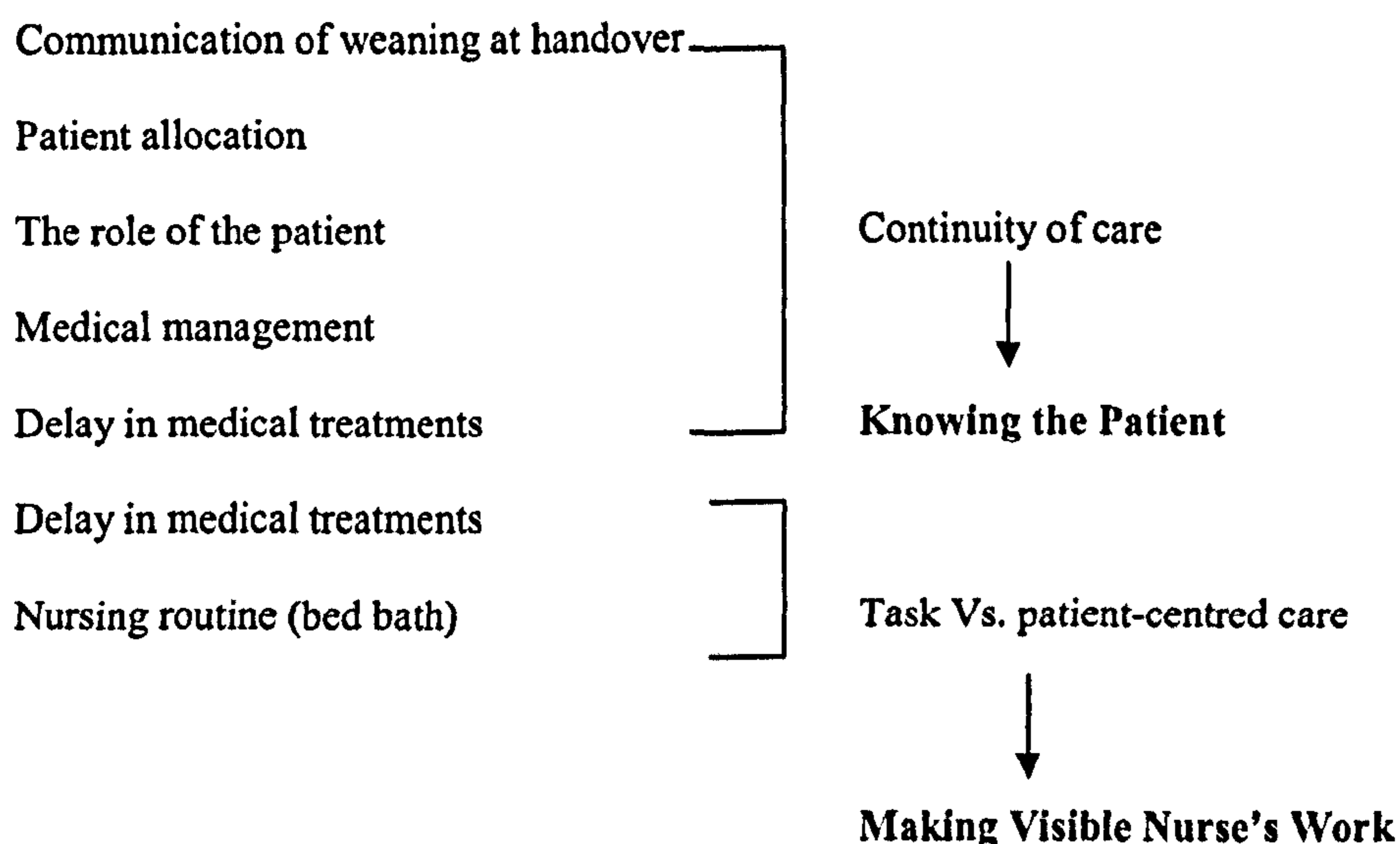
Figure 6a. Example of a Concept Map (stage 1)



Stage Two

This stage of analysis involves the simultaneous development of analytical themes that capture relevant aspects of the data and the assignment of particular items of data to those themes (Hammersley & Atkinson 1995) or as Blumer (1954) describes as 'sensitising concepts' (Blumer 1954 in Hammersley & Atkinson 1995: 212). Sensitising concepts give the researcher a general sense of reference and are used as guidelines in approaching empirical instances or suggesting directions in which to look. For example 'knowing the patient' not only aided my data collection it also led me to explore the literature on this subject and helped me uncover meaning. It drew me to other related literature such as Carper's (1978) 'Ways of knowing in nursing'.

Figure 6b. Example of a Concept Map (stage 2)



I began to see how continuity of care, the role of the patient and patient allocation were fitting together. For example the skill mix in part, determined patient allocation and this revealed how nurses viewed patients who were weaning. Therefore the weaning patient was looked after by many different nurses and this linked with continuity of care. An examination of the literature revealed that continuity of care was a factor in getting to know the patient. The literature on weaning revealed knowing the patient was important in successful weaning (Jenny & Logan 1992). Continuity of care became part of 'Knowing the Patient'. At this stage I identified 4 main themes with a number of sub-themes. These are listed below:

Knowing the Patient

Continuity of care (communication, delay in medical treatments)

The role of the patient in weaning

Differences in knowledge between doctors and nurses in ICU

Making Visible Nurses' Work

Washing - the nurse's domain (task or patient focused, the temporal order)

Nurses render themselves invisible

Nurses are rendered invisible

Inter and Intra - Occupational Boundaries

Responsibility for weaning (introduction of new technology)

Defining the 'expert' in weaning

Role of the bedside nurse and the shift coordinator (hands-on care Vs management)

Boundary blurring and boundary creating

Weaning: A Technology Transferred or a Technology Transformed

'Toys for the boys'

The 'scientification' of weaning

Control of technology

Factors that delay / impede weaning (task focused care)

Factors that accelerate weaning

The relation between weaning: a technology, and nursing

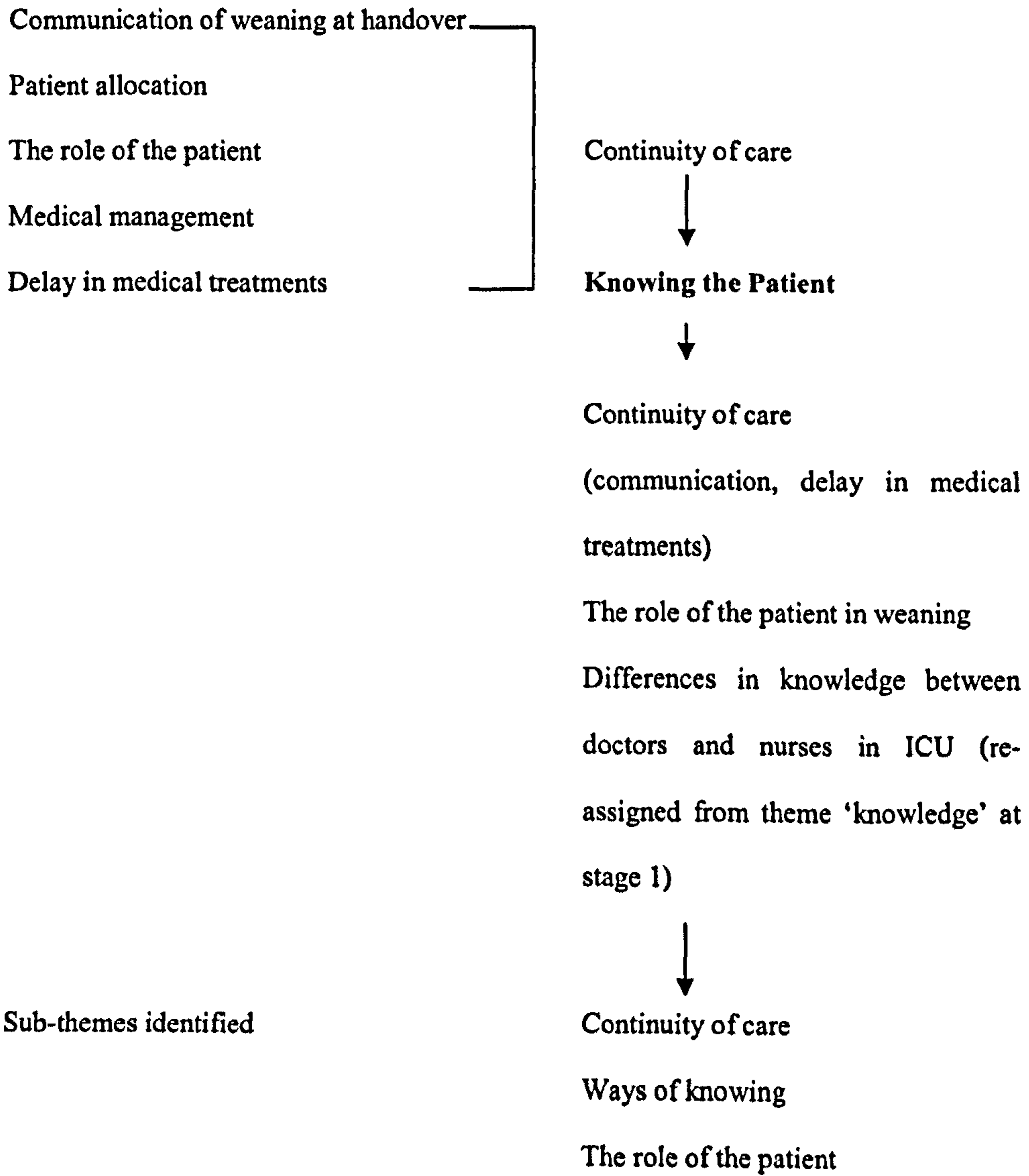
Towards a definition of nursing technology

Stage Three

Having identified my analytic themes, the next stage was concerned with clarifying meaning and exploring the relationship with other themes. New themes or sub-themes may emerge at this stage and there is usually a considerable amount of reassignment of data among the themes or as Hammersley & Atkinson refer to it as 'systematic sifting' (Hammersley & Atkinson 1995: 213). Hammersley & Atkinson (1995) distinguish between themes in the way in which they emerge. Useful analytical themes may emerge spontaneously and are used by the participants themselves. 'Doing the wash' was referred to in many instances throughout the data collection period and is described by the nurses themselves. Observer-identified themes are applied by the ethnographer.

'Knowing the patient' became an observer-identified theme. Nurses alluded to this in their interviews but did not use the term specifically. Nor did they use it in relation to that used in the nursing literature. The sub-themes were identified. At this stage sifting and sorting of themes meant some concepts were moved to other themes or themes were collapsed. Differences in medical and nursing knowledge was identified from the theme 'knowledge' at stage one but had been reassigned to 'Knowing the patient'. It was later collapsed into the theme 'Division of Labour in stage 3 under 'control of weaning'.

Figure 6c. Concept Map (Stage 3)



Refined Themes

1. Knowing the Patient

This was split into three sub-themes:

Ways of knowing

Continuity of care

The role of the patient in weaning: The weaning trajectory

An example from the data follows: The patient had been on ICU for 12 days. When asked how the nurse got to know the patient whom he had never looked after before, he replied

‘Well initially there was handover this morning in the coffee room, and there was hand over from the night staff, she went through bits and pieces and changes and so forth. After she left I picked up the hospital notes (patients or medical) and designed a care plan from there. There was information from the patient’s team and I talked to them (surgeon) and I talked to her (the patient). I got the background from there and did a care plan from that’ (Interview: P 6).

2. The Division of Labour in Weaning

This was divided into three sub-themes:

Inter-occupational boundaries

Intra-occupational boundaries

The control of weaning

An example from the data follows:

'The consultant intensivist on the medical ward round examined the patient and reviewed the weaning plan. He then 'fiddled' with the ventilator without talking to the nurse. The nurse had changed the ventilator settings early in the morning but the intensivist changed them back' (Field notes ICU 30.06.04).

3. Nursing Visibility

Three sub-themes emerged:

'Doing the wash'

Nurses render themselves invisible (or nursing work)

Nurses are rendered invisible (or nursing work)

'I think there is a certain amount of kudos if you get all your washes done before 9am and you are some sort of super nurse and your patient is sat there in a perfect bed and looking beautiful' (Interview: P12).

4. The Nursing –Technology Relation

Three sub-themes emerged:

The definition of technology and the nursing relation

The definition of weaning

Weaning: a technology transferred

‘A new ventilator had been brought on to the unit (ICU); staff were waiting for the representative to come and give instructions on how to use it. The ventilator should not have been used until staff were familiar with it. When I came to observe I found the ventilator was in use and had been over the weekend and bank holiday ((reduced senior cover and medical cover available for a 4 day period)). I asked who knew how to use the ventilator, the reply was no one, none of the nurses on the shift had received any teaching, this included the bedside nurse where the ventilator was in use. I thought, ‘So how has she been able to check the ventilator settings and set the alarms?’ (Field notes ICU 13.04.04).

At this stage it was important for me to re-acquaint myself with the research aims. There is a danger that the researcher can lose sight of the research aims during analysis although it is perfectly possible for these to be changed or refined. I re-worded my aims slightly at this stage in order to make clearer the purpose of my study.

Original:

1.To identify what intensive care nurses mean by ‘technology’ and how it is used in practice and

2. To use weaning from ventilation to explore and analyse 1.

Now became:

1. To identify what intensive care nurses mean by 'technology' and explore how it is used in practice.

2. Determine whether weaning from mechanical ventilation can be used to demonstrate the nursing contribution to the development of ICU.

3. Define a 'nursing technology' and explore the conditions under which technology can be transformed

This re-framing reminded me that I needed to look for what was not always apparent, the relation between nurses and technology. In order to examine this I would need to concentrate on the language used, the context and environment in which the actions occurred. I made a memo in my field notes to re-read the transcripts and look carefully for evidence of this.

Stage 4

After determining the themes and sub-themes a process of coding followed. I was able to identify 248 codes in the interviews and 509 in the observation data. At this stage it becomes important to note the temporal relationships, the use of language and the context for example

'The shift coordinator informed me as soon as I walked on the unit at 8am that the patient in bed three (who had been with us for 19 days) could not be weaned (by the nursing staff) because he was too complex and this would be better left to the medical staff'. (Field notes 8.03.05)

From this extract I noted the terms used by the participant such as 'too complex' and 'better left to the medical staff' and noted that in his view, the patient could not be weaned by the nursing staff. In another example I noted that senior nurses had their weaning plans overruled by medical staff and they were frustrated by this.

'I was approached by two bedside nurses who were frustrated by the medical staff because they had over ridden their weaning plan and, in the nurses view, had inappropriately weaned the patient. The result was the patient became fatigued and now needed to rest for 24 hours' (causing a delay in weaning) (Field notes 8.03.05).

Now the themes had been defined, the next process was to code the data, and a process of organisation under the appropriate headings took place. I was aware that I needed to always be reflexive, that I was an insider and had on occasions become possibly too familiar with the field. To ensure trustworthiness of the data I wanted to discuss these issues with an outsider, (known as a 'critical friend') or as Hammersley and Atkinson state (the researcher) 'should use whatever resources are available which help make sense of the data' (Hammersley & Atkinson 1995: 214). I took

the opportunity at this stage to confer with a colleague. I had made several memos in my field notes. These were concerned with identifying the number of possible explanations for my data. For example I had noted that nurses were often not recording changes in ventilation made during weaning. There was a reluctance to complete weaning plans and handovers between nurses often consisted of only a brief summary of weaning. There could be several reasons for this. One possibility was to explore the nursing–technology relation. Nurses may feel this was a technology transferred to them from medical staff and therefore not their responsibility. Another explanation could be that nurses truly did not recognise their professional responsibility and therefore the legal implications this would have. There also appeared to be a reliance on the intensivist for what they described as ‘support’ or ‘back up’. Consultation with a critical friend was one way of helping me look for possible explanations of the data and avoid making assumptions based on my own beliefs and values.

Data sets are compared, paying particular attention to similarities or contradictions. I found contradictions between interview transcripts and observations. One area in particular was concerned with the allocation of junior staff to patients who were weaning (observation). There were three G grades on duty yet a junior nurse had been allocated to look after a weaning patient. Two of the G grades were ‘floating’ (did not look after a patient). The junior nurse did not receive any support from the senior members of staff. However in the interview transcripts nurses (participants 4, 5, 6, 11) referred to the allocation of junior staff to patients who were weaning as a necessity in order that the more

experienced nurses could look after the sicker and more dependent patients.

Conclusion

This chapter has described both the method and the process of analysis. In order to ensure trustworthiness of the data it is necessary to make transparent the whole process. Streubert & Carpenter (1999) note that

‘It is important to remember that no two researchers would likely describe a culture in the same way, because of the issues within each researcher’s culture and the period in which the study was conducted [.....] but seek to share a context-bound view of culture... these discoveries bring important insights but do not pretend to bring forward *the* truth, but rather *a* truth and that is why rigorous collection and analysis of data is so important’ (Streubert & Carpenter 1999: 166).

It was my intention to lay bare my analysis, including post fieldwork memos. In the next chapter I present my findings for discussion. During observation there is a vast amount of possible data. What is recorded and what is omitted is in part down to the researcher and their particular approach, background and position in the research. This is also a concern in the presentation of findings. The exemplars I have chosen to illustrate the themes were derived in a number of ways. In some cases when there were relatively few examples all are presented, in other cases were there

were many a selection have been chosen that represent the range of data available (different participants or different episodes of observation). Some have been chosen because of their significance to the context in which the data was identified for example conference, weaning meeting etc. others to provide a comparison of views. I have tried to present a selection of exemplars that characterize the theme and (where they exist) deviate from the theme.

CHAPTER FOUR

Results, Discussion and Recommendations

4.0 Introduction

This section is concerned with a discussion of the four main themes listed below. The chapter begins with an illustration of the daily routine in critical care. Each theme is discussed in turn.

4.1 Knowing the Patient

4.1:1 Ways of knowing

4.1:2 Continuity of care

4.1:3 The role of the patient in weaning: the weaning trajectory

4.2 The Division of Labour in Weaning

4.2:1 Intra-occupational boundaries

4.2:2 Inter-occupational boundaries

4.2:3 The control of weaning

4.3 Nursing Visibility

4.3:1 Nurses render themselves invisible

4.3:2 Nurses are rendered invisible

4.3:3 Making nursing visible: 'Doing the wash' - a nursing ritual

4.4 The Nursing – Technology Relation

- 4.4:1 Definition of technology and weaning
- 4.4:2 Weaning: a technology transferred
- 4.4:3 Weaning: a technology transformed

Background and Daily Routine

In order to understand the following discussion of data and to put this into context it is important to explain a little of the background which incorporates the care for patients in critical care and interventions by nurses and other staff. The day shift begins at 7am when the night staff give a verbal handover to the day staff. This handover is in two parts; the shift coordinator gives a brief handover to the whole of the day staff in the coffee room and nurses are allocated patients. A second and more detailed handover occurs at the patient bedside from one nurse to another. The system of patient allocation varies between ICU and HDU. On ICU nurses are allocated by the shift coordinator whilst on HDU nurses are given a choice which patient they prefer. The system of patient allocation is an historical one. In ICU the shift coordinator will allocate nurses to patients according to the available skill mix of staff. Usually this means the sickest patients (unstable, or requiring multiple therapies) will be allocated to the most senior nurse next to the coordinator. Factors such as students and staff training would be taken in to account. For example if a member of staff is working with a student they would be able to choose the patient according to the competencies the student was required to achieve. Another consideration would be the number of skilled and experienced staff available to help the shift coordinator. It was desirable

at times to have a more experienced nurse 'float' (does not take a patient) in order to support the shift coordinator or help less experienced staff. Different units have different systems of allocation (for example some units have a system of team nursing or primary nursing and some employ the system of named nursing). None of these systems are used here. The differences between the units was determined by the G grades.

Most nurses worked a combination of long days (12 hours) and short days (7.5 hours, morning or late shift). More than 2 consecutive long days were avoided. This pattern of shifts meant nurses were rarely on duty for more than 3 consecutive days with the exception of nights (12 hours) when nurses could request any combination (up to a maximum of 5 nights per rota). Occasionally a nurse on a long day would be relieved at 12.30 by the late shift. This was usually done for teaching, or meetings or to allow the nurse time for personal study (completion of expanded role packages, referred to as 'working in new ways' packages).

After handover the nurse would wake the patient and introduce him / herself before going about the other activities. These activities consisted of 'checking the bed area'. This incorporated completing safety checks (such as checking the suction equipment was in full working order, additional methods of providing emergency oxygen were available etc.) and checking and calibrating the equipment. The infusions (drips) would be checked, noting the rate of infusion, amount of drug left etc. These are repeated in this order at the beginning of every shift change. Following on from this the 8 o'clock drugs would be administered (which could take a considerable amount of time), before the hourly observations would be

performed. There was a checklist at every bed area of duties the nurse needed to perform and sign on completion. These included damp dusting (washing the bed area to reduce the risk of contamination and outbreak of infections), checking emergency drugs, oxygen cylinders and equipment for moving patients etc. The nurse would then perform a head to toe assessment of the patient which was used to formulate a plan of care for the day. Nurses usually commenced bed bathing when all of the above procedures were completed. This would coincide with the medical ward round in ICU which usually occurred at around 8.30 (On HDU the intensivist was only in attendance two days of the week, there were no formal rounds when he was not there). This consisted of the consultant intensivist, junior doctors, the shift coordinator and nurse consultant (researcher). On most occasions the pharmacist and physiotherapist would join the round (On HDU there were no junior doctors). The patients' parent team (admitting physician or surgeon) would visit the patient at any time in the day and this varied from team to team but it was most usual for the majority to visit between 8 – 9 am. The ward round on ICU gave the doctor on the night shift the opportunity to hand over the patient to the day doctor and acquaint the intensivist with the patients. Some intensivists would use the round to teach the junior doctors. This round could last 30 minutes or 3 hours and depended on the intensivist, number of interruptions and number of patients.

The physiotherapist would treat the patients once in the morning and again in the afternoon. Physiotherapy usually consisted of assisting the patient to cough and expectorate. For those patients who were weaning they would usually assist them to get out of bed into a chair. The nurse

would assist with physiotherapy and help get the patient out of bed. Medical interventions began after the ward round had finished. These comprised of a thorough assessment of the patient, review of drugs and treatments before going on to additional interventions such as line placement (drips) or tracheostomy placement. The nurse would assist the doctor in these additional medical interventions. Activities would occur throughout the day but were subject to availability of staff. For example the intensivist and physiotherapist would not usually visit after 1700 hours. The dietician would visit once a day in the morning and review the patients' nutritional requirements. The morning shift was the busiest, most activities occurred during the hours of 7am – 1pm. The nurse would take a break (of 30 minutes) during the morning and the nurse in the next bed would over see the patient(s).

The afternoon period was usually when relatives visited (although they could visit at anytime) and at this time the nurses would usually speak to them, updating them of the patient's progress and answering any questions they may have. It was a time when patients had an opportunity to rest. There was usually less to do in the afternoon and evening. These centred on performing hourly observations, assisting the patient to move and completing any tasks left over from the morning. Drugs were given through out the day. Additional duties for the nurse would comprise changing of drips, ventilator circuits etc. in accordance with infection control policies. Active weaning never occurred during the night and from 2200 hours this was a time when patients were rested and settled to sleep. The night shift was the most quiet, care continued but the emphasis was to create an environment conducive to sleep. Apart from the

observations and drugs there were fewer tasks to complete, apart from blood samples that would be taken just before the day shift arrived. Throughout the 24-hour shift patterns, nurses would complete paperwork. This consisted of writing care plans, communications with families and filling in scoring tools for audit purposes. These activities were usually done during the quiet times. If at any time a nurse had finished her duties she would help another nurse complete theirs. Routines were disrupted when an emergency patient was admitted or a patient deteriorated requiring additional interventions. These determined the pace of the unit.

The Role of the Author as Participant Observer (Nurse Consultant) and Ethnographer

My position in this research is of a participant observer. I therefore occupy a dual role as nurse consultant and ethnographer. I took up my post in January 2001. This was the first post in the hospital and the first in the local Critical Care Network. New posts take some time to become established. I began data collection in 2004. This therefore raised several potential problems for me as a researcher. The first was an understanding of how the staff in the unit understood this new role and how this related to the implementation of nurse-led weaning on the unit. The second related to my position as a participant in the research and how I differentiated this from my position as ethnographer and in particular how I presented myself in the written ethnography. The third was concerned with my relationship with staff I worked with during and after the research had been completed.

The establishment of the nurse consultant role is outlined in chapter 4.2. I recognise the inherent difficulties in establishing a new post and undertaking research in one's own place of work. The difficulties arose when trying to interpret the way nurses interacted with technology and to differentiate whether this was in deed related to my role or the technology itself. I found it difficult to distinguish between my role as a participant in the research and my role as ethnographer. As a result I have deliberately written in the third person when I want to distinguish my role as a participant and the first person when I am acting as the ethnographer. I therefore move to and fro between the two voices within this ethnography. Where this happens I have made footnotes making clear my position. Finally, I wanted to write as sympathetically as possible about the staff and practices I observed in my own workplace. It is important to understand that nurses may find themselves in positions that they too are uncomfortable with or have no control over and I try to show some understanding. I did not want to appear critical of the people or practices. I understood my moral and professional obligations to inform participants of the findings of my study and improve practice.

4.1 Knowing the Patient

Introduction

The four themes identified from the analysis of results are separate but interconnected. Each one will be discussed in turn and, like the pieces of a jigsaw, they will fit together to construct a whole picture. The first theme is concerned with knowing the patient. I have divided this in to three sub-themes; ways of knowing, continuity of care and the role of the patient in weaning. I begin with the first part, ways of knowing. I draw on the literature to discuss how knowing is defined (Tanner et al 1993, Radwin 1996, Henderson 1997, May 1992, May 1991) and in particular what this means in terms of weaning (Jenny & Logan 1992). I go on to identify that many nurses did not 'know' their patients as defined in the literature rather they came to 'know' their patient through biomedical data, in particular technology-generated data.

Central to getting to know the patient is continuity of care (Morse 1991). I move on to discuss how this was related to knowing the patient in the context of this study and demonstrate how the system of patient allocation often prevented this. I draw on the work of Benner (1984) in order to explore the role of the expert nurse and knowing. Finally I discuss the role of the patient and explore what I have referred to as the weaning trajectory (Lawler 1991).

4.1:1 Ways of Knowing

Nurses implied during interview that knowing the patient was essential to the delivery of individualised patient care. Nurses believed they knew their patients better than any other health professional as the following extracts demonstrate.

‘Although nurses are more holistic in our care and doctors come along and they will see the organs and the rate and the numbers, as nurses we see the overall picture, we see the psychological, emotional and all that kind of stuff and that is good. It is important that at handover we pass that over because that is important to weaning, so that is why it is more beneficial’ (Interview: P3).

‘As a nurse I can bring a lot to the ward round about the patient, yes the consultant (intensivist) has a lot of scientific knowledge, which is good, but he doesn’t even know the patient. You can’t go by the textbook, it does not necessarily work like that for the patient’ (Interview: P1).

‘Do you feel you know the patient?’ (Researcher)

‘Only what I heard in handover and as far as I knew he was a weaning problem and was doing Ok, but having gone to the bedside this morning I think there is a lot more to it than what was handed over this morning (Interview: P1).

For this nurse there was an appreciation that this patient's weaning was more complex than had been discussed at handover. The following excerpt from interview demonstrated that this nurse had indeed got to know the patient in terms of his physical and psychological responses.

'You said you know the patient, is there something about "knowing the patient" that is important in weaning?'
(Researcher).

'I think you need to know the patient, know what their personality is like, if they are a laid back person or an agitated person, obviously he (the patient the nurse was looking after) has learning difficulties, so I know what he is like normally. He is prone to being anxious and having looked after him, he very much likes people being there all the time. Change makes him anxious and uptight' (Interview: P 5).

Nurses also recognised there were barriers that prevented getting to know the patient.

'Well when she was first admitted she was sedated, she has a tracheostomy now, so yes fairly well I suppose' (Interview: P 7).

'...it is a bit difficult to assess what has gone on from paper, you get a better picture from what has happened the day before...' (Interview: P1).

'I suppose it has been really difficult the morning because he has been constantly on and off the bedpan and quite distressed at times' (Interview: P4).

Nurses describe these barriers in terms of difficulty communicating with the patient, difficulties in communication about the patient between staff (reliance on using paper or charts) and being busy attending to the needs of patients.

Not all nurses demonstrated that they knew their patients. The following example demonstrates that the nurse appeared to misunderstand the patient's anxiety and panic and was more concerned with getting on with her work.

'I (nurse consultant)²¹ saw a patient today, she has been with us for some time now and I feel I know her well. I go to review the weaning plan but the nurse is anxious to get on with her work. She is keen to wash the patient before she (the patient) undergoes a series of investigations. I could see the patient was struggling on the ventilator, unable to get her breath and this was causing her some anxiety. I intervened and turned up the level of support. The bedside nurse had interpreted this as the patient panicking and ignored it. The patient was anxious she had not made any progress this week

²¹ 'I' is used here to mean the nurse consultant, in the position of participant observer. Writing in the genre of realist tales I have described my role as nurse consultant as one of the participants under study, however because I am also the ethnographer it is difficult to separate out my roles and to write about myself in a detached way. For this reason I have used the first person and combine the genres of realist tales and confessionalist tales.

and furthermore anxious because she had been unable to get her breath in the night, this frightened her....' (Field notes ICU 27.4.04).

'A patient who has been with us for 20 days has been allocated a nurse who has never looked after him before, handover is a summary of the patient's physical condition. The patient had been prescribed a sedative to slow down his breathing, it has not worked, how ever the nurse is unaware why the patient's breathing is fast or why the sedative had been commenced, handover failed to pass this information on and the sedative continues' (Field notes ICU 9.03.04).

'The bedside nurse begins his/her shift by taking handover from the night staff, he/she introduces him/her self to the patient (if awake, later if not) and continues by checking the equipment, infusions and drugs. This usually takes some time. Next is an assessment of the patient (the patient is woken at this time). There is a head to toe assessment. The nurse then moves to the charts and patient notes. If there is time the nurse scans the medical notes (some do this later at the end of the morning in order to catch up from previous days), but rarely the nursing notes. A care plan is made, but rarely written down. The nurse formulates a series of questions for the medical ward round and a list of tasks these are written down' (Field notes 18.03.04).

From an analysis of the field notes I²² found this was common practice among nurses but the method of assessment, the involvement of the patient and the ability to formulate questions, pick up on patient cues was very dependent on the individual nurse. The reliance on patient information obtained through conversation also varied. What was common was the reliance on the other sources of information such as the 24-hour chart, blood gases etc. Nurses felt that getting to know the patient enabled the development of a weaning plan, which was individual to the patient. This plan was thought pivotal in helping the patient to achieve independence from the ventilator.

‘What works for one patient will not work for another in weaning and you definitely need to get to know the patient, their personality has a lot to do with that as in anxiety and I think because you are at the bedside and you know what makes them anxious. You can see their pattern of respiration changing a lot of the time and the interventions you give, so therefore you can plan your day and your daily tasks around them to support them (the patient)’

(Interview: P3).

‘... you get a sense of whether the patient is going to cope or not, you realise there are no rules set in stone and it is a “touchy feely” approach. Some patient’s cope really well

²² ‘I’ here refers to the ethnographer. I am writing in the genre of confessionalist tales and therefore give my interpretation of events. These events are seen through the lens of the ethnographer, in my case an expert in critical care nursing.

and you stop the support abruptly, where others need more of a gradual reduction of support' (Interview P:12).

I observed at handover at the bedside between the night and day shift that the nurses expressed concern the patient had not progressed (his weaning) as much as they expected. They discussed several reasons why this may be the case.

'The nurses (night and day) discussed whether this was due to the patient's psychological problems. They decided to move the patient's bed so the patient could see what was going on, this was thought to help him psychologically and therefore a plan was made to move the bed' (Field notes ICU 9.03.04).

Observation in practice revealed there was a reliance on technology-generated information, for example when a nurse was asked what her plan was for weaning she replied in detail everything about the patient's biomedical history but nothing about the actual patient.

'The plan was to come in and read the notes, look at the charts and look back over the days to see how he (the patient) had done. To check his blood gases and go from there. The plan was to check the PO.1 so we could see how far to turn the assist down (level of support) and then I will turn down the rate. I checked a blood gas and this showed no change and his PO₂ (oxygen level) showed he was well oxygenated so I could turn his oxygen down' (Interview: P5).

‘Normally I read the (medical) notes after handover to check what is happening...’ (Interview: P7).

When asked why the nurses chose to read the medical notes (which was common practice) and not the nursing notes, she replied

‘Looking at the Mead assessment (form of documentation used on the unit) you think because she has been here a while there will be stacks of paperwork and it takes you about 10 minutes to find an updated Mead, then you have to look back at the different Meads, whereas the medical notes you get an overall picture from the start’ (Interview: P7).

‘After handover in the coffee room, we had handover from the night nurse (at the bed side) she went through bits and pieces and changes and so forth. After that I picked up the medical notes and designed a care plan from there’ (Interview: P6).

Ways of knowing (the patient) refer to how information about the patient was gathered and what information was elicited. Most junior nurses relied on biomedical facts and tended to concentrate on the patient’s illness and past medical history. They would gather this information from the 24-hour observation chart, medical notes and technology-generated information. Henderson’s study (1994) of intensive care nurses noted that nurses’ knowledge was formulated from the 24-hour observation chart. The chart prioritised physiological information, which was

objective in nature and omitted the emotional status of the patient. Information, which appeared on the chart, had the power to regulate and dictate the form of the nursing activities and this led to task-orientated care. This form of practice according to Henderson limited the nurse - patient interaction (Henderson 1994). Sandelowski comments that nurses are unaware of the full extent to which their knowing is informed by what she refers to as 'visualist' technology. These technologies she says, 'are themselves a way of knowing in nursing and part of a new nursing informatics' (Sandelowski 1998: 3). However knowing the patient is both reading and acting upon the conclusions drawn from the technology - generated information (Sandelowski 1998). Nurses' accounts at interview recognised the need to know the patient not just in terms of biomedical data, but their personality and the way they responded to changes in their ventilation. Analysis of the transcripts revealed that nurses spent a considerable time, not getting to know the patient, but finding out about them, which was different.

Frequently, information essential to knowing the patient had been missed. This is congruent with a study by Henderson (1997) who found Australian nurses did not know their patients, and despite nurses espousing the values of knowing the patient and how essential this was to the delivery of patient- centred care engaged in activities which inhibited this. Three inhibiting factors were identified. The first was a lack of time. This meant nurses could not engage in small talk with patients and therefore could not develop meaningful relationships. Secondly, a negative nurse - patient attitude meant nurses used closed communication and failed to pick up on patient cues. Thirdly, nurses focused on the

delivery of task-orientated care in an effort to get the work done (Henderson 1997).

The ability for patients who were weaning to engage in verbal conversation is often limited, some, if not all, will have a tracheostomy and during weaning this will usually prevent them from verbal communication. However communication is still possible through lip reading and written accounts but long and detailed communication is often not possible. Despite the nurse - patient ratio of one nurse to one patient in intensive care and one nurse to two patients in high dependency, nurses say they do not have time to spend with patients. However observation of practice revealed nurses used their time in other activities such as checking bed areas and cleaning and prioritised 'work' over getting to know the patient. Knowing the patient is not simply a process of reading about the patient or being told in handover what the patient is doing; the nurse needs to spend time actually being with the patient, furthermore, nurses need to use this time to actively engage with the patient in a therapeutic way. Tanner et al (1993) in their study of 130 intensive care nurses demonstrated that knowing the patient was framed in terms of knowing them as a person and this was embodied in an understanding of the effect nursing care had on the patient. At interview one nurse felt the handover from the previous shift nurse was inadequate. Observation revealed the content of nurses' oral handovers were related to the medical status of the patient rather than the nursing issues. This is congruent with Erkman & Segesten (1995), in their analysis of nurses' oral handover. They found little attention was paid to nursing needs of patients, nursing was in relation to what a doctor had prescribed. Tanner

et al (1993) stated that knowing the patient meant an immediate grasp, an involved rather than detached understanding of the patient's situation and patient responses to treatment.

Observation revealed nurses used a particular method to hand over their patients. They would use the 24-hour observation chart and systematically review this. Nurses always started with the respiratory system which included the ventilator settings, mode of ventilation, amount of sputum obtained on suction and the type of airway in situ. This was followed by a description of the observations as recorded on the chart. A description of weaning would be given but the amount and detail varied between nurses. Nurses then moved on to the cardiovascular system noting the pulse and blood pressure etc. before moving on to other systems of the body. Next the nurse moved to the area on the chart where the intravenous infusions were recorded, scanned the drug chart to acquaint the nurse with the number and times of drugs before moving on to information regarding how the patient slept and details about the family. Finally any instructions or investigations for the day were noted. This may include such things such as requests for the medical staff to prescribe aperients (if the patient was thought to be constipated) or a note regarding the need for the medical staff to speak to the family. In this study nurses revealed that handovers did not equip them with enough knowledge of the patient in order to know them.

'Definitely (did not know the patient), only what I heard in handover and as far as I knew he was a weaning problem and was doing OK, but having gone to the bedside this morning I

think there is a lot more to it than was handed over'

(Interview: P1).

Henderson (1997) identified four factors that enhanced knowing the patient, mutual trust and rapport, a positive nurse – patient attitude, sustained nurse – patient contact and meaningful interaction. Patients wanted both clinical and personalised care. Personalised care was perceived as looking after their emotional health. A positive nurse - patient attitude required nurses being friendly to patients, taking an interest and making the patient feel important. Nurses and patients were agreed that sustained contact was essential if they were to get to know each other. However, in Henderson's study, observation in practice revealed most nurses only expected to have contact with patients if they were engaged in clinical care. Meaningful interaction was perceived as engaging in small talk about feelings, families and lifestyle (Henderson 1997).

Knowing the patient can have benefits for the patient in terms of a positive outcome. Jenny & Logan (1992) found knowing the patient facilitated successful weaning and could shorten the length of stay for patients in intensive care (Jenny & Logan 1992). The unique contribution of the nurse to the weaning process according to Jenny and Logan (1992) was the delivery of individualised care. In their American study of 16 expert ICU nurses, the nursing role in patients who were weaning from ventilation revolved around knowing the patient. This was possible when the nurse had gained knowledge about the patient and had continued contact, although this for some nurses could be as short as a few hours.

All the nurses were experienced in weaning. This enabled the nurse to formulate a series of clinical judgements about the patient enabling them to direct nursing interventions and personalise the care of the patient. Knowing the patient was a complex interpersonal process and required a number of actions which included showing concern and communicating. Showing concern demonstrated caring and included reassurance, being with the patient (presencing) and supporting the patient. This resulted in increased patient trust and comfort. Knowing the patient had consequences for both the nurse and the patient. For the nurse, it provided authority for nursing judgements and was pivotal in decisions and actions for successful weaning. The nurse had knowledge about the patient's motivation to wean, personal preferences, style of coping, stressors and what strategies were most likely to succeed. Nurses could gauge the patient's readiness to wean in terms of their physical and psychological ability and the patient's tolerance for weaning (Jenny & Logan 1992). Nurses had information about the patient that doctors did not have and they could therefore offer alternative approaches to weaning. Nurses in their study identified a number of conditions that affected the knowing process and are divided into; patient attributes and nursing attributes. Patient attributes consisted of the patient's ability to communicate, co-operate and form a working relationship with the nurse. Nursing attributes centred on experience of weaning. This increased the nurse's ability to direct their knowing strategies skilfully, engender trust rapidly and anticipate problems. There was a direct link between experience and confidence and successful weaning (Jenny & Logan 1992). This important landmark study has not been replicated to date but requires caution when interpreting the data. The sample size was small (n = 16)

and data was obtained via interviews based on nurse's written descriptions of critical incidents and previous experiences. This was not corroborated through periods of observation. Expertise was defined as reaching expert level of skill acquisition and was determined by their peers. This study nevertheless is a valuable contribution to the weaning literature.

Knowing the patient is an important aspect of nursing (Tanner et al 1993, Ball & McElligott 2002). Many studies have been conducted in order to define the exact meaning of knowing and attempts have been made to describe and analyse how this is achieved in nursing (Luker, Austin, Caress & Hallett 2000, Radwin 1996, Radwin 1995, Sandelowski 1998, Henderson 1997, Jenny & Logan 1992, May 1992, May 1991). In Radwin's (1996) study of American hospital nurses, knowing the patient was synonymous with individual care of the patient and was dependent on: time spent with the patient, intimacy with the patient and the nurse's previous experience of caring for patients.

The literature suggests that knowing the patient requires expertise (Benner 1984, Jenny & Logan 1992, Radwin 1996, Manley et al 2005) and is related to positive patient outcomes (Jenny & Logan 1992, Radwin 1996). Expert practice has been defined and explored by Benner (1984) Benner, Tanner & Chesla (1992) using the Dreyfus model of skill acquisition. In a sample of 105 intensive care nurses, Benner et al identified four levels of practice, from advanced beginner to expert practitioner. Two interrelated aspects were found to distinguish the four levels of practice. First, practitioners at different levels of skill live in

different clinical worlds, noticing and responding to different directives for action. Second, a sense of agency was determined by the nurse's clinical world and this was expressed as responsibility for what happened to the patient (Benner et al 1992). Through observation and interview it was evident that nurses were at different levels of practice, but the majority of nurses looking after patients who were weaning were advanced beginners and this had consequences for the success of weaning. The advanced beginner focuses on what is to be done for the patient during the time the nurse spends with them. Work is shaped by a concern to organise and prioritise tasks; a failure to do so results in considerable anxiety for the nurse (Benner et al 1992). These practitioners accept they have limited understanding of a patient's condition and feel this can be remedied by asking their colleagues, as the following excerpt reveals.

'Yes definitely I would ask the charge nurses or sisters if I were not sure about something, they will point you in the right direction and say well if this does not work, try this (Interview: P1).

Several of the nurses wanted backup or support for their decisions and would approach either the shift coordinator or the intensivist. On further exploration support meant 'to verify what you had done was right or to give another opinion' (Interview: P7).

'Yes and get backup from the shift coordinator and get their agreement. I have done that before, so long as you have some

one else, like a charge nurse or a doctor or some one, so you can document it' (Interview: P7).

Advanced beginners do not feel responsibility for advanced planning and preventing patient situations from developing. Rather they feel responsible for completing the tasks that are ordered. The scope of their clinical grasp is limited as they focus on particular details of the patient's condition and seldom achieve practical grasp of the salient clinical issues and their interrelatedness. Furthermore in unstable conditions these practitioners are less flexible and lack clinical know-how, failing to adapt to rapidly changing situations. Consequently they miss subtle cues of problems and continue to care in a way that does not notice problems beginning (Benner et al 1992: 20). Many of the practitioners in this study were advanced beginners and yet they were allocated to look after patients who were weaning whose condition could change rapidly. Knowledge and skill was required in order that cues of fatigue or deterioration were recognised promptly and this had consequences for patient outcomes. Advanced beginners have a limited understanding of the patient and no responsibility for planning or preventing patient situations from happening. The following excerpt from field notes demonstrates the advanced beginner's inability to grasp the clinical situation.

'A D grade nurse is looking after a weaning patient in the cubicle, the cubicle is significant because he is in effect isolated from his colleagues and getting support is difficult. He is keen to learn and presents me with a history and a plan

(for weaning). It becomes apparent how little he knows and his level of understanding is poor, his history is incomplete and he misses out vital information about the patient. For example, I asked what was wrong with the patient and he omitted to tell me she had renal failure and had dialysis three times a week. This is a significant factor influencing weaning but also demonstrated his lack of grasp of the situation. His handover became a teaching session, we reviewed the charts together and I explained the interpretation and significance of these. We reviewed the chest X-Ray and he said this showed ARDS. I corrected him and pointed out that this was not a classic picture of ARDS but was in fact a pneumonia.' (Field notes ICU 27.04.04).

Although nurses said at interview they felt they knew their patients this was framed in terms of technology-generated data and not as the literature defines knowing. Whilst some nurses recognised the importance of the psychological, social and emotional aspects of care few had enough previous experience of weaning to appreciate the importance in weaning in practice.

4.1:2 Continuity of Care

A lack of continuity of care was identified by the nursing staff as a problem. Most nurses would work 12-hour shifts (known as 'long days') resulting in nurses working fewer shifts. There was a lack of agreement

from the nursing staff as to whether this resulted in a lack of continuity of patient care.

‘I do think actually long days are beneficial to all of us (nurses) and I work long days, they can have a bit of a detrimental effect because you are not seeing a patient in a window of about 5 days because that nurse will be on today and then maybe off the next day. They may come back in three days time so you don’t actually see the flow and you can lose some continuity of patient care. By knowing for example the patient had his pressures reduced by 2 and he did not tolerate it, this mistake may be repeated again whereas some one will say we did that yesterday and it didn’t work’ (Interview: P 2).

A longer shift period allowed the nurse to plan his / her work. However what nurses espoused at interview was seldom the case in practice. Observation revealed that nurses performed most of the work in the morning shift, leaving weaning until much later (see 4.3:3).

‘I think that a long day in itself is good for weaning because you know it is over a longer length of time and you can try different approaches to your weaning. Like the other month I went from ventilator to low flow in a 12 hour shift which was fantastic and it just so happened that it was beneficial to that patient and I could tell within 3 hours that he was not going to be a slow wean’ (Interview: P 3).

In almost all cases there was a lack of continuity of care. This was particularly the case in ICU where the shift coordinator allocated patients to the staff. In HDU nurses were allowed to choose which patient they cared for. All the nurses expressed the view that continuity of care was important to weaning and was thought to improve the success of weaning yet they never challenged the system of patient allocation in practice.

‘I think it’s because of the allocation (lack of continuity) to be honest, really they (shift coordinator) keep swapping, I think you can have a choice if you want to go back, I don’t know whether I approve of the allocation because I haven’t looked after him before and he (patient) has been here for quite a few weeks. I don’t think you should be given the choice to go back, especially when some one is weaning and you are trying to pinpoint the problems. I think there is a better way of doing things rather than chopping and changing’ (Interview: P 1).

‘I was frustrated because I had looked after him for three days in a row and when I got back every thing I had initiated had not been carried through. A person came on who was unfamiliar with the patient. There were some problems but because they were unfamiliar with the patient they did not know what happens, it was not the change in ventilation it was the patient’s behaviour’ (Interview: P6).

On this occasion the nurse had been allocated to look after the patient for three days in a row (he had been on the unit for 6 months) and returned to find the patient had not progressed because staff did not know him. The patient often panicked and this caused him to hyperventilate, some nurses interpret this as failing to wean and as a result increase the amount of support on the ventilator.

‘There has been some continuity because the patient has been here so long he has had the same nurses over and over again’
(Interview: P11).

This patient was a 20 year old man following removal of a terratoma from the lung (carcinoma). He had learning difficulties and was particularly anxious. Weaning had been difficult because he often panicked and this resulted in hyperventilation. He had been on the unit for 60 days and his condition was deteriorating due to increasing fibrosis, a result of his chemotherapy. Whilst the patient may have had several of the same nurses allocated to look after him this was not on consecutive days as observed in practice.

‘A patient who has been on the unit for 20 days, most of it weaning has a different nurse today. Yesterday I saw the patient and it was agreed to prescribe a sedative for anxiety. The anxiety was causing him to hyperventilate and this was not helping the weaning process. I listen to the hand over between the night and day shift. There is a brief summary of the last 20 days and weaning is emphasised. Handover failed

to mention why the patient has been prescribed a sedative and therefore the nurse today does not evaluate its effect' (Field notes ICU 9.03.04).

Nurses recognised continuity of care was important for patients who were weaning. When asked what makes weaning successful a nurse replied:

'Continuity, a set plan, if you have a plan you stick to it and every one knows what the goals are. At hand over you know what the goals and plan is for the day and that tends to work as long as the patient is fit for weaning' (Interview: P7).

When asked to explain 'continuity' the nurse responded:

'In my opinion I do think it helps if the nurse looking after the patient has some continuity, as they can get to know the patient really well, when you have a different nurse at the patient's bed every day you are starting from scratch every day, that is my opinion. I find if I have looked after the same patient every day I know them. You get a feel' (Interview: P7).

Whilst nurses recognised the importance of continuity of care they were rarely allocated the same patient over a number of shifts. This may be related to the popularity of the patient and how ICU nursing has changed (see role of the patient).

There are a number of occasions when medical continuity of care resulted in a delay in weaning. As a result nurses were unable to progress the patients weaning.

'No intensivist cover meant no ward round and decisions about the medical management of patients was delayed. The intensivist on call was in theatre all day and unable to come to the unit. This had been the case for the last 2 days, it has been a bank holiday weekend. This, according to the nurses, was a common occurrence. At 10 am an intensivist arrived unexpectedly and asked to do a ward round. I accompanied him. He expressed some anger that weaning had not progressed over the weekend. It was expressed by one of the nursing staff that "nothing happens at the Weekend" (Field notes 5.05.04).

'It is very frustrating that they (patients) do not get reviewed as quickly as I feel they should, it is like chasing your tale. It makes it difficult sometimes as to where we are going or what we are doing, which can upset the weaning. For example he (patient) has had an ultrasound but what do we do now? I am expecting to see something that tells us why his weaning has stopped, but then it takes another day. Perhaps we should be looking at this, or looking at that, this is very frustrating because you can't progress like you feel you should be able to' (Interview: P1).

Consultant absence occurred on a number of occasions during observation (Field notes ICU 5.05.04, 6.05.04, 30.06.04, 11.08.04). However continuity was problematic when the intensivists were on the unit and this appeared to be dependent on the individual.

‘There is no intensivist cover today and the 2 junior doctors, who have been on the unit for a week have no experience of ventilation’ (Field notes 11.08.04).

‘A patient is waiting for a tracheostomy, and has been waiting 3 days now as a consequence there has been no weaning for the last three days’ (Field notes ICU 14.06.04).

‘The patient had problems at the weekend and nothing got done which really beggars belief about the NHS being a 7 day service (Interview : P2).

‘Was it that there was no intensivist cover’? (researcher)

‘You could say it was more about who was on. Two of the investigations the patient had this morning, an ultrasound and an abdominal X-Ray, so these are standard weekend procedures that could have been carried out’ (Interview: P2).

‘I had delayed things (plans to wean) because I had hoped to get the intensivist input, especially today because he is so motivated and he likes to have an input. So that delayed

things quite a bit and by the time he did come round at 11.30 it was followed by a bronchoscopy at 12 noon and then I handed over at 1pm so weaning was a non-starter (Interview: P4).

‘Continuity falls down when the plan is not followed. The thing is we have a different consultant every day, some of the consultants will spend an hour on the unit then go back to their office, leaving the junior doctor with us. That is a problem. I think a lot of the consultants do not seem to communicate with each other and that is a problem’ (Interview: P 6).

Nurses felt weaning was often delayed as a result of a lack of availability of medical staff or a lack of continuity. They were frustrated when medical procedures were not carried out which had the ability to delay weaning even more. Nurses in the study by Ball and McElligott (2002) revealed nurses were frustrated when doctors had no plan or failed to communicate their plan of care.

In an international review of advanced practice Ball & Cox (2003) revealed that continuity of care across the whole of the patient’s continuum of care was fundamental to improving patient outcome and was a key feature of advanced practice. Relatives of patients in ICU associated knowing the patient with continuity of care (Ball & McElligott 2002). Nurses in this study work in conditions that prohibit the ability to get to know the patient. Morse demonstrates that a lack of time and

multiple caregivers were identified as two inhibiting factors in getting to know the patient (Morse 1991). She believes that quality of patient care is compromised when a number of caregivers are used interchangeably (Morse 1991). Observation in this study revealed the weaning patient had multiple caregivers.

4.1:3 The Role of the Patient in Weaning: The Weaning Trajectory

An interesting finding during analysis was the number of documented codes relating to the role of the patient. These were 6 from interview and only 7 during observation. Most references to the patient were about how patients were seen in critical care, not one nurse mentioned the role of the patient in weaning and I did not see any nurses engaging with the patients when writing a weaning plan.

‘He (the patient) has a learning disability and is prone to getting anxious so I would not tell him (about changes in his weaning), which some people say is unethical, but he has been here for so many days (21) and knowing him as I do I feel it is not worth upsetting him’ (Interview: P 4).

Although it was possible to involve the patient in his weaning plan there had been no dialogue with the patient and therefore he had not been involved in its development.

Patients who were weaning were not a popular choice of patient for nurses. The most junior nurse would inevitably be allocated to care for the weaning patient. On investigation there were two reasons put forward for this. One was skill mix (level of knowledge and skill of the nurses on the shift, this related to time as an ICU nurse). The other was that nurses did not find the weaning patient interesting.

‘We get a lot of difficult patients and a junior (nurse) is going to need a lot of support, so let’s give them a weaner and you can leave them to it. It is not a life and death situation, if they do not get weaned no one has died, they will just be there a couple of more days. But if they (the junior nurse) look after a critically ill patient and they do something wrong they are going to need a lot of support and the unit can not give it to them then you are risking people dying because you are weaning’ (Interview: P 5).

‘When we allocate we have thought the weaning patient gets the junior nurse that does not matter because they are less dependent, not life-threatening, but that will delay their weaning’ (Interview: P 11).

However the reasons given for the allocation of junior nurses to patients who were weaning were often not evident in practice. It had more to do with how nurses viewed a weaning patient rather than skill mix. During several periods of observation it was noted that there were a number of

senior nurses on duty yet none of them took the patients who were weaning neither did they support or teach the junior nurses.

‘A junior nurse is looking after a complex weaning patient. There are three G grades on duty yet it was left to me to explain to the junior nurse how to wean and how to change the ventilator settings. This patient is the most complex weaning patient and has a junior nurse looking after her, there is even a nurse floating (does not have a patient to look after). The junior nurse had never looked after the patient before who is extremely anxious’ (Field notes ICU 28.04.04).

An experienced nurse working a 12-hour shift was allocated to a weaning patient, at lunchtime she handed the patient over to another, less experienced nurse. She then ‘floated’, that is she had no patient to look after. When asked in interview why this had happened the nurse replied that the junior nurse had a student and it was more beneficial for the student to observe a patient weaning from ventilation. The allocation of patients therefore was on this occasion for the benefit of the student and continuity of care and patient choice were not considerations. On further exploration the nurse explained:

‘I can see things from both sides the fact that the patient knows the nurse well and she knows the patient and they have some rapport between them and that makes a difference. If they had not met before then it might have been an issue. I

know the nurse is keen on weaning and she enjoys looking after the patient and have a rapport together' (Interview: P 4).

Observation in practice does not bear this out. The nurse had a busy shift and the patient who was awake had requested the bedpan several times that morning (Field notes ICU 28.04.04).

Nurses did not find the weaning patient stimulating or exciting, they did not fit the criteria of being critically ill.

'Some nurses do not find the weaners so interesting, they tend to get different nurses, and people do not volunteer to go back to the patient. Staff who came to critical care like it because they want the sick patients, weaners are not very sick, they do not have many pumps or infusions [...]' (Interview: P 11).

'A patient who has been with us some time now (40 days) still requires some respiratory support has had his observations reduced. Although still not stable he has been put on 4 hourly observations in HDU '(Field notes HDU 21.07.04).

An analysis of field notes revealed a lack of attention to the patient as an active partner in their weaning. After observing for four months I note there is little involvement of the patients in weaning. There appears to be little partnership between the patient and staff caring for them. This was made evident at a network conference when Dr John Shnearson, the lead

for Papworth weaning centre spoke. His concluding remarks were poignant 'machines do not wean patients, patients do. I remember thinking 'but only if we let them' (Field notes: analysis 1.07.04).

The next excerpt from field notes demonstrates the nurse had noted the patient's distress but continued with the bed bath. The nurse had deemed the cause of the patient's distress was psychological and therefore it was ignored.

'The bedside nurse was anxious to get the work done (bed bath) and seemed unaware of the patients' difficulty (breathing). I intervened and turned up the level of support on the ventilator. The bedside nurse felt the patient often panicked and therefore it had not been necessary to increase the support' (Field notes ICU 27.04.04).

Nurses saw a patient's progress in terms of a 'weaning trajectory'. A concept taken from Lawler's 'recovery trajectory' (Lawler 1991). In her work Lawler identifies the recovery trajectory as a continuum relating to the temporal aspects of recovery. This continuum follows a pattern or timetable, which is predominately set by the nurse rather than the patient. Nurses in critical care saw weaning as a continuum from total dependence to complete independence of the ventilator. Usually this continuum was in one direction. Patients were always expected to improve, albeit some more slowly than others. Setbacks were viewed as a disappointment and usually some physical explanation would be sought. If no physical explanation was found then the patients psychological

response was questioned and they could be referred to as 'too slow' or 'too lazy'. This is contrary to Lawler's recovery trajectory, which was dependent exclusively upon the patients' medical condition.

Lawler (1991) identified that variations from this pattern (by the patient) resulted in a reinterpretation by the nurse of their expectations of the patient's condition or being firmer in dealing with the patient. The patient also has a view of their recovery. Patients in her study exhibited frustration if they had not met the nurse's expectations. This could result in the patient withdrawing and non-compliance with treatment. Patients' experiences of being on a ventilator have been reported as good, difficult or frightening (Jablonski 1994). In a study of experiences of being mechanically ventilated Jablonski (1994) revealed that patients have a myriad of concerns and relied heavily on nursing staff. Nurses acted as communication gatekeepers limiting the patient's ability to communicate which resulted in frustration, anger, fear, anxiety, panic and apprehension (Jablonski 1994).

Jenny and Logan (1994) developed the nursing diagnosis 'Dysfunctional Ventilatory Weaning Response' (Jenny & Logan 1994: 35). In their study the patient was seen as a set of defining characteristics, which labelled them as mild, moderate or severe. According to Jenny and Logan

'this denotes an interruption of the weaning process because the patient cannot meet the current weaning goals' (Jenny & Logan 1994: 35).

Weaning goals were set by the medical or nursing staff. Both nursing and medical staff appeared to get bored by patients who did not fit the weaning trajectory or frustrated that patients were not progressing fast enough or that they had taken a step back (Field notes 27.04.04). The cause of a slow wean was seen to be either the fault of the patient, 'who needed pushing more' or the nurses who were 'supposed to lead weaning'. Observation revealed that on one occasion a patient had been successfully weaned off the HDU ventilator, but it was thought he may require intermittent ventilation in a form that could be given on a respiratory ward. The nurses were keen to discharge the patient to the ward. This patient had been on the unit for a considerable time and he was not expected to survive. He had survived and he had also weaned from the HDU ventilator. The plan was to try and get the patient home where it was thought likely he would die shortly after discharge. There was much pressure from one of the intensivists to transfer the patient to the ward as he was now 'blocking an HDU bed'. The best option for the patient and indeed the patient's choice was to stay in HDU until transfer home could be arranged. To go to the ward at this time meant the patient would not know the staff and this was causing him and his wife a considerable amount of anxiety. Eventually the decision to stay on HDU was made and five days later the patient was transferred home (Field notes HDU 29.06.04). An examination of this event reveals that on this occasion the patient exceeded what was expected of him. However the patient did not fit the typical weaning trajectory and it became clear that the intensivist and some of the nursing staff were no longer interested in keeping the patient on HDU. Egerod (2003) demonstrated that in her

analysis of 14 patients who were weaning from ventilation there were 14 different weaning trajectories.

Conclusion

‘Knowing the patient’ in this study was implied during the interviews as essential to the delivery of patient-centred care. I have determined there were two main factors that needed to be present in order for nurses to know their patients: continuity of care and expertise. Nurses needed to use their expertise to be able to elicit information about the patient and this required sustained and meaningful contact with the patient. ‘Ways of knowing’ was reliant on gaining information about the patient. Observation of practice revealed that many nurses depended on technology-generated information. This information was transferred to the 24-hour chart. What nurses did was find out about their patients; they did not ‘know’ them in the way described by Morse (1991), Tanner et al (1993), Radwin (1996) and Henderson (1997). Information from the chart had the power to regulate and dictate the form of nursing activities and this in turn led to task orientated care (Henderson 1997).

Knowing the patient required sustained patient contact and this could be achieved through continuity of care. Nurses lacked continuity with the patient due to a system of patient allocation, which resulted in multiple caregivers identified as an inhibiting factor in knowing the patient (Morse 1991). Moreover the use of the 24-hour chart had the effect of prioritising the physiological needs of patients over the psychological, emotional and social needs. This limited the nursing interaction with the patient.

Knowing the patient has been defined as a characteristic of expert nursing (Tanner et al 1993, Radwin 1996, Manley et al 2005). Yet observation revealed that although senior nurses realised that patients who were weaning had complex physical and psychological needs they were often allocated to junior nurses to care for them. These nurses can be described as advanced beginners on the 'novice to expert' continuum (Benner et al 1992). They focused on what was to be done for the patient during the time the nurse has to spend with them. Their work was shaped by a concern to organise and prioritise tasks. This in turn limited the role of the patient to a passive recipient of treatment. Patients were expected to follow a weaning trajectory (Lawler 1991).

I have acknowledged that knowing the patient is a fundamental nursing activity and uncovered that few nurses in ICU and HDU ever really knew their patients as described in the literature. Nurses did think they knew their patients but this was in terms of a set of observations and this is linked to how nurses used and perceived technology. Expert nurses have the potential to influence patient outcome (Radwin 1996) in particular those patients weaning from ventilation (Jenny & Logan 1992) yet few experts were ever allocated to look after patients who were weaning. Data from interviews were contrasted with data from observation and this revealed some disparity. What nurses espoused was rhetoric; the reality was quite different. Allen (1996) demonstrated that the division of labour affected knowing the patient. Nurses felt they should know their patients but were prevented from doing so because of the organization of work on the ward. The next theme concentrates on the division of labour in weaning and here I explore two areas in particular in detail: intra-

occupational boundary working and inter-occupational boundary
working.

4.2: The Division of Labour in Weaning

Introduction

Discussion from the first theme revealed junior nurses were frequently allocated to look after patients who were weaning. This division of labour had important consequences for weaning and this is the focus of the next theme. Here I explore the division of labour in weaning and draw on the work by Allen (1996, 1997, 2001) to explain my findings.

There were three sub-themes identified. The first is intra-occupational boundary working. This was evident in two ways; firstly, role overlap between the intensivist and the respiratory physician in HDU and resulted in role confusion for nurses. Secondly between the nurse consultant and other nurses which revealed both tension and harmony. The second sub-theme was inter-occupational boundary working characterised by boundary blurring, traditional ways of working and cross boundary working. Here there was most evidence of tension and conflict. I concentrate my discussion on the doctor – nurse relationships and examine the literature by Stein (1967), Stein et al (1990), Hughes (1988), Porter (1991) and Svensson (1996). The control of weaning was the final sub-theme. There were several competing ‘experts’, the nurse consultant, the intensivist and the respiratory physician. Firstly I will discuss how weaning was carried out on the units in order to put the following discussion in context.

Nurse-Led Weaning

Prior to September 2001 the intensivists in ICU weaned patients although in their absence any of the junior doctors would lead this if they felt able. Nurses did not have formal approval to change ventilator settings or to wean patients from ventilation. Although informally this often occurred when senior nurses would use their initiative to commence weaning and inform the medical staff after the event. From September 2001 nurse-led weaning was introduced (see section 2.4 'Context of the Research'). A number of guidelines (criteria for initiating weaning) and protocols (see appendix 3) were introduced to help guide nurses wean. Nurses could deviate from the protocols and write this on the patient's weaning plan. Nurses were able to determine when a patient could be weaned by using the criteria for weaning, but doctors also could decide when weaning could be initiated. When a patient was deemed ready to wean nurses would initiate the weaning process. The intensivists would prescribe the parameters for weaning, such as the oxygen and carbon dioxide levels and the mode of weaning. Nurses would write a daily plan based on the patient's progress. Any nurse could initiate weaning and write a weaning plan. It was envisaged that the shift coordinator, who was usually the most experienced nurse on the shift, would support the more junior and less experienced nurses. The nurse consultant came to the units every day (Monday to Friday) and would assess patients and either write the weaning plans or advise other nurses. The respiratory physicians came to HDU after the introduction of nurse-led weaning and had not been involved in the construction of weaning protocols.

4.2:1 Intra-Occupational Boundaries

Two areas of analysis were of significant note: the division of labour between junior and senior nurses and the division of labour between doctors from different specialities.

Nurse – Nurse Relations

Although the participants at interview stated that they would approach the shift coordinator for advice and support observation demonstrated nurses would usually ask the medical staff. The shift coordinator clearly felt junior nurses should come to her for advice but they rarely did and this frustrated her.

‘I have overheard nurses phoning medical staff to ask permission to do something, when I can quite clearly do that. It could be something to do with the CPAP (weaning) or blood pressure which I could do without a doctor, yes they bypass me as a coordinator. I say you do not need to ask the doctor, why do you not come to me? They are still thinking that to change anything they need to ask permission from the doctor. For me if I contact the doctor it is because I have run out of options. I might want advice but you do not need them to come and do X, Y or Z, you should just do it’ (Interview: P11).

On further exploration this was interpreted as a lack of confidence, or a lack of knowledge and skill.

'I think we need more guidelines, well they are probably in place but we need to be more aware of them. We need more teaching sessions as to why we do this or what the outcomes are when you start because it is quite daunting. Even using the ventilators, because I think I will reduce the PEEP or reduce this or that, then I think have I done it right, because all the ventilators are different. When you come back off your days off you question yourself' (Interview: P1).

'I looked after the patient on Saturday and I hadn't done a PO.1 (measurement of patient strength of breathing done on the ventilator) for ages, when I got the figure I knew roughly what it should be but was not sure what to do. I had to read the blue folder (where weaning guidelines are kept at each bedside) and update myself on it to make sure I was familiar with it' (Interview: P5).

'It is a confidence issue for the nurses. If they used their clinical judgement and not the graphs or fiddled with the ventilator to find out where we are with this but looked at the patient and asked is the patient struggling, what is his respiratory rate, are they pyrexial and then they will know if the patient is ready to progress. They know if a certain doctor is coming on they will do the Po.1 but the technical side will

stop them going ahead because their confidence will be knocked. They do not have the technical know how or back up' (Interview: P10).

'You have to look at the experience of ICU and HDU nurses even in terms of age, maturity and the different training they have had. You can really see a big difference between the two units. On HDU they are younger and may not have the old school training and the ability to adapt and change' (Interview: P10).

'The other barrier (to weaning) is that of competence. I think competence underpins everything. This linked with confidence to make the decisions to wean. Some nurses are afraid of weaning, but it may only be the oxygen that is reduced. Guidelines and protocols have gone a long way in helping the bedside nurse, that is if they follow them' (correspondence with G grade).

'I only work here one day a month. I have needed quite a lot of guidance about the way weaning is done. Different nurses appear to approach this in different ways. My perception of it is that it depends on the nurse's experience and how confident they are in undertaking the weaning process. Others appear to leave it to other nurses to suggest when to start weaning. I use the protocols as a resource but still feel I need to ask for

advice from the senior nurses' (Email correspondence with Outreach Nurse).

Nurses may have felt that weaning was outside of their jurisdictional boundary as reported by Allen (2001). The shift coordinator felt at this time her role was ineffective. There were too many operational demands and as a result she could not do the job of overseeing nursing practice effectively. She felt nurse-led weaning would be more successful if the shift coordinator's role was developed or a new role created such as the advanced practitioner role.

'It works better when the nurse consultant comes down, because the nurse consultant is an extra and we can get things done and the nurse consultant can remind staff otherwise it gets missed. If some one comes who is not in the establishment (off duty numbers) then they can organise and get things done. Any one in the establishment does not get the chance' (Interview: P11).

'I believe an advanced nurse practitioner role could and should consider weaning to be part of their role, (Correspondence with G grade).

'I think an advanced nurse practitioner (ANP) would be able to support the weaning process. They would be there on a day-to-day basis and would have really detailed knowledge of the patients. Using their experience they could support

colleagues in making an effective patient-focussed plan of care. They could become a resource for new nurses or nurses like me (Outreach) who need to build up their confidence and knowledge in patients who were weaning. These ANP's are expert nurses and as long as they remain patient focussed would be invaluable in critical care' (Email correspondence with Outreach nurse).

'An advanced practitioner could be a hybrid (mix between medical and nursing roles) person but if the role was to develop further they could make weaning safer as they could develop into expert weaners rather than people just having a go. They could give advice to doctors and nurses on the best possible way to individually wean patients. They could also be involved in the non-invasive developments and the future expansion of weaning services' (Email correspondence with Clinical Governance nurse).

'The nurse consultant leading nurse-led weaning and facilitating weaning plans has been a good idea. She ensures that every nurse looking after a weaning patient has a plan and an aim for the day. She also supports and encourages the nurses who are less confident and skilled. I certainly used and valued her advice with my patients' (Correspondence with Outreach Nurse).

The role of the shift coordinator was operational with little time to organise and supervise care for patients. Nurse practitioner posts in Allen's study were developed in order to realign the formal division of labour between nurses and doctors (Allen 2001). Like the nurses in Allen's study these nurses found the organization of work created tensions (Allen 2001).

There was evidence of tension between the nurse consultant and the other nurses. This arose as a result of weaning plans that were not up-dated and parameters for weaning not sought from the medical staff. On occasions, weaning plans written by the nurse consultant, were not adhered to by the nursing staff (Field notes ICU 25.05.04). Several times the nurse consultant asked the bedside nurse and communicated this to the shift coordinator her recommendations to change the ventilator. Because there were 4 different models of ventilator in use only two of these were thought to be suitable for long term patients who were weaning. On almost all occasions the ventilator in use at the bedside remained unchanged (Field notes 13.04.04, 14.04.04, 5.05.04, 12.05.04, 12.08.04).

Other examples are:

'The weaning plan had not been updated for 4 days. Instead of writing the plan myself I²³ asked the bedside nurse to do it. She looked at me in a way that was quite dismissive and quite unexpected. I went back 2 hours later to find the plan still unwritten. I asked again for this to be done. I returned 2 hours later to find the plan still unwritten' (Field notes 25.05.04).

²³ 'I' refers to the nurse consultant as participant in the study.

'I²⁴ was informed by the bedside nurse that her patient was not ready to be weaned. The reason she gave was the patient had too many secretions. I disagreed but got the impression when I pushed that she was adamant the patient would not be weaned. In the end I noted her concerns and gave her my opinion, I left a weaning plan' (Field notes ICU 22.07.04).

'There are no weaning plans in place today, even the long term weaning patient has not had an updated plan for several days. There are 5 patients weaning, I²⁵ made the plans for three and asked 2 nurses to do their own. One nurse agreed but then put the blank plan away. When I enquired what she had done with it, she replied she had tidied it away. I replied that I put the plan on her table for her to fill it in and suggested we did that together now and to leave it where it could be read' (Field notes ICU 6.08.04).

This demonstrated that the nursing division of labour was marked by tensions. This related to work content and its control, with a clear distinction between junior and senior nurses' work. Weaning had the potential to disrupt the organisation of work for nurses. Nurses had a schedule of work; this routine meant weaning was last on the list of activities (see sections 4.3 & 4.4). Allen identified that nurses said at interview that doctor-devolved tasks would be prioritised below nursing

²⁴ Both these excerpts refer to the nurse consultant as a participant in the study. On these occasions the first person is used deliberately following in the genre of confessionalist tales. This combines description with interpretation whilst identifying the ethnographer as both participant and researcher.

²⁵ As above.

care yet observation revealed nurses continued to undertake them regardless of their own work pressures (Allen 1996). In this study nurses left weaning until all other care was delivered.

It must be noted that not all nurses were reluctant to be involved in weaning, some were enthusiastic and would seek reassurance from the nurse consultant and others would take a lead.

‘The nurses are informing the nurse consultant of all their treatment decisions. All the nurses today appear to be making decisions about weaning. The nurse in charge of the shift is very active, moving from bed to bed. One nurse, who is very junior is being given support from the nurse in charge’ (Field notes 28.04.04).

‘I notice a senior but inexperienced nurse was allocated to look after a weaning patient. The nurse consultant offered to help her and spent some considerable time explaining and teaching, offering advice about weaning. Eventually they wrote a weaning plan together. The nurse appeared very grateful and thanked the nurse consultant. She felt satisfied that her patient had made significant progress as a result and she was happy about this’ (Field notes ICU: 5.05.04).

²⁶I noted on the ward round one nurse asked the doctor if he could wean the patient. Weaning had been started the previous day but the nurse had been reluctant to move this on, instead waiting for the ward round and asking permission. I asked him why he needed permission as the patient had already commenced weaning. His impression was that nurses needed permission from the medical staff. In my position of nurse consultant I reassured him and pointed out the patient was already weaning he just needed to continue. He suddenly thought and then replied 'I see' and asked 'shall I get on with it then?' I replied in the affirmative and he wrote a weaning plan (Field notes ICU 9.06.04).

When this occurred there was no tension. Nurses would be praised for their efforts and congratulated on their successes. Some nurses would wait for the nurse consultant to visit in order to plan weaning, or they would wait in anticipation for her to review the patients' weaning plans they had written, often looking for agreement and reassurance.

Nurses were also united when they felt the medical staff challenged their autonomy. This was made evident from the number of occasions nurses would approach the nurse consultant in order to share their frustrations (Field notes ICU 8.03.04, 24.06.04, 8.03.04).

²⁶ This extract from field notes is an example of writing in combined realist and confessionalist tales. In this way it is possible to write both as ethnographer and participant.

Intra-occupational boundaries therefore were characterised by both tension and harmony. Tensions occurred between the nurse consultant and other nurses at all levels when nurses were reluctant to either carry out the nurse consultant's instructions or when nurses did not write weaning plans themselves. Harmony was achieved when nurses embraced nurse-led weaning and showed enthusiasm for weaning.

Doctor – Doctor Relations

The second area of intra-occupational boundary working was the relationship between the doctors, in particular, the ICU intensivists and the respiratory physicians. The respiratory physician is a new post in HDU. They did not usually offer advice regarding mechanical ventilation used in ICU. Their expertise was in the use of non-invasive ventilation (NIV) and this was used in HDU. However their role in ICU was not clearly defined. Referral from an intensivist to a respiratory physician whilst the patient was still in ICU was rare. Indeed it was nurses who suggested the respiratory physician be involved.

'At the moment I think it depends who is on (which consultant), he (the patient) has an acute abdomen but when he is actually discharged he will have to go under the care of the respiratory team. One, he is tracheostomised, two, he has been on long-term ventilation and three, he may need support when he goes home. Certainly I have seen over the years, the respiratory physicians are some what offended when they are

referred patients right at the end of their stay in ICU'

(Interview: P2).

The addition of the respiratory physician had resulted in role confusion and this resulted in conflict. Weaning had been successful in a long-term patient. The shift coordinator in HDU had remarked that weaning was often done with a degree of conflict but on this occasion the teams had come together in a case conference.

'It has been a team approach and all the disciplines in the case conference have dealt with him (the patient) together, made plans and have not been at loggerheads which has been the normal way we make plans for weaning' (Interview: P11).

Clarification of what was meant led to the following statement

'The conflict comes from the medical teams and sometimes the nursing staff. It may be they have different ideas about or a lack of understanding. At the moment it appears to be a disagreement between the respiratory teams and the teams looking after them (parent teams) on how to manage weaning so we (the nurses) are getting conflicting ideas' (interview: P11).

The shift coordinator felt the respiratory physician had different ideas about weaning and this created conflict, not between the intensivist and respiratory physician but between the nurses and respiratory physician.

'A patient who was weaning had deteriorated. The respiratory physician had seen the patient and the nurse caring for him expressed her concerns. This was ignored by the respiratory physician, she pressed him further and he regarded this as 'over reacting'. The nurse was so concerned she approached the intensivist who moved the patient from HDU to ICU for full ventilation' (Field notes HDU: 24.06.04).

'The respiratory physicians have been round this morning and written several weaning plans. The intensivist also sees the patients who were weaning and alters two of the weaning plans' (Field notes HDU: 20.07.04).

'A patient who was being weaned has been told by the respiratory physician he will need home ventilation. He asked the nursing staff to prepare the patient by getting a ventilator used on the ward (NIPPv) and to start using this. This is the first time this has occurred and is different from the philosophy of the intensivists. Patients have either left critical care without a ventilator or they do not leave at all (or they have died). This is challenging our philosophy, we have different goals²⁷' (Field notes HDU: 29.06.04).

There was evidence of role overlap between the intensivist and the respiratory physician in HDU. Both would make suggestions regarding a

²⁷ Written in confessionalist style. The philosophy here is that of Critical Care but seen through the eyes of the ethnographer, an expert critical care nurse.

patient's weaning in HDU and this could be contradictory. Nurses therefore would be torn between the two. The respiratory physician also challenged the traditional critical care definition of weaning. Their experience meant weaning could continue outside of critical care and some patients would go home on a ventilator.

4.2:2 Inter-Occupational Boundaries

Inter-occupational boundary working is divided into three main areas: junior doctors and nurses; intensivists and nurses; and the nurse consultant and doctors at all levels. The junior doctor's role was limited in weaning. Nurses would usually bypass them and go straight to the intensivist. They were thought to lack skill and knowledge of ventilation and weaning in particular.

'A lot of them come on to the unit and they do not understand that what we do is nurse-led weaning and they are quite surprised, they will actually suggest things and half the time, well ninety percent of the time, at the end of the day it is a battle. They will suddenly come on and make a big decision 'switch off the sedation and put them (patient) onto high flow' within five minutes. We say that is not really acceptable, they are not fully awake and we will give good reasons why not to do so and they think they are in the right and you end up for safety reasons discussing it with the shift coordinator and then discussing it with the consultant and then you end up doing what you were going to do any way. I don't think that they

(junior doctors) really appreciate that you are at the bedside more than them, you know the patient more than them and you have in some cases more experience than them because they are new to the unit' (Interview: P 3).

As evidenced from this excerpt, nurses felt they had more knowledge than the junior doctors. Nurses felt the junior doctors did not appreciate this and this caused frustration for the nurse. Yet nurses found it difficult to articulate this even in nurse-led weaning. The nurse in this excerpt also felt the time she spent with the patient gave her additional knowledge about the patient which the junior doctor did not have. This is in accordance with Snelgrove and Hughes (2000) who found knowing the patient gave nurses a position of strength and increased their participation in decision making. However this example demonstrated the nurse was limited in her decision-making and the boundaries were unclear to the junior doctor.

Hoekelman (1975) found conflict arose when doctors and nurses failed to understand each other's roles and where boundaries were blurred. Mackay (1993) suggests that one of the major reasons for the experience of interpersonal conflict was the perceived failure of doctors to seek or to listen to the opinions of nurses. However doctors felt they did listen to the opinions of nurses and actively sought them. Mackay interviewed 262 nurses and doctors in hospitals in five locations in England and Scotland. She identified a number of factors thought to influence the level of conflict. These were the personality and seniority of the doctor and specialist locale. Furthermore her study revealed doctors viewed nurses as

handmaidens. Nurses were not seen as equals, but were seen to 'do the leg work whilst doctors do the brain work' (Mackay 1993: 184).

On the whole junior doctors in this study were willing to relinquish decision-making concerning weaning to the nursing staff. However those who did have experience of ventilation such as the trainee anaesthetists would sometimes make decisions regarding weaning. It was usually at this level that there was conflict between nurses and junior doctors.

Relationships were generally good between nurses and the intensivists. It was felt by the nursing staff that the intensivists respected them, however this was variable.

'Well the consultants (intensivists) now are good, in particular two who are interested in weaning and they will actually say to the junior doctors 'the nurses do nurse-led weaning here and they will probably know a lot more than you', they will give you respect.' (Interview: P3):

Some nurses worked hard to organise and coordinate medical activities in order to accelerate weaning. Frequent delays in medical procedures such as the placement of a tracheostomy tube would result in a delay in weaning. One nurse was observed to deliberately keep the medical staff at the bed area until they had given her a time when the tracheostomy would be performed and she had got all the procedures in place to ensure that this would happen. Nurses would spend a considerable amount of time

organising the medical staff and undertaking procedures outside of their traditional role.

‘Sometimes you find they (doctors) just make the decision among themselves and they go, and you have to force things like drug charts under their nose and then they just go off, they don’t prescribe, it is the same with weaning as well [....] There you are chasing them around all morning and you just don’t get any where really[...].’ (Interview: P1).

‘I noticed you had made some changes (to the ventilator) and the intensivist changed them back and I didn’t think he had taken that on board when he started changing them back to where you started this morning’ (Researcher).

‘Yes, it is like he had to prove to himself, he did not listen to us and just reverted the settings back in order to prove to themselves, then come back at another time and say that did not work, let’s try this’ (Interview: P3)

This is an example of what Allen refers to as boundary blurring. This occurred in order to ensure patient care was continuous (Allen 1997, Ball & Cox 2003). However the constant chasing up of doctors is redolent of traditional work boundaries (Devine 1978, Tellis-Nyak & Tellis Nyak 1984). Hughes (1988) in his observational study of a British casualty department represented a major reappraisal of the working relationship between doctors and nurses. He found nurses’ influence to be greater and more overt than would be expected if the unproblematic subordination or

doctor nurse game as described by Stein (1967) were accepted as universal. Porter (1991), in his observational study of power relations between doctors and nurses in a general medical ward and an intensive care unit, tested four types of interaction: (1) Unproblematic subordination as described in the doctor – nurse game (Stein 1967); (2) Informal covert decision making which was characterised by refraining from open disagreement or making direct recommendations and diagnoses whilst still having some input into decision making; (3) Informal overt decision-making characterised by a breakdown of nurse deference but this form of decision-making was not officially sanctioned, and (4) formal overt decision making on the part of nurses, which was in the form of the nursing process. Porter concluded that while both the unproblematic subordination and informal covert decision making types of interaction appeared superficially to be used frequently, closer examination revealed that (with the exception of the nurse – medical consultant interactions) nurses were less dependent on these subordinate modes of interaction than much of the literature had suggested (Porter 1991). Svensson (1996) states that much of the research on the interplay between doctors and nurses has rested upon the assumption that health care organisations have a hierarchical order in which doctors occupy a paramount position and this approach is limited (*ibid.*, 395). Instead he argues that a negotiated order approach is a better basis for understanding the inter-play between doctors and nurses. He found, in a study of five Swedish hospitals, that nurses had increased their influence over decisions which affected patient care and this had altered their influence on the wards.

The majority of junior nurses used a combination of unproblematic subordination and informal covert decision-making strategies. However the unproblematic subordination was not as straightforward as first thought.

‘The nurse consultant was concerned about a patient who was deteriorating and had communicated this to the bed side nurse in order that this was communicated to the medical team. She had suggested escalating treatment to BiPAP therapy. The respiratory physician had left and his plan to the nurse was to start BiPAP only if the patient tires. [...] The patient looked in respiratory distress, with physical signs of laboured breathing and a high respiratory rate. The nurse consultant was shown the patient’s blood gases by the bed side nurse and told the patient’s oxygen levels were OK. The nurse consultant replied ‘yes but for how long?’ There was a reliance on the blood gases and a disregard for the physical signs the patient was showing. The nurse consultant suggested BiPAP. The patient was eventually and reluctantly put onto BiPAP by the bedside nurse’ (Field notes HDU 5.08.04).

Alternatively, senior nurses would use an intra-occupational mediator in the form of the nurse consultant. Only the nurse consultant, with the exception of one or two nurses, used formal overt decision-making using the nurse-led weaning protocols. This is an interesting and unexpected finding. Nurses saw the nurse consultant challenge the medical staff

regularly and this may be why they used the nurse consultant to act as a mediator on their behalf. I shall now discuss in more detail how nurses used what I have called an intra-occupational mediator. Examples from field notes are varied but can be divided into: frustration with the medical staff regarding the altering of ventilator settings or overruling weaning plans made by nurses; suggesting treatments that the nurse was unsure of; disagreement with the treatment plan and delay in treatment. On each occasion the nurse consultant was asked by the nurse to intervene. (Field notes ICU 8.03.04, HDU 14.04.04, ICU 6.05.04, ICU 8.06.04, ICU 15.06.04).

‘The nurse consultant was informed by two nurses (senior) that they were frustrated with the medical staff. The cause of which was overruling their weaning plan without negotiation. The patient had been weaned by the medical staff and the nurses thought this was inappropriate. The patient was now exhausted which meant the patient would need to be rested for 24 hours (Field notes ICU 8.03.04).

‘The nurse consultant is asked by a nurse on HDU to review a patient who has been seen by the respiratory physician. The doctor had made a weaning plan, the nurse follows it at first but alters this when the patient tires, they are clearly not happy with the doctor’s plan and ask the nurse consultant to intervene on their behalf’ (Field notes HDU 14.04.04).

'A patient requires a tracheostomy in order that sedation can be stopped. This allows the nurse to accelerate weaning. The nurses have been unable to persuade the intensivists this needs to be done today (Thursday) before the weekend. Not getting a decision today means this will be delayed until Monday as 'nothing gets done at the weekend'. This is a constant frustration for nursing staff' (Field notes ICU 6.05.04).

'There was some discussion about whether a patient should receive further treatment or have their treatment limited. The intensivist thought the patient should have a tracheostomy, this had been delayed for several days and had been re-sedated and weaning had been attempted. The bedside nurse was not happy with the decision but reluctant to articulate this further to the doctors. She asked the nurse consultant to intervene on her behalf' (Field notes ICU 17.06.04).

In each of the examples it was senior nurses who approached the nurse consultant. Without exception it would be to intervene with senior doctors such as the intensivist or respiratory physician. This appeared to happen when nurses felt they could not approach the individual doctor themselves. In these cases the doctors may have been seen as difficult to influence. Nurses would use the nurse consultant to challenge the intensivists. In doing this they maintained their boundaries and therefore harmonious working relationship. This approach has not been discussed in the literature before. The use of an intra-occupational mediator allows

nurses to challenge in a way that gives the illusion to the medical staff that they are in agreement whilst at the same time achieving their nursing goals. Nurses are released from tensions this may create and escape humiliation and overt conflict that may arise as a result of direct and overt challenge.

An investigation of doctor – nurse boundaries in a post anaesthesia care unit demonstrated that doctors and nurses roles overlapped (Prowse & Allen 2002). Nurses employed a range of strategies in negotiating care with doctors. Nurses recognised their own clinical expertise but they were orientated to different power relationships between the two occupational groups and they adopted interactional styles that displayed respect for doctors’ ‘professional turf’. This was believed to be necessary to maintain interpersonal relationships (Prowse & Allen 2002). The authors concluded that the doctor – nurse game was alive and well in this context. Fairman & Lynaugh (1998) refer to the fluid boundary working as ‘situational credentialing’ as the giving to nurses by doctors the authority to respond to particular patient care situations. They refer to this in times of emergencies when doctors and nurses temporarily discard traditional patterns of working.

Rather than blurring the nurse - doctor boundaries, some nurses suggested that the development of a new role such as an advanced practitioner would negotiate cross-boundary working. The Government’s policy for the future of health care provision is dependent on the creation of a workforce that has the skills and flexibility to deliver the right care at the right time to those who need it (DoH 2000a, DoH 2000c, DoH 2004).

This has necessitated cross boundary working and has led to the creation of new roles and new ways of working. Some of the influencing factors are the reduction of junior doctor's hours (DoH 1991), changes in medical training (Calman 1993), review of the medical consultant role (DoH 2000a), and strategies to enable nurses to expand and advance their professional practice (UKCC 1992, 1999, DoH 1999, RCN 2005). Scholes & Vaughan (2002) state that nurses are the largest workforce and therefore are often identified as 'gap fillers'. A mapping exercise of new roles in practice in forty NHS Trusts in England identified 838 new roles of which 72% were undertaken by nurses (Read et al 1999). In a survey of Royal College of Nursing (RCN) members in 2004, 758 roles were considered advanced or specialist roles (RCN 2005). However the true number may be larger as not all nurses are RCN members. Scholes & Vaughan (2002) identified a typology of new roles, complementary roles, substitution roles and niche roles. Complementary roles were those associated with cancer services, adapting new skills to meet the changing needs of patients and thought to be non-threatening to other roles. Substitution roles were more commonly found in critical care and developed to deliver a service traditionally undertaken by doctors in training. They tended to be technical in nature with expanded practice governed by protocols and procedures and were led by medical consultants. Knowledge control with precise limitation of function was clearly evident in these roles. Practitioners operated within the medical model and this served to perpetuate medical power. Niche roles were developed to fill the gaps in service and considered to be non-threatening to other roles. However practitioners in these new roles had to negotiate a number of intra and inter-professional sensitivities. Teams were heavily

influenced by patriarchal dominance of the medical consultant. Risk management and fear of litigation were threats that maintained compliance but could be seen as

‘a screen behind which others could hide and maintain their authority and control, in these cases role boundaries were not blurred they were redrawn’ (Scholes & Vaughan 2002: 346).

Despite this concern the Government is pushing forward the development of new and specialist roles in health care evidenced by the creation of the Modernisation Agency ‘Changing Workforce Programme’ in 2003. This programme is designed to help Trusts to implement new ways of working with the aim of improving patient services and tackle staff shortages. Sixteen pilot sites across the U.K. are working to redesign roles, expand roles and move tasks up and down the traditional unidisciplinary ladder (see <http://www.doh.gov.uk> or <http://www.modern.nhs.uk>).

One new role is the development of the nurse consultant. This role was established in the Critical Care Directorate in January 2001 and was one of the first tranche of nurse consultants in the country. Plans for nurse consultant posts were outlined in a Government paper ‘Making a Difference: Strengthening the Nursing, Midwifery and Health Visiting Contribution to Health and Healthcare’ (DoH 1999) and in more detail in a health service circular (DoH HSC 1999/217). These roles were new roles

'intended to provide better outcomes for patients by improving services and quality, to strengthen leadership and to provide a new career opportunity to help retain experienced and expert nurses, midwives and health visitors in practice' (DoH HSC 1999/217: 3).

The posts are structured around four core functions: expert practice, professional leadership and consultancy, education, training and service development and research and evaluation. At least 50% of the time should involve working directly with patients. The main element of the posts was the provision of expert nursing.

Throughout this study the nurse consultant has been pivotal, as both researcher and a senior nurse. It was never an aim of the study to explore the role of the nurse consultant however the influence of this role on practice is important. Part of the nurse consultant role is the provision of expert knowledge:

'The nurse consultant was asked by a G grade to go through the ventilator. There is much confusion regarding some of the modes on the ventilator and there appears to be no consensus among the medial staff' (field notes: ICU 27.07.04)

'We²⁸ have been successful in getting a patient off the ventilator. I had pushed and pushed against the opinion of the respiratory physician. I also suggest we now move to wean the patient's tracheostomy, allowing him to speak and to protect his trachea from necrosis. The respiratory physician is pleased and congratulates me on our success. He comments this is the first time he has seen such pro-active weaning. I am told after wards by the nurses he has been singing my praises' (Field notes HDU 26.07.04).

The nurse consultant role is designed to cross barriers (professional) and push boundaries of working. There were instances when the nurse consultant was able to challenge the medical staff or provide advice:

'The intensivist has prescribed a set of pressures for ventilation which in my²⁹ opinion is incorrect for this type of ventilator. I point out that the pressures are too low to be effective in this patient. I explained he had increased the patient's work of breathing and reduced the support from the ventilator' (Fieldnotes 5.05.04).

'The intensivist during the ward round begins to alter the patient's ventilation. I ask him what he is doing and he replies

²⁸ 'We' is used to denote the ethnographer as participant. This refers to the participant as insider and part of the team. I have deliberately used the first person throughout this extract in order to demonstrate the position of the observer.

²⁹ The following extracts are written in the first person in order to demonstrate the role of the nurse consultant, in particular my position in the team. Writing in this way combines the realist and confessionalist genres of writing. It combines the dual roles of observer in one's own work place and ethnographer. It also gives a personalised account of the role of a nurse consultant.

that he is reducing the pressures. I inform him that cannot be done on the model of ventilator in use. He attempts to turn the pressures down anyway when challenged he replies 'it is not that I do not believe you I just need to check it out for myself'. I suggested changing the ventilator, he agreed (Field notes 12.05.04).

There were numerous examples (on a daily basis) where the nurse consultant actively intervened in patient's weaning for example: (field notes ICU 9.06.04, 14.06.04, 10.08.04, 12. 08.04, HDU 12.08.04, 13.08.04)

'Initially at hand over the nurse said the patient required a certain amount of sedation to enable her to tolerate the endotracheal tube. Then when you (the nurse consultant) said on the round have you checked the sedation score I thought no I haven't. The patient was needing noreadrenaline (to keep her blood pressure up) because of the sedation so I reduced the sedation and it was fine. I thought I had hindered the patient's progress and you (the nurse consultant) made me think' (Interview: P8).

After the interview the nurse mentioned that in future she would always think 'now what would Cheryl (Nurse consultant) do here?'

'It works better (weaning) when you come down (to ICU and HDU)..... you can get things done and remind staff otherwise it gets missed...' (Interview:P11).

'A patient has been waiting for a tracheostomy and as such his weaning has been delayed for 2 days. This has meant the patient has needed sedation to ensure he tolerated his endotracheal tube. Over sedation is another cause of weaning delay. The nurse consultant asked the intensivist if they could perform a sedation hold (reduce sedation), the intensivist asked the bedside nurse, who preferred not to. The nurse consultant intervened and said that they could perform the sedation hold as this would help weaning. The nurse consultant told the nurse she would come back to support her' (Field notes ICU: 23.06.04).

An evaluation of the establishment of the role revealed: role ambiguity, role overload, role conflict and role overlap. Boundary management and role credibility were the main areas of difficulty experienced by nurse consultants (Wilson - Barnett 2001 in Guest et al 2001). Role credibility meant trying to convince colleagues, in particular the medical staff, about their level of authority, with many doctors objecting to the title of consultant. Three years later a further report evaluating the impact of nurse consultants demonstrated some changes with sixty percent of nurse consultants reporting clarity of role. However fifty-six percent reported high role overload. Key problems associated with the role were a lack of support, a lack of resources and lack of authority. Forty-nine percent

reported low support from senior medical staff, with many reporting that their impact would be greater if they had adequate resources and support (Guest et al 2004).

Although there were many accounts of tension between doctors and nurses there was limited evidence that harmony between doctors and nurses was achieved when there was a consensus regarding a patient's weaning.

'We have been successful in weaning a long-term patient off the ventilator. Every one is pleased, in particular the respiratory physician. He approaches me and asks that all the nurses on HDU be congratulated, he acknowledged for the first time the nursing contribution to weaning. I pass on his congratulations. The nursing staff feel particularly good about this' (Field notes HDU: 26.07.04).

On this occasion both doctors and nurses worked together. The patient had not been expected to live never mind become ventilator free. There was a sense of achievement when this was eventually realised. On another occasion there was a case conference and all the professional groups were brought together to discuss the progress and future treatment of the patient. This worked particularly well as all the groups were communicating with each other. This was commented on in one interview:

'It has been a team approach and all the disciplines in the case conference have dealt with him (the patient) together, made plans. They have not been at loggerheads which has been the normal way we make plans for weaning' (Interview: P 11).

In the main weaning was characterised by a blurring of boundaries resulting in tension and conflict. Some have suggested the creation of new roles as a way of resolving these tensions but this may simply move the conflict to another role.

4.2:3 The Control of Weaning

In this study nurse-led weaning had been negotiated and there had been a lengthy period of discussion, debate and multi-professional working. The decisions had been made within the Directorate and had included periods of teaching followed up by monthly weaning meetings and evaluation. Field notes (17.03.04, 15.04.04, 20.05.04) revealed weaning meetings were poorly attended and eventually disbanded. Despite the negotiations and apparent consensus to introduce nurse-led weaning there was evidence of tensions between doctors and nurses. Boundary blurring and boundary working was also evident. This suggests that the devolvement of medical tasks to nurses is fraught with ambiguity and tension. An example is given below from a meeting held at the network

'A network wide weaning group is established. Membership is varied (from different hospitals in the network and mixture

of intensivists and respiratory physicians) but mainly consists of medical staff. A respiratory physician is chair and apart from me there is one other nurse (nurse consultant). She openly discloses that she is no expert in weaning and is there to represent nursing in decision-making. The aim of the group is to ensure weaning services across the different hospitals in the network are equitable. We begin by looking at the provision of non-invasive services and set up a splinter group. This group consists only of nurses and their aim is to set up an educational programme for nursing staff. The weaning group look at the development of a weaning care bundle and the provision of weaning centres. At one of the meetings the NIV group feed back on the educational package they have produced. One of the respiratory physicians comments that this is far too complex for nurses and in too much detail. The nursing representatives on the group disagree and there is much discussion. The result is the package remains unchanged but the group ask for evaluations from the teaching sessions (Field notes Weaning Group).

‘I³⁰ have been given the impression today that the intensivist is assuming expertise in weaning. Furthermore he believes himself to be the only expert. This is quite interesting as I show him how to use the equipment and explain that what he

³⁰ This and the previous extracts from field notes are written from the perspective of the nurse consultant as participant observer but also I offer an interpretive perspective through the lens of an expert in critical care nursing (the ethnographer). This shifting from realist to confessionalist genres allows the ethnographer to use the ‘self’ in both the writing and interpretation of the ethnography.

has just suggested in terms of a weaning plan will only cause the patient to deteriorate. I also get the impression that in his view nurse-led weaning is the development of a weaning plan by the medical staff which is executed by the nursing staff (field notes: ICU 5.05.04).

Although consensus appeared to prevail concerning the introduction of nurse-led weaning there was evidence that medical staff continued to control elements of weaning. This was always the intensivist in ICU and a combination of the intensivist and the respiratory physician in HDU.

'I think the junior nurses are a little wary about making changes (to ventilation) and it can make a difference depending which consultant is on. We may not always agree with what they have done but we are made to feel they have the last say because they are the consultants' (Interview: P 4).

Nurses often became frustrated that changes were made to the patients' ventilation without discussion or when the nurse was absent from the bed area. It appears from this that the medical staff thought weaning decisions could be made without the involvement of the nurse. Doctors would make changes and immediately leave the patient, they therefore were not in a position to evaluate what effect the changes had made. This could be interpreted that doctors make the decisions and nurses report the responses, usually in the format of blood gases and other physiological parameters. This is in keeping with the traditional role boundaries. If

nurses wanted to take control of weaning they were often prevented from doing so by the medical staff.

'I³¹ had made a weaning plan but this had not been commenced. I questioned why this was so and the intensivist commented he did not feel this was appropriate for this patient. I questioned him further to explain why he felt this. He refused to listen, and began shouting at me. I did not pursue this further at the bedside instead waited until there was a more convenient moment. We discussed the patient and he agreed with my weaning plan, he admitted he had confused the patient with another (Field notes: ICU 17.06.04).

'The nurse consultant had left a weaning plan for a patient only to find the medical staff had over ruled it This had caused some frustration for the nurses. The doctor had commented the plan was 'too slow' (Field notes: HDU 29.06.04).

Nurses may have been led to believe this was the case but actually reinforced this in practice by referring to the intensivist for instructions, or waiting for back up.

³¹ This extract from field notes is written in the confessionalist genre to emphasise the dynamics between the doctor and the nurse consultant. Following on is an extract written in the realist genre in order to give description. The emphasis was on nurse's frustration with medical staff. This is one example of how all nurse's weaning plans were overruled, including the nurse consultant.

'The patient has come back from theatre following the insertion of a tracheostomy. There is no weaning plan. The nurse waits for instructions from the medical staff. When no instructions come he asks if it is all right to wean the patient' (Field notes: ICU 9.06.04).

Some nurses however would carry out their instructions even though as in this case the nurse did not agree with them. However nurses would accept that the intensivists had overall responsibility for weaning. One nurse revealed at interview she had had a disagreement with the respiratory physician over a patient. In her opinion the patient was deteriorating and she communicated this to the doctor, who ignored her concerns. She was accused of being 'an ICU nurse' and over-reacting. The nurse asked the intensivist to see the patient. He agreed the patient had deteriorated and took her to ICU for ventilation.

'A patient had been admitted to HDU with a chest infection, legionella was suspected. No past medical history of medical problems. On this particular day I was shadowing the Pharmacist and went to the cubicle where I met this patient. My first reaction was the patient appeared to be in quite severe respiratory failure. He was on 70% oxygen via a high flow CPAP 5 circuit. He looked anxious, his respiratory rate was about 30 per minute and sats 92%, using accessory muscles, monitoring in ST, clammy and sweaty. His IV fluids had been switched off and he was allowed to eat and drink. The patient was unable to speak in sentences but did complain

of feeling extremely thirsty. He was unable to eat and drink due to desaturating down to 75% when his mask was removed and took several minutes to recover. The patient did have IV access, no arterial line, no NG tube and some abdominal distension. I expressed my concerns to the nurse caring for the patient and asked her what the medical plan was. She informed me that there was no medical plan and no parameters [.....] Dr X arrived and looked at the patient's chart but not particularly at the patient. He questioned why the patient's oxygen had been turned up. I expressed my concerns that the patient was getting worse and also tired. I asked if I could try BiPAP Vision and he questioned my judgement, saying too many ICU nurses concentrate on having sats of over 95%. He stated that saturations of 85% were perfectly acceptable. I explained that the patient was showing all the signs and symptoms of respiratory failure and that I was concerned that he would go off (deteriorate) and need full ventilation on ICU' [...]. (Interview: P 8)

In this extract the experienced nurse demonstrated clearly her concerns. The respiratory physician ignored her and contradicted her suggested treatment plan. The nurse was furious but made no effort to communicate this to the doctor. Instead it was discussed in the corridor afterwards. The nurse had overstepped the traditional boundaries. She had assessed the patient, made a diagnosis and suggested a treatment plan. This has traditionally been the domain of the doctor and resulted in conflict and tension (Allen 2001). This has been shown to be an area where most

conflict occurs between doctors and nurses (Ball & Cox 2003). Further illustrations from field notes (HDU 29.06.04, 21.07.04, 26.07.04) demonstrates the relationship between the nurse consultant and the respiratory physician was strained and there to be a degree of conflict between them. On one occasion there had been a stand off between the nurse consultant and one of the respiratory physicians. The respiratory physician was at the patient's bed when the nurse consultant asked if he had examined the patient's chest and reviewed the X-ray. He was very dismissive, further questioning from the nurse consultant led to him eventually turning his head away and ignoring her. The nurse consultant had questioned the respiratory physician and suggested a referral to the intensivist this can be interpreted as an over stepping of traditional role boundaries. Snelgrove & Hughes (2000) in their study of three hospitals in Wales found doctors drew a sharp distinction between medical and nursing roles that emphasised their control over diagnosis, treatment and prescribing whereas nurses struggled to reconcile their image of themselves as autonomous professionals with continued subordination to doctors in many areas.

Weaning was definitely in the medical domain. Even when nurses believed they could accelerate weaning in the absence of the medical staff they were unwilling to take on the responsibility for weaning themselves. This was evident through the lack of documentation on the 24-hour charts, an absence of weaning plans and comments made at interview. Even at interview nurses were at first unclear but always referred to the need for 'medical back up' or 'medical support'

'I think it is everybody's (responsibility), it is the nurse because you are accountable for your patient, you know when the patient is ready for weaning, if you wait around for the doctors you could be waiting all day so you has to initiate weaning. You have to get medical back up with weaning and the physios' input with helping with the chest and you have microbiology with the antibiotics for the chest, every one really' (Interview: P5).

The reluctance to assume responsibility for weaning by junior nurses was clear. These nurses felt unprepared and lacked the confidence to adopt what was once a doctor's role. Role boundaries were blurred. There was a lack of agreement between doctors and nurses. This is in tune with what Allen describes as medical dominance. What constrained nurses was their relative power in the organization (Allen 2001). At no time did nurses openly challenge this transfer of technology. A senior nurse felt this had more to do with the culture of the professional groups and a reluctance of the medical profession to 'let go' of traditional roles and responsibilities.

'It goes back to the doctor - nurse relationship and may be something about the culture not of the nursing staff but the culture of the medical staff in allowing it to happen, and almost expecting it to happen so when the doctors arrive at the bed side they are saying ' what is happening with weaning' and 'where are we with weaning' rather than ' what are we going to do about weaning?'. More about what have you (the nurse) done about weaning, like they do when they

ask about observations, the other obvious nursing care, it needs to be a two-way thing it is not just the nurses embedding it into their practice and culture and getting on with it but they need to feel that this is what is expected to do from the medical angle. There are still some medical staff and nursing staff who are reluctant to get on with the weaning process may be because of which doctor is coming on, they will take over and change things, and the nurses, not having the confidence to already instigate something and will be waiting for the medical staff' (Interview: P10).

The difference in nursing and medical knowledge may be a reason why nurses felt they could not take control of the weaning process. A senior nurse felt one reason for the reluctance of nurses to take responsibility for weaning was because it had become too medicalized and therefore assumptions were made about the level of knowledge and skill required to operate the equipment.

'It may be, if there was more of a sort of a clinical assessment, just the basics about temperature, pulse, or a gut feeling whether this patient could manage a reduction in the assist a bit, then the nursing staff be able to go with that. To initiate it rather than think it a complicated approach and they have to measure this and the other. May be we have made it too complex and too medically orientated. If we want it to be nurse led or want nurses to get involved, then we should approach it at a different level, well not at a different level but

a less scientific way, looking at a numbers way' (Interview: P 10).

Nurses would often presume the doctors were highly trained in weaning and had a special knowledge; they accepted their competence without question.

'I think I would accept (doctor's decision) it because after all, they are the anaesthetists and they are specially trained' (Interview: P4).

According to Allen, when the task was devolved to nurses, medical staff downgraded it, emphasising the repetitive, practical nature and relative safety (Allen 1996). This had the effect of subordinating the nursing contribution to that of a technician. Non-invasive ventilation on HDU was a relatively new service and had only been in place for nearly three years. One of the intensivists who had previously used the equipment was responsible for introducing it to HDU, though it was the nursing staff that implemented it into practice. Not all the intensivists had received training in this equipment as became evident in the following account from field notes.

'On one occasion the nurse consultant suggested swapping the ventilator on one patient to that used in HDU, the intensivist agreed. The nurse consultant asked the intensivist to prescribe the pressure settings. These were too low and when this was pointed out, the intensivist increased them to a

level the nurse consultant suggested' (Field notes ICU 5.05.04).

McKee & Lessof (1992 in Robinson, Grey & Elkan 1992) stated that before nurses can undertake additional roles in practice they must first demonstrate they have had adequate training and are competent, although this is not the case for medical staff.

'Once doctors qualify there is an implicit assumption that they are skilled in all of the tasks necessary for the diagnosis and treatment of patients under their care, whereas for nurses it is the assumption that the skill is absent unless it has been taught and tested' (McKee & Lessof 1992: 66).

Nurses had developed the knowledge and skill to use NIV in HDU and for the main this was a nurse led service when medical staff were not present. Tensions were noted when doctors were present, in particular when the respiratory physicians joined HDU.

'At the beginning it was very much trial and error, good or bad, we very quickly became very good at patients who were weaning from BiPAP and we relied on our experience, it was like progressive learning. It was a good opportunity for nurses to develop that skill and over time we got more knowledge, skill and practical skill about BiPAP in general and weaning [....].When it was first introduced we had minimal support, it was very much something that nurses did by themselves, not

without necessarily knowing every thing about it, without reading the evidence base and all the research pertaining to weaning, but based on their experience and almost their intuition. Now we have got medical support the nurses take a hump a bit when the medical staff start interfering, it is something we have developed ourselves, something we are good at and something we are proactive with, so when the doctors come along and try and alter what you are doing or give you advice, you almost take offence. You know they are treading on your toes a bit and in particular in HDU, it is definitely the nurses' domain and the doctors have minimal input' (Interview: P12).

In this case the nurse describes how nurses on HDU came to develop their expertise in BiPAP, not through formal education but experiential knowledge. This may conflict with the medical view of how knowledge is constructed and go some way to explain the differences between the professional groups and their (presumed) control of weaning.

Some nurses felt the complicated patients who were weaning were best left to the medical staff. A senior nurse had deliberately left the weaning plan of a patient for the medical round and greeted the nurse consultant when she arrived with the comment 'his weaning is too complex, best left to the doctors' (Field notes ICU 8.03.04). The assumption here is that this would be too difficult for a nurse and even a nurse consultant, although many nurses had expressed the view that many of the junior doctors lacked the skills and knowledge about ventilation and in particular

weaning. Although some nurses appeared happy to accept responsibility they frequently referred to the back up or support from the medical staff.

‘ I think it gives you a bit of support and a bit of back up. We have quite a junior skill mix on and being junior in a senior role (nurse was acting into a more senior role) can be quite trying if you are trying to advise people, it is quite handy (to have medical staff) to clarify things’ (Interview: P 9).

This clearly demonstrates that nurses did not feel at total ease with nurse-led weaning and relied on the support from intensivists. However more confident nurses would not wait for the intensivist as the next excerpt reveals.

‘I would go ahead (in the absence of the intensivist) with weaning to be honest. You get conflicting information from the doctors and to be honest a lot of the time the doctors are not interested in weaning. They look at it as our job really and they come along and make some changes not realising we had already done them. Normally I would say ‘ we are weaning’ and they do not normally ask ‘how’, usually they don’t make any changes, I know what I am doing and I know the patient and they don’t and they come along and say’ we must try this’ and unfortunately they try all sorts of different things’ (Interview: P 5).

One intensivist would get frustrated that weaning had not occurred as quickly as he had hoped and he asked why there had been delays over the weekend. The nurse answered 'because it was the weekend, nothing happens at the weekend'. The intensivist then stated that we had nurse-led weaning, 'if only the doctors would let us' was a response made by the nurse consultant (Field notes 5.05.04). He made several changes to the weaning plans despite his previous comments. The nurse consultant was in attendance.

Doctors maintained control over weaning in a number of ways. Firstly they altered ventilator settings at will and without explanation to the bedside nurse. Secondly, they omitted to document these changes when asked to do so. Thirdly doctors frequently overruled weaning plans made by nurses without discussion. Nurses allowed medical staff to control weaning by carrying out instructions without question even when they were unhappy with the decision. A member of nursing staff had altered the ventilator in accordance with the doctors' instructions. He had thought at the time these instructions were unusual but did them anyway without comment. Later he approached the nurse consultant and asked her opinion. She replied it was not the right thing to do, asking him to return to the previous settings and inform the doctor of his actions. Nurses often feel their knowledge to be inferior attributing the intensivist with a superior level of knowledge and therefore unable to confidently question some of their decisions.

Conclusion

Within the sphere of nurse-led weaning there was evidence of boundary blurring and traditional ways of working. Within the intra-occupational boundaries there were differences between junior and senior nurses, with the role of the shift coordinator thought to be ineffective and too operational. A new role, the nurse consultant, crossed boundaries and challenged traditional ways of working. This resulted in tensions with other nurses. For the doctors there was evidence of role overlap between the intensivist and respiratory physician in HDU only. Inter-occupational boundary work was characterised by tension and conflict. This mostly occurred between the nurse consultant and other senior doctors. Conflicts arose when nurses, in particular the nurse consultant, was seen to cross traditional roles by offering advice, suggesting treatment plans or making a diagnosis. There were a few examples when there was harmony. This was achieved when doctors and nurse reached a consensus regarding a patient's weaning. Styles of decision-making adopted by junior nursing staff were a combination of unproblematic subordination or the doctor – nurse game and informal covert decision making. However this was not as unproblematic as previously described in the literature (Stein 1967, Hughes 1988, Porter 1991, Svensson 1996, Allen 1997). Senior nurses would use an intra-occupational mediator, the nurse consultant, a term not described in the literature before. The nurse consultant was the only nurse, with one or two exceptions, to use formal overt decision-making strategies using the nurse-led weaning protocols. Unlike Allen's study (1996) the transfer of weaning from the medical staff was fraught with conflict. One reason for this may have been the senior level of doctors in

this ethnography compared to Allen's work. The transfer of technology occurred from consultant to nurse, there may also have been differences in the meaning of nurse-led weaning as perceived by the two groups or even within the same occupational group.

The medical staff controlled weaning. There were a number of competing 'experts', the nurse consultant, the intensivist and the respiratory physician. Nurses attributed medical staff with a 'special kind of training', with knowledge that was scientific compared to nursing knowledge, which was 'more basic'. Some nurses felt weaning had become too medicalized for nurses and decisions regarding complex patients who were weaning should be left to the medical staff. New roles have been developed in order to compliment or plug the gaps in existing services or to substitute other professions. However the introduction of the nurse consultant fits none of these categories and as such there has been some role confusion (Guest et al 2001). In this study it was thought the creation of a new role such as the advanced practitioner would realign occupational boundaries. However, these conflicts may simply shift to another role that will remain under the direct influence of medical power (Scholes & Vaughan 2002).

An analysis of the division of labour in weaning has demonstrated that this was fraught with tension. The lack of clear boundary working may serve to marginalize the nursing contribution to weaning and has the effect of rendering nursing work invisible. This is the subject of the third theme. Nursing visibility refers to the way in which nursing work is seen, valued and made explicit.

4.3: Nursing Visibility

Introduction

In the previous section I have established that despite the philosophy of nurse-led weaning doctors controlled weaning. This was illustrated when doctors overruled weaning plans made by nurses and when junior nurses looked to the intensivists for back up or weaning instructions. This meant it was difficult to see the nursing contribution to weaning. This section of the analysis is concerned with the theme of nurses' visibility. By visible, reference is made to the contribution made by nurses to a patient's weaning and how this was made evident or obscured to others. Three sub-themes emerged. Firstly, nurses rendered³² themselves invisible. Secondly, nurses were rendered invisible by doctors. I explore the literature related to the nursing role on ward rounds in order to interpret and explain the results (Busby & Gilchrist 1992, Mallik 1992, Erkman & Segesten 1995, Felten et al 1997, Manias & Street 2001). I suggest that nurses were silenced at the bedside and the dominant medical paradigm that prevailed in critical care served to marginalize the nursing contribution to weaning. Thirdly, nurses attempted to make³³ visible their contribution to patient care through 'the wash'. I suggest that this routine care was in fact a nursing ritual. I draw on the literature concerned with rituals to explore the possible meanings this may have for critical care

³² The word 'rendered' is used specifically to infer that nurses were not intentionally *made* invisible but became invisible as a result of many actions.

³³ 'To make' has been chosen deliberately to infer there was some intentionality, for example nurses wanted it to be known that patients had been washed.

nurses (Menzies 1970, Chapman 1983, Wolf 1988, Walsh & Ford 1989, Wolf 1993, Ford & Walsh 1994, Biley & Wright 1997, Geoffrey 1998). Engaging in rituals enabled nurses to control the content of their work but it also made their contribution to weaning difficult to see. I go on to interpret these findings in the light of Melia's (1987) work in order to explain why nurses in critical care were driven by the need to 'get the work done'

4.3:1 Nurses Render Themselves Invisible

Nurses rendered themselves invisible in three ways, by not attending the ward round or by not participating in the round and through the allocation of junior nurses to patients who were weaning. The following is a description of a typical scenario. Present on the ward round were the intensivist, junior medical staff, medical student, nurse in charge and the nurse consultant. When the round arrived at the patient's bedside the nurse was busy putting up a feed.

'The bedside nurse was occupied putting up a nasogastric feed. The round began by discussing the progress of the patient overnight. The patient's main problems were discussed between the doctors. The bedside nurse continued with what she was doing before moving on to get the patient's drugs ready without breaking off to attend to the ward round. There was no communication between the nurse and the team. The nurse in charge who had started the round was called away. After fifteen minutes or so the medical staff had

reviewed the patient and made a plan of care. This was not communicated to the bedside nurse, neither did she ask what it was. At no time did the team ask the bedside nurse about the patient. The round moved to another patient, neither the bedside nurse nor the nurse in charge knew what had been discussed on the round' (Field notes ICU: 8.03.06).

The same nurse was asked at interview about the ward round, in particular she was asked to comment on her level of participation.

'To some extent, at times I do think nurses stand back and listen to what the doctors because they have been used to them making all the say decisions. I feel it is getting better. I have often been asked about my opinions, with particular doctors you can, you can contribute what you have observed in the morning, some times they appreciate your opinion and sometimes they think 'we will do it this way'' (Interview: P 1).

'Present on the ward round are the intensivist, junior doctor and nurse consultant. The intensivist examined the patient and reviewed the weaning plan. He proceeded to change the ventilator settings without communicating to the bedside nurse. She was busy, engaged in checking infusions and clearing away items from the bed area. The intensivist began to explain the rationale for changing the ventilator settings to the junior doctor. This is out of range of the bedside nurse,

she therefore missed what was said. The intensivist moved on to the next patient' (Field notes ICU: 9.03.04).

Observation in practice revealed that nurses would busy themselves at the time of the round, mostly concerned with tasks such as the drawing up and administration of drugs or washing patients. Most of the time these were not considered urgent activities but the nurse had a routine and there was a reluctance to break this. The result was nurses did not contribute to the ward round and decisions about patient care would be made without their input. As one nurse commented when asked why she had not been part of the round

'A lot of the time the nurses are quite busy and they do not have time to listen to handover (ward round) as well'
(Interview: P1 bedside nurse).

As a result the intensivist had made a plan of care for the patient and the bedside nurse was unaware of the plan. The following excerpt from field notes demonstrates that the intensivist does not attempt to communicate with the bedside nurse, instead passes on his instructions at the nurse's station.

'Another intensivist arrives on the unit he saw the patient the day before. He approaches the nurse's station and enquires about the patient, looking over to the patient's bed (which is opposite the station), noting the rise in temperature, he orders blood cultures, this message he communicates not with the

bedside nurse but the nurse standing at the nurse's station
(Field notes ICU: 8.03.04).

Interestingly the medical teams did not communicate with each other.

'The parent team arrived, came to the patient's bedside, discussed the patient and wrote in the medical notes. They did not communicate with the intensivist who was on the unit nor the bedside nurse. The team focus on the surgery (the patient had undergone a thoracic oesophagectomy) and are unaware of other aspects of the patient's care, in particular weaning' (Field notes ICU 8.03.04).

The bedside nurse acts as a conduit for communication between teams. It is therefore important to actively participate with the medical staff when they come to review the patient. The following is an example when the parent team visits the patient but the bedside nurse does not attempt to communicate with them.

'The parent team visit the patient whilst the intensivist teaches the junior medical staff in the coffee room, neither of them know that each other is on the unit. The team review the patient and fail to write in the patient's notes. There has been no communication between the bedside nurse and the team. It transpires that the parent team have arranged theatre for the patient later that day, this was only discovered when theatre

phone the unit to arrange the list, neither the bedside nurse nor the intensivist is aware' (Field notes ICU: 28.04.04).

Nurses either believe they cannot contribute to the round, or that their contribution is not important. This was interpreted as a lack of confidence on the part of the bedside nurse.

'Quite often when the doctors come on the round the nurse will stand there waiting for instructions. It is not a participative role. It comes down to a lack of confidence (Interview: P12).

The lack of participation on the ward round is a reflection of the nursing priorities, the ward round is seen as something separate and has little to do with nursing, a view echoed by Busby and Gilchrist (1992). Although the multi-disciplinary team exists within critical care, multi disciplinary team working is often not evident in the way each professional group works independently of each other. Keddy et al (1986) found this to be the case in their study of Canadian nurses. When the nurses tried to change the status quo, this resulted in professional groups working independently of each other. She draws on literature that reinforces the idea that doctors are noted for not working well with other health professionals, especially nurses, whom they regarded as handmaidens (Keddy et al 1986).

Nurses also rendered themselves invisible when they absented themselves from the medical ward round.

'The nurse in charge in ICU is busy helping staff to wash patients, she is therefore unable to attend the ward round. Three of the seven bed areas are screened off whilst nurses bed bath' (Field notes ICU:29.06.04).

On many occasions the nurse in charge was called away from the ward round.

'The nurse in charge accompanied the ward round but was frequently disturbed. The receptionist interrupted twice with queries, on one occasion the nurse had to take a phone call and on another a member of staff asked for help (Field notes ICU: 25.05.04).

When asked why staff continually interrupt the nurse in charge one senior nurse replied:

'It is the old institutionalised thing, oh go through the shift coordinator, some times I prioritise by saying, no, some one else can sort that out' (Interview: P3).

The shift coordinator did not look after a patient but is pivotal to the organisation of the unit. They therefore need to be aware of the status of all the patients and be up-to-date with changes in their condition yet they were often absent from the round. The shift coordinator would be busy undertaking administration tasks, or helping the bedside nurse perform tasks of washing, turning or assisting with other aspects of patient care.

If they were able to join the round they were called away many times and their contribution was patchy and inconsistent which was demonstrated in studies by Mallik (1992) and Ball and McElligott (2002). There was no recognition from the other staff of the importance or status of the role of the shift coordinator on the ward round as indicated by the many interruptions from staff. Indeed the round was referred to as 'the medical ward round' and this in itself negates the role of the other health professionals and multi-disciplinary team working.

'I quite like the medical ward rounds. They are succinct, direct and don't waste time. Long ward rounds at nine O'clock can be an absolute pain because of the other issues that go on (in the unit), especially on a Monday morning (there is usually the issue of beds to sort out for the elective post-operatives cases)...If there is a patient that is quite complex and I have opinions I will join the round briefly and then dart off. I think I am experienced to know what pathway the patient will take (Interview : P2).

In this statement the shift coordinator saw the round as essential for the medical staff but not a necessity for him. Nurses were not expected by the doctors to join the round either.

Observation revealed that the round often started at the convenience of the medical staff and not when the shift coordinator was available. Indeed on one occasion the nurse consultant asked the intensivist to wait until the shift coordinator was available as she was held up taking a telephone call

(Field notes ICU 23.06.04). It was apparent that doctors thought nurses were not essential to the ward round, a finding consistent with other studies (Mallik 1992, Busby & Gilchrist 1992, Wright et al 1996, Manias & Street 2001). In observation of a junior member of staff acting as the shift coordinator (nurse in charge) in order to gain experience, he was seen to join the round unaccompanied by his mentor, who was busy helping at a bed area. The mentor made no attempt to guide the junior nurse. It appeared that the round was something the junior should experience, but was not an essential role for the shift coordinator (Wright et al 1996). The junior member of staff accompanied the doctors on the round taking down instructions from the medical staff and noting the plans of care made, but said nothing at all on the round (Field notes ICU 6.08.04). This example indicates that the role of the shift coordinator on the ward round as some one who carries out instructions on behalf of the medical staff and notes the medical plans of care in order to hand this over to the next shift. This resonates with a study conducted by Porter (1991) where it was noticed that nurses were reduced to 'listening on the side lines', only contributing factual statements when required (Ibid.: 733). In no way at all did the nurse contribute to patient care or to the development of a plan of care. This is in concordance with Manias and Street (2001) who found the nurse's role to be no more than an information giver. However here the nurse did not give information to the medical staff rather the aim was to pass this on at oral handover to the nursing staff. Erkman & Segesten (1995), a Swedish study concerned with examining the ritual of the oral handover, concluded that registered nurses paid minimal attention to nursing care during the handover. Nursing was in relation to what a doctor prescribed and stated that 'while

the medical paradigm dominated, nursing was virtually invisible' (Ibid.: 1011).

The ward round is acknowledged as a valuable time for the whole multi – disciplinary team to come together in order to plan care (Busby & Gilchrist 1992) and the aim is to ensure quality patient care (Felten et al 1997), share information, address patient problems, plan and evaluate treatment (Manias & Street 2001). However nurses frequently absented themselves from participating. This is reinforced in a study by Ball and McElligott (2002) where they found the bedside nurse was not always included in the ward round or they were absent. Participation was reduced when the nurse did not feel knowledgeable or had insufficient time to know the patient. The reasons nurses were absent from the round included taking coffee breaks, patient needing attention, or attending to another patient (Ball & McElligott 2002). Studies involving nurse – doctor interactions during the ward round have identified nurses' passivity and their lack of confidence about asserting themselves in discussions (Busby & Gilchrist 1992, Mallik 1992, Whale 1993, Wright et al 1996, Felten et al 1997). Busby and Gilchrist (1992) suggest nurses assert themselves more and doctors relinquish control. However many authors have failed to examine the techniques used by doctors to sustain dominant medical practices during the ward round (Manias & Street 2001) and the complex relations between intra and inter professional groups which plays a large part in understanding the culture of the workplace. Those studies that have introduced nurse participation have found benefits in improved doctor – nurse communication (Wright 1996 et al, Thomas 1989), Nurses had a clear understanding of their role (Wright et al 1996), greater patient

advocacy (Thomas 1989) and improved patient care (Felten et al 1997, Wright et al 1996, Thomas 1989).

There were examples when both the nurse in charge and the bedside nurse were actively participating in the ward round (Field notes ICU: 27.05.04, 14.06.04, 17.06.04). When this occurred nurses were able to pass on valuable information about the patient to the team and this was instrumental in progressing the patient's weaning.

'When the round reached the patient's bed area the bedside nurse had prepared a list of questions for the intensivist. During the round she asked for weaning parameters, reviewed the mode of weaning and passed on information about the patient's progress. Although she took a back seat (as the intensivist led the round) she was able to participate in the round and when the team left the bedside nurse had a plan for the day' (Field notes ICU: 27.05.04).

The intensivists themselves often prevented nurses from joining the round. There was no consistency with the medical ward round. Different intensivists had different approaches. The following is one approach. This intensivist likes to hand over in the coffee room then proceed to review in full each patient, as a consequence the round can take 3 hours.

'The ward round commences at 9am. The intensivist and junior doctors have already handed over the patients in the coffee room. Before the intensivist can start the round to

review patients he is called to see a patient, leaving the junior medical staff to start without him' (28.04.04).

'Handover was in the coffee room, the doctors then come on to the unit and begin the round. The intensivist likes to use this to teach the junior medical staff. They take it in turns to examine the patient and record in the patient's notes. As a consequence the round takes 3 hours. On this occasion the intensivist gets called to scan at 11 am and therefore not all the patients are seen' (Field notes ICU: 29.06.04).

Nurses felt the nurse in charge could not afford to spend three hours attending a ward round when there was so much else to do (Interview: P 1).

The allocation of junior nurses to patients who were weaning (discussed in sections 4:1, 4:2) also contributed to the invisibility of the nursing contribution. Despite the recognition from senior members of staff that patients who were weaning required a nurse with a great deal of skill, confidence and expertise, they continued to allocate the most junior and inexperienced nurses to those patients.

'In weaning we are finding that the patients who were weaning go to the junior staff and they are the patients that the senior staff should go to, so we can get them (the patient) out (of ICU) ultimately. You really need someone more

senior who has weaned before so will know when to push and what to do' (Interview: P5).

A patient who had been on the unit for 12 days was being looked after by a junior nurse. On this occasion she was being supervised by a more senior nurse. The junior nurse was keen to learn and asking questions about weaning, they had formulated a weaning plan. However after a period of absence from the unit I returned to find the intensivist had made some changes to the ventilator and the junior doctor had made the weaning plan (Field notes ICU 27.05.04).

On this occasion the nurses had attempted to make a weaning plan but the allocation of a junior nurse meant they were overruled, even the presence of the more senior nurse did not prevent this. When junior nurses are allocated to patients who were weaning and not supported by more senior nurses, doctors may feel they may need to take the lead in weaning. The inability of junior nurses to question these practices further reinforces this.

There are 3 patients weaning in ICU. One patient is a long-term weaner and he is looked after by a D grade with 6 months experience. This is significant because the patient has complex needs (renal failure). When I ask the nurse about the patient it becomes clear how little he knows. Another patient is looked after by an inexperienced nurse, she usually works as an outreach nurse but today is working in critical care but

is not familiar with weaning. After asking her how she is it is apparent that she is anxious and out of her depth. I end up staying the whole shift with her, acting as her mentor. The other patient is looked after a nurse with one year's experience. There are 6 patients on the unit and the other three are considered not suitable to wean and looked after by more experienced nurses' (Field notes ICU: 5.05.04).

On the majority of shifts in ICU patients who were weaning were allocated to junior members of staff. Only when there were many patients who were weaning at a time would more senior nurses be allocated to look after them. In this way nurses could be seen as collaborating in their own invisibility. Nurses also devalue the nursing contribution to caring for critically ill patients through the allocation of junior nurses to patients who are weaning. However nurses at interview justify their allocation through matching the available skill mix to the severity of a patient's illness (section 4.1). They recognise these patients have complex needs and that nurses need experience, skill and knowledge to look after them. However as has already been demonstrated nurses saw patients who were weaning as not really critically ill. This may have been compounded when patients who were weaning were transferred to level 2 (HDU).

4.3:2 Nurses are Rendered Invisible

The doctors rendered nurses invisible. This was demonstrated in two ways; by doctors overruling weaning plans made by nurses and the way doctors regulated the ward round.

‘Two bedside nurses informed me (as the nurse consultant) as soon as I came on to the unit that they were frustrated by the medical staff. The medical staff had overridden the nurses’ plans without negotiation. As a result the patient had been weaned inappropriately and was now exhausted. This meant weaning would need to be delayed for 24 hours’ (Field notes ICU 8.03.04).

There were many examples from observation where the doctors would overrule the nursing weaning plan (I noted 20). For some nurses this caused frustration and for others they accepted it without question. When asked to clarify why this was the case the nurse replied:

‘To some extent, at times I do think nurses stand back and listen to what the doctors say because they have been used to them always making the decisions, but I feel it is getting better. I have often been asked about my opinions, with particular doctors you can’ (Interview: P1).

In this account the nurse realised nurses had been passive. The culture had been to let doctors make the decisions but with some doctors nurses

felt they could have some influence. This implied that this varied. It may explain why some nurses who were present at the bedside when the round was in progress were often silent. It could also reveal the extent to which the nursing role is redundant in decision-making.

‘Today I left a plan as usual for a patient who has been with us for some considerable time (over a month) and my plan was to wean gradually. When I returned later that day the plan had been changed to a quick wean by the intensivist. The nurses had gone along with his plan and therefore mine was over ruled. The patient had deteriorated and was put back on to my plan. I spoke to the intensivist who informed me my plan was too slow’ (Field notes 29.06.04).

It was clear that the role and status of the nurse consultant was not considered any different from other and more junior nurses. On one occasion the weaning plan had been crossed out and a new one written. Having asked the bedside nurse why this had occurred (there had been no discussion with the nurse consultant) the nurse replied that

‘[...]there was no discussion, even though the nurses pointed out the nurse consultant plan and the rationale, but he (the doctor) was adamant, we did not know how to wean his patients, then he offered to do some teaching, they (the doctors) do not recognise your role, they are treating you (the nurse consultant) like the (other) nurses on HDU’ (Interview: P11).

In other instances where nurses had made changes to the patient's ventilation (in accordance with her plan for weaning) prior to the ward round the intensivist came and changed the ventilator back without discussion with the nurse. The nurse interpreted this as

'It is like he (the intensivist) had to prove to himself, he did not listen to us, they just reverted the settings (on the ventilator) back in order to prove to themselves, then come back at another time and say, 'that did not work let's try this''

(Interview: P3).

Nurses realised they did not always contribute to the ward round and felt they should assert themselves (Interview: P6). One of the reasons for this may have been the differences between the intensivists. There was some variance in the conduct of the ward round. For example one intensivist would take handover in the coffee room and nurses were not invited. He would then go round every bed area assessing the patients and making a treatment plan. Others may take handover and make a treatment plan at the same time, leaving the junior medical staff to complete the patient assessment. Therefore the round may take from 30 minutes to 3 hours. It was not guaranteed that all the patients would be seen before lunch. At 12 noon the drug cards expired. These were re-written every 24 hours. Therefore nurses did not have up-to-date drug prescription charts and may also not have a treatment plan until much later in the day.

During observation it was noted that when the parent team came to see their patient, the nurse had stood at the end of the bed and informed them

of the patient's progress. The parent team were more concerned with those aspects directly related to their speciality (surgery or admitting illness) rather than the whole picture and how this connected with weaning.

'It's a very complicated wean and in relation to the ward round I don't think the parent team were very helpful just from the point of view that they did not pick up on all the problems we told them that affect weaning such as his bowels and fluid balance etc. Just didn't help really, it was 'just carry on as normal', that was it' (Interview: P 3).

The ICU ward round occurred just afterwards and the nurse again attempted to inform them of the patient's main problems.

'I do think he does his own thing (the intensivist) yes, he did listen (to the nurse) more than the parent team. I think our consultants (intensivists) listen more to you when you are speaking to them, although they may have in their head that they are going to do their own thing' (Interview: P 3).

There appear to be differences in how nurses in ICU interact with medical teams and even within the medical teams. Manias & Street (2001) conducted an ethnographic study in critical care in order to explore the power relations associated with ways in which critical care nurses interacted with doctors on the ward round. Findings from their study showed consultants regulated nurses' physical visibility (by holding part

of the round in a private room) and their contribution to the ward round. The result was nurses felt marginalized. Whilst the consultant regulated the format and content of the round in the private room, nurses were unable to do this at the patient's bedside. One attempt within critical care may have been to draw the curtains and commence washing the patient. There were many occasions where many, if not all, the bed areas were inaccessible as nurses were engaged in intimate procedures with patients. However the majority of doctors either ignored the closed curtains and ventured behind them or discussed the patient without even seeing them. The latter had the effect that nurses were silenced at the bedside.

Other nurses would wait for the ward round, especially if the intensivist on that day was thought to be approachable.

'I had delayed things (weaning plan for the patient) because I had hoped to get the intensivist input, especially today because he is very motivated and does like to have an input'
(Interview: P4).

Whilst one nurse commented she would proceed in the absence of an intensivist ward round.

'I would go ahead (without the ward round) because you get conflicting information from doctors and to be honest a lot of doctors are not interested in weaning' (Interview: P 5).

Manias and Street (2001) found that consultants adopted an authoritative position in directing communication and decision making on the ward round. They were able to adjust the nurse's capacity to contribute to decision - making by a process of differential visibility. This, according to Sweet & Norman, is when a person becomes visible or invisible to others depending on the person, the place, the time and the forms of symbolic representation (Sweet & Norman 1995: 51).

One explanation for the absence of the nurse from the bedside is that this is a deliberate act in order to avoid interacting with the medical team. When nurses left the bedside their patient would be overseen by another nurse. It was not possible to give a full and in-depth handover and, as a consequence, when the medical staff came to review the patient, nurses were unable to answer their questions. There was no attempt to call back the nurse to attend to the medical staff queries. This also happened when a nurse had been allocated a new patient. On several occasions the nurse who had been present the day before was on duty but was not asked. Comments such as 'it is not my patient' or 'I have not looked after the patient before' were made in response to medical questions. Nurses frequently acted as 'a passive bystander' (Manias & Street 2001: 447). Furthermore, teaching usually took the format of questions to the junior medical staff from the consultant and this had the effect of further alienating the nursing staff.

Svensson (1996) argues that previous research on the interplay between nurses and doctors rests on the assumption that there is a hierarchical system of authority in which doctors occupy a paramount position; that

this authority is top down and little influence can be exerted from the bottom up. He quotes Stein's (1967) description of the doctor nurse game whereby nurses exert influence only through manipulation but never really challenge the fundamental asymmetry of the power relationship (Svensson 1996: 395). Svensson instead prefers to examine nurse doctor relations through a negotiated order perspective by regarding the social order on a ward as a negotiated order. In this way the investigator can examine the processes that continue to preserve and recreate that order. The results of his study revealed that nurses' position on the wards in Sweden had been altered in a 'significant manner' where nurses had increased their decision making over patient care. However this study was conducted using interviews and, as Svensson himself points out, what nurses say they do in interview needs to be corroborated through a period of observation in practice.

The nature of the ward round had the effect of overcrowding at the bedside or excluding the bedside nurse. Some of the ward rounds occurred in the corridor in ICU or outside the cubicle in HDU and this would result in excluding the nurse who either may not be able to leave the bedside or was reluctant to leave the patient. On occasions a great number of people would attend the round and this meant the nurse was often pushed to the back. This was particularly so when the parent teams visited. The following is an example of the thoracic grand round, called so because all three consultant thoracic surgeons see all the thoracic patients. This is to ensure that there is sufficient knowledge of the patients for cross cover (on call).

'The thoracic ward round was in progress. It was noted how difficult it was to get through the unit because of the number of people on the round. There were three thoracic consultants, two senior medical staff, three junior medical staff and two specialist nurses. Consequently the bedside nurse could not get near her patient' (Field notes HDU:20.07.04).

Nurses were rendered invisible in two main ways. Firstly when doctors over ruled their weaning plans and secondly in the way the ward round was regulated. This had the effect of marginalising the nursing contribution to weaning.

4.3:3 Making Nursing Visible: 'Doing the Wash' - a Nursing Ritual

The morning shift was the busiest time. Patients were usually washed in the morning between 8.30 – 10.00.

'Weaning the patient had been delayed as the nurse had been busy all morning, there was the wash, then physiotherapy and a range of other tasks, it was 12 noon before any attempt to wean was made' (Field notes ICU: 18.03.04).

Weaning would follow on after all other tasks were completed and this would result in frequent delays in weaning. When staff were asked in interview, and during periods of observation why patients were washed first thing in the morning they would reply;

'It's routine, that is just the way it is' (Interview: P7).

'When I turned up on the unit this morning, all except one of the 7 beds had the curtains drawn. It was 8.30 I looked for the nurse in charge. He was busy helping one bedside nurse with the wash. At the one bed area with open curtains the bedside nurse was cleaning, the patient had already been washed' (Field notes ICU: 22.06.04).

'There are 4 patients weaning today. When I approached the bed of the first, the nurse informed me she had assessed her patient, there was no plan, when I asked where the weaning plan was she replied she was going to wash first. The second patient had a weaning plan written by the bedside nurse, the third had already been washed and the fourth was waiting for the medical round before stopping sedation' (Field notes: ICU 10.08.04).

'There are three patients weaning today but in each case the bedside nurse delays weaning in favour of performing other tasks' (Field notes ICU: 5.04.04).

There were occasions when washing did not delay weaning.

'Weaning has been commenced early this morning at 8.30. This is in conjunction with having a wash and sat out of bed' (Field notes ICU: 18.03.04).

However washing a patient who is critically ill causes an increase in oxygen demand by up to 30%. This is of particular relevance to patients who are weaning.

‘A patient has been successfully weaned and is ready for extubation (removal of breathing tube), however the nurse at the bedside wishes to delay this, as this means stopping the sedation completely, until after she has finished the wash’ (Field notes ICU:18.03.04).

The rationale for this is to get through all the nursing work whilst the patient is still sedated. It would be better for the patient to be extubated and left to rest. There were a number of examples when washing was not always in the best interests of the patient.

‘Weaning had been progressing well, however today the patient had developed left ventricular failure and lying her down caused her to deteriorate. Her wash was delayed until 11 am when she was laid down to turn and change the sheets, this caused her to deteriorate further’ (Field notes ICU: 28.04.04).

Even in HDU where the nurses had two patients to care for the nurse would wash the less sick patient first, in order to get it over with so that she could then move on to the other patient who was going to take more time even though this meant the sicker patient would not be assessed until after the first had been washed.

'One nurse has two patients to look after in HDU, one of them is weaning. She attends to this patient first in terms of bed checks, drugs before going on to give the patient a wash. These procedures are carried out at speed, enlisting the help of the auxiliary who begins the wash whilst the nurse goes to the other patient and checks the drugs. When the auxiliary reaches a stage when she requires help she calls back the nurse and the two of them complete the wash. After this the nurse goes back to the second patient in order to complete the drugs and carry on with her tasks. This patient is unstable and his blood pressure has deteriorated, she spends a considerable amount of time at this bedside. There is no weaning plan for the first patient and no attempt to wean has been made' (Field notes: HDU 30.06.04).

When nurses were faced with patients whose condition caused uncertainty, or when the amount of time they would need to spend with the patient was great, they were always attended to last. Consequently patients who were weaning who were for the most part stable and relatively well would have their wash first, but weaning would not commence until after the second patient had been attended to. Washing patients at this time inevitably clashed with the medical ward round. There were many occasions when the intensivist and the nurse consultant were prevented from seeing the patient because the curtains were closed and the patient was in the middle of the wash.

'The ward round commences at 9am. The doctors have had a formal handover (from night to day) in the coffee room. They begin the round with the intention of examining every patient. Today however every patient is having a wash at the same time' (Field notes ICU 28.04.06).

'I have tried to see the patients today but the curtains are drawn. Most are having a bed bath, some are having physiotherapy, the result is I am prevented from going behind the curtains and I cannot ask the staff about the patients and their weaning. I wait a while but decide to leave the weaning plans for the bed side nurse to do' (Field notes ICU 12.06.04).

Nurses were keen to 'get the wash out of the way' as quickly as possible and definitely before lunchtime before the relatives arrive.

'I think you know you should get the wash done and (the patient) looking neat and tidy. It may not seem a necessity, but when the relatives come in they do not want to see the patient looking sluggish in the bed, they are likely to come in at lunchtime' (Interview: P7).

This excerpt clearly states that nurses understand that washing a patient is not a medical priority but from a nursing perspective was a necessity. For nurses it was important that the relatives should be able to see that their loved one had been cared for. When asked if the nurses saw washing the patient as a sign of being cared for they answered yes, but understood that

weaning should be (although wasn't) a priority. This care though did not have to be performed by the registered nurse and frequently in HDU would be delegated to the nursing auxiliary.

'There is a certain amount of kudos if you like if you get all (2) of your washes done before 9am and you are some sort of super nurse, and your patient is sat there in a perfect bed and looking beautiful. It is also other peoples' attitudes, even coordinating the unit I see staff are behind and a patient has not been washed yet I will say shall I help. They are not running behind, they are just planning their day in a different way, so yes it is a change in attitude really' (Interview: P12).

This excerpt clearly demonstrates that nurses were judged by their efficiency and getting the wash done and being up-to-date gave the appearance that they were efficient. Nurses who were taking too long were thought not to be able to manage their time and were offered assistance, usually from the shift coordinator. Nurses risked criticism from their colleagues if they had not completed their washes. In HDU this was particularly evident in that a nurse would have two patients to care for and there was pressure to complete both washes in the morning. Pressure increased if the patient was likely to be transferred to the ward. It was essential that the patient be washed before discharge as a matter of pride. If a patient were sent to the ward without a wash, nurses on HDU would face criticism from the ward staff. This was a cultural and historical act, steeped in tradition and entrenched in every nurse. Attempts to change this practice by the nurse consultant were met with

resistance (Field notes Directorate Time Out 30.04.04, Clinical Leaders Time Out 17.06.04). There were other reasons for performing the ritual of the wash. Nurses wanted to give the appearance that they had cared for the patient. This was clearly visible by looking at the patient. Weaning on the other hand remained invisible to staff, patients and their relatives.

‘There is a risk of judgement from your peers, there is always the joke about an untidy bed area and someone’s bed is not made perfectly and the sheets are crumpled’ (Interview: P12).

Doing the wash made visible what nurses did. It was evident to all when patients were being washed because the curtains would be drawn, or afterwards when the physical appearance of the patient would indicate they had been washed. When asked about this view at interview one nurse commented:

‘Yes I think it is peoples’ perceptions of what their role is and this is a more visible element of what nursing is, weaning like psychosocial support is an invisible role and a good job would be to get them (the patient) off the ventilator. Even if you reduce the pressure support by 10 and that is a lot, it is still not visible unless you go and look at the dial of the ventilator, whereas the patient is visible and the family say oh don’t you look lovely today, if they have had their hair washed, but reducing their oxygen by 5 is less visible’ (Interview: P12).

It has been argued that the time of the wash allows the nurse to do other things simultaneously such as observe the patient's skin and that this routine part of care can be therapeutic (Wolf 1993). Observation revealed that nurses saw washing the patient as another task in an order of tasks and therefore could be delegated to an un-registered nurse. In this way according to Geoffrey, the ritual of the wash is seen as uncaring yet maintaining an appearance of care (Geoffrey 1998). The wash also becomes functional in that the nurse is able to play a part in the routine of the ward without becoming too involved with the patient. Geoffrey (1998) points out that when this occurs these rituals serve to control both the nurse and the patient. The patient therefore becomes an object within the structured routine of care and any control he / she may have is limited by the narrow framework of their sick role. Routines also serve to give structure to the patients' day and long stay patients therefore may come to expect their wash in the morning. 'Doing the wash' therefore can be considered a ritual. It formed part of the routine care of patients.

The treatment of nursing rituals in the literature is at variance. On the one hand nursing rituals are seen as no more than 'carrying out a task without thinking it through in a problem-solving and logical way' (Walsh & Ford 1989 ix). Whereas Wolf (1988) uses the definition formulated by DeCraemer, Vansinia and Fox 'a patterned symbolic action that refers to the goals and values of a social group' (Wolf 1988: ix). The definition of ritual is important in order to understand the meaning of the ritual and place it in context. Chapman (1983) commented that it was necessary to understand both the social and psychological meanings of ritual. The literature that defines ritual as no more than a routine task tends to treat it

as harmful and as serving no purpose (Walsh & Ford 1989, Ford & Walsh 1994), whereas authors such as Biley & Wright (1997) state this is a limited interpretation.

There is some confusion between when a routine part of care becomes a ritual. Washing a patient is undoubtedly necessary but it is the manner in which this is done, the temporal spacing of the activity, the priority nurses afford this task and how it is performed that is of particular relevance. Menzies (1970) saw rituals such as washing the patient as dehumanising the patient to a set of routines. Jones (1995) describes the process of washing patients as grounded in Victorian values and exemplified by Nightingale who espoused the importance of washing and as such has now become part of the nursing culture. Chapman (1983) states that the routine becomes a ritual when it is no longer required or when it is used to avoid facing the demands of new goals. It was clear that patient care in ICU and HDU was task orientated and not patient centred, done as a matter of routine and more for the needs of nurses to get the work done than for the benefit of patients.

Even though nurses knew that weaning should be a priority in practice they continued to adhere to the ritualistic behaviours clearly evident on the unit. Nurses felt doing the wash was their domain, something they could plan, that they could control, moreover it made visible what they did.

'I think (the wash) is traditionally the nurses' domain, so if the doctor or physiotherapist comes behind the curtain they

are coming in to their domain, whereas if a nurse asserts herself over a treatment plan, that is stepping into the doctors domain' (Interview: P12).

Nurses concentrated their efforts on personal care because they lacked confidence in higher order tasks. Being busy with a patient absented the nurse from decision-making and contributing to the medical ward round. Menzies (1970) found that decision-making was a cause of anxiety and rituals reduced the need to make decisions, echoed by Melia (1987) who states

'Routinized, carefully prescribed care can obviate the need to exercise any professional judgement on the part of the nurse. If the nursing care is organised along individualised care lines, then questions of professional judgement and discretion on the part of the nurse is more likely to arise' (Melia 1987: 49).

This is important in critical care as so many nurses now are considered junior and inexperienced. They may feel unable to make complex decisions about weaning and instead prefer to adhere to task orientated care that encompasses rituals.

'[.....] quite often when the doctors come the nurse will stand there and say 'well what do you want me to do' and write down a list to do. It is not a participative role, going back to being a dog's body. It comes down to a lack of

confidence I suppose that is why we focus on washes and personal care of the patient instead of weaning because with washing you can be more confident in that task than weaning. I feel more confident in those tasks rather than decision making capacity' (Interview: P12).

On the other hand this was also observed in more senior nurses who felt the need to get the work done. This may be more to do with anticipating the unexpected and being prepared. The ritual has served the purpose of creating an order and is a process that unites the social group of nurses. To step outside this order would mean nurses would face criticism or alienate themselves from their peers. The roots of the wash originated in the 1800s where it was seen as an important part of the nurse's work. Moreover nurses were seen as experts on hygiene and incorporated hygiene into their professional identity. Wolf (1993) examined the bath as a nursing ritual using examples from the nursing literature from 1880 to 1993 she concluded that the literature portrays the bath as representing

'..... part of the essential character of nursing and is rooted in the beliefs, art and science of the profession. It is a channel for many other nursing activities and responses, and as such occupies a necessary part of nursing's repertoire and identity' (Wolf 1993: 135).

In this study I would draw the readers attention to the role of the un-registered nurse and demonstrate that this task is often delegated to this group of professionals. Furthermore I argue that not performing the wash

does not mean the nurse cannot provide holistic care. The wash is not necessarily a therapeutic act rather this is dependent upon the conditions under which it is performed and the attributes of the nurse performing it. Nurses saw bathing as doing good and never harm. However to bathe a seriously ill patient in ICU at a time when they are unstable can precipitate harmful effects. In these cases a bed bath would be inappropriate. As the routine of washing the patient often delayed weaning this too can be interpreted as harmful. Applied in this way the wash was not a therapeutic procedure but more the next task to complete in order to 'get the work done'. This is in concordance with the seminal work of Melia (1987). In her work on the socialization of (student) nurses she found that students were preoccupied with getting by on a day-to-day basis, with little time to think of how they might learn to do the work of qualified nurses (Melia 1987). Melia's work revealed several themes. They were 'nursing at speed', 'unwritten rules' and 'getting the work done'. Nursing at speed was considered a good thing, nurses could not be seen to be taking their time or not pulling their weight. Unwritten rules included the need to 'look busy' even when there was no work to do. Washing the patient in the morning appeared an unwritten rule in critical care. Nurses were reluctant to change this practice. Some students in Melia's work favoured routinized work because it presented a foolproof system of getting through the work without items of care being missed out. Routine care was seen as tasks being performed by nurses in a timetabled order throughout the day. In this sense routine meant a generalised approach to care rather than individualised patient care and was seen as 'nursing work' to be achieved at a certain time. Melia found that getting through the work was linked to the ward routine. There were

routines to every shift with a number of allocated tasks to be completed before the next shift arrived. Much of the frenetic activity of the shift was linked to the general uncertainty of ward life. Routines were adhered to 'in case any thing happened'. There was a need to adhere to routine in order to keep ahead (Melia 1987). Interestingly, this was related to the shift patterns of the time. Shift patterns are now lengthened with the normal being 12-hour shifts, usually from 7 am to 7 pm. However these shift patterns may have had the effect of altering the routine but have not had the effect of altering the rituals. Although nurses had 12 hours to plan care and perform the wash they still chose to do so early in the morning. There was an unwritten rule that these must be completed before 12 noon. In deploying unqualified staff it has become more expedient and safer to encourage task-orientated and routinized care in order to get the work done.

Doing the wash was considered to be in this ethnography a nursing ritual and served the needs of the nurse. This ritual had the effect of uniting nurses, giving them and their patients a structure to the shift. Nurses believed washing the patient, whether they did it or delegated to the nursing auxiliary (un-registered nurse), made visible what they did. Patients who were washed looked cared for. Washing as a routine part of care also served to allow nurses to be exempt from the medical ward round and from making decisions about care and in particular weaning. However doing the wash was not observed to be a therapeutic procedure, and although the patient looked cared for washing was not a caring act and this ritual maintained this illusion. This is not to say that all nurses performed a wash which was non-therapeutic or uncaring, when weaning

was transformed patients received individualised, patient-centred care rather than, the task-focused care described here, and under these conditions the bath could be seen as therapeutic and caring (see 4.4 technology transformed).

Conclusion

Nurses rendered themselves invisible in three ways: by physically absenting themselves from the ward round, by not participating in the ward round and through the allocation of junior nurses to patients who were weaning. In this ethnography the ward round was seen as the 'medical' round and was viewed as separate from nursing (Busby & Gilchrist 1992). The nurses' role on the ward round was as Porter described as listening on the side-lines (Porter 1991) or to act as information brokers as described by Manias & Street (2001), receiving and passing on to the next shift medical information which had little to do with nursing care (Erkman & Segesten 1995). Nurses busied themselves performing tasks which were part of an elaborate matrix of routinized care which meant weaning had seldom begun at the time of the ward round, doctors therefore saw little evidence of nurse-led weaning.

Nurses were rendered invisible by the medical staff. This mainly occurred in two ways; the control of the nursing contribution on the ward round and the overruling of weaning plans made by nurses. Nurses often failed to actively participate on the ward round. Nurses were often marginalized or silenced, with doctors controlling their contribution (Manias and Street 2001). Nurses were also rendered invisible when doctors overruled their

weaning plans. The ward round is a valuable activity whereby the whole multi-disciplinary team engage in conversation about the patient. Nurses have the potential, therefore, to contribute to patient care through the ward round by passing on information about the patient. Studies have demonstrated that when this occurs patient care is enhanced (Felten et al 1997, Wright et al 1996, Thomas 1989). This study demonstrated that although there is evidence of a multi-disciplinary team in critical care there was little evidence of multi-disciplinary team working and many of the professionals worked independently and in isolation (Keddy et al 1986).

Nurses attempted to make visible their contribution to care through the wash. 'The wash' or bed bath was seen as an important and essential part of nursing care. Doing the wash, a routine part of care, became ritualised because of how it was done, the spatial ordering and priority it was afforded. It became more than just a physical activity; it gave the impression to others, in particular the relatives, that the patient had been cared for, whilst the act itself was uncaring (Geoffrey 1998). Doing the wash became an unwritten rule (Melia 1987). It also provided structure to the shift, a framework for nurses in which they could demonstrate to others their work. In this sense it made visible what they did. However in doing this it masked their contribution to weaning. It also absented them from decision-making (Menzies 1970, Melia 1987).

Analysis of the nursing contribution to weaning has revealed that this was often marginalised and that nurses too played a contributory part. This has given the view that the nursing contribution to the development of

critical care is invisible. Several explanations have been explored. I go on to explore this further in the next theme which examines the nursing relation with weaning as a technology.

4.4 The Nursing – Technology Relation

Introduction

This theme explores how critical care nurses used and perceived one technology in practice, weaning from ventilation. This is divided into three sub-themes; nurses' definition of technology and in particular weaning, weaning as a technology transferred and weaning a technology transformed. Analysis of the data revealed that the definition of technology was dependent on the user context. I draw on the literature concerned with 'technological competence' (Wilkstrom & Larson 2004, Alasad 2002, Barnard 2000, Little 2000, Barnard & Gerber 1999, Locsin 1998, McConnell 1998, Bevan 1998, Cooper 1993, Walters 1995, McConnell 1990, Ray 1987) and challenge this in the context of one critical care unit. I examine what nurses meant by weaning and how their definition shaped their practice.

In exploring the nursing – technology relation I take the concept of technology transferred as described in the literature and develop this further. I show that weaning was in the process of being transferred both from doctors to nurses and from one geographical location to another (from ICU to HDU). I was able to demonstrate that weaning could be transformed into a 'nursing technology' and I describe the conditions under which this occurred.

4.4:1 Definition of Technology and Weaning

Data revealed that the way nurses viewed the ventilator was determined by a number of factors such as how the equipment was used, who had jurisdiction over it, the level of critical illness of the patient and the geographical place in which it was used. Nurses in this study liked caring for patients who were critically ill.

‘Staff who come to critical care like it because they want to help the sick patient. Weaners are not very sick. They do not have many pumps or infusions’ (Interview: P11).

Walters (1995) noted the degree of illness was measured by the amount of equipment. Historical associations with saving life have meant the ventilator is often referred to as ‘life support’ and is part of the socially constructed image of intensive care. The ventilator has become a symbol of critical illness. Nurses in this ethnography saw patients who were weaning as ‘not really critically ill’. This was made evident in a number of ways such as the allocation of junior nurses to the weaning patient, the lack of documentation of observations, and the removal of the ventilator before weaning had been completed. This may have been reinforced by the transfer of a weaning patient from ICU (level 3 care) to HDU (level 2 care). This had been implemented in this critical care unit as a means of utilising the limited number of level 3 beds more appropriately and has consequences for the transfer of a technology between geographical places.

There was a difference between how nurses saw the traditional ventilator used in ICU and the non-invasive ventilator used in HDU. Sandelowski (2000) describes technology as

‘context dependent, objects become technological, components of technologies, not only by virtue of how they are defined and classified but also by virtue of how they are used (Sandelowski 2000: 32).

Non-invasive BiPAP ventilation had been introduced in HDU in 2001. There was an absence of intensivists on the unit and it was therefore left to the nursing staff to implement and develop it, as one nurse describes:

‘When it was first introduced we had minimal support, it was something the nurses did by themselves.... Now we have medical support the nurses take the hump a bit when the medical staff start interfering, it is something we have developed ourselves, something we are good at and something we are pro-active with...This is the nurses’ domain and doctors have minimal input’ (Interview: P12).

One nurse described the introduction of non-invasive ventilation (BiPAP) as ‘trial and error’ as the following excerpt identifies.

‘At the beginning it was very much trial and error, good or bad, we very quickly became good at patients who were weaning from BiPAP and we relied on our experience, it was

like progressive learning. It was a good opportunity for nurses to develop that skill over time and we have got more knowledge and practical skill about BiPAP in general and weaning in particular' (Interview: P12).

The nursing role in NIV incorporated setting (prescribed) pressures on the ventilator and helping achieve patient compliance. Some patients when they first arrive on HDU who need NIV are extremely breathless. Once the doctor has prescribed NIV it is the nurse who sets up the ventilator, fits the mask to the patient and begins the process of patient acclimatisation, that is getting the patient to accept the mask. It takes some time and at first the patient may not tolerate the mask. Nurses will try different masks (facial or nasal) for comfort and adjust the pressures on the ventilator until eventually the patient either accepts NIV or is non-compliant. Once accepted, the nurse titrates the pressures according to the prescription³⁴. Nurses do not prescribe NIV therapy this is always done by the doctor. It is therefore interesting that this nurse saw NIV under the control of the nurse this was not evidenced during weaning from NIV. This account in HDU is different to the role nurses had in ICU where the doctors checked the ventilators, prescribed the ventilator settings and were there to commence ventilation. Titration of ventilator settings by nurses was not formalised (a document was being written at the time of the study). Nurses usually altered the level of oxygen depending on the

³⁴ British Thoracic guidelines states NIV should be used in patients who are acidotic (pH <7.2) and hypercarbic (high carbon dioxide levels). Pressures are usually set low at first to aid patient compliance then increased to bring down the carbon dioxide levels which returns the blood pH to normal (7.35-7.45).

blood gases but were not sanctioned to alter any other settings (except during weaning).

Nurses in this study saw the introduction of a new piece of equipment as a need for training and education and associated it with the development of new skills and knowledge. However when a new piece of equipment, which was familiar to staff in ICU, such as another ventilator (this was a new model and looked different, it had additional modes not available in the older models), was introduced staff were happy to use it without additional training.

'An incident occurred in ICU to day. A new ventilator had been purchased and left in the store room, with a notice pinned to it stating it must not be used until staff had been instructed how to use it. However the ventilator was in use over a bank holiday weekend. This is a time when the senior staff are absent and the intensivists run an on call service. On the shift, none of the nurses had received instruction on how to use the ventilator, including the bedside nurse who stated she did not know how to use it. She was therefore unable to check the ventilator or set the alarms'. (Field notes ICU 13.04.04).

'The introduction of a new ventilator on the unit was usually accompanied by teaching. However on this occasion the ventilator was introduced by the nursing staff without any education. Nurses at the bedside were unable to navigate

around the screens or set alarms. I³⁵ felt this was a governance issue and felt that the nursing staff were inadequately prepared to use it. Each piece of equipment has a set of competencies and these are now mandatory. However the ventilator remained in use. I spoke to the nurse who introduced it into the unit and he made a joke that I was unable to use it. The ventilator according to him was easy to use and very similar to all the others. He then began to instruct me how to use the ventilator. Whilst this is alright for him, a senior nurse, more junior nurses did not know how to use it and he had a professional obligation to ensure the staff were competent, which clearly they were not.' (Field notes: analysis).

On this occasion it was a nurse who brought the ventilator into use and nurses continued to use it without question. They appeared to be unconcerned with the need to satisfy governance procedures or demonstrate their competence. For them this ventilator, although a different model, was just another piece of equipment. Nurses felt they did not need any additional knowledge in order to operate it, although on questioning, nurses openly stated they were unfamiliar with it, so much so, that the bedside nurse had been unable to check the settings. She could however read the monitoring screen and could transfer these observations on to the 24-hour chart.

³⁵ I use the first person here to refer to my role as nurse consultant. I act as an interpreter here giving my perspective as a senior nurse. In doing this I hope to explain the severity of the situation which may not have been emphasised if I described this event. I have deliberately included my views rather than bracket them out. In this way the reader who is unfamiliar with critical care can understand the nuances of the situation and place it in context.

Barnard and Gerber (1999) in a phenomenographic study of 20 Australian nurses in surgical wards identified a number of categories related to the different ways surgical nurses used and understood technology. These nurses also experienced technology as equipment and machinery. Nurses viewed new technology as increasing their knowledge and requiring changes to their skills. The authors found the presence of technology altered and de-emphasised certain skills and forced the critical re-appraisal of the skills required.

It was considered good practice (as defined by local guidelines which were formalised in 2005: 'Weaning from Ventilation ('Trust' Guidelines 2005) and 'Altering Ventilator Settings by Nursing Staff'³⁶ ('Trust' Working in New Ways document 2005) that on each shift the nurse would check that the ventilation that had been prescribed by the doctor was actually being delivered to the patient. This should be recorded on the 24-hour observation chart and the nurse should initial this indicating it has been checked. Any changes would be initialled either by the nurse or the doctor. All alarms should be checked and reset as appropriate. However nurses rarely recorded that ventilators had been checked. It was also noticed in practice that ventilator alarms were either not attended to immediately or were disabled without checking out why they were alarming. When asked why nurses did not pay attention to these aspects of practice one nurse replied

³⁶ An audit of practice in 9 critical care units in one network revealed only two Trusts had any written policies in place (Mid Trent Critical Care Network 2005: Audit of ventilator observations)

'I think it is either ignorance, they are not aware of it, or they see other people are doing it, role models, when I think, they do it (turn off the ventilator alarms) without thinking 'why is the ventilator alarming ?' (Interview: P8).

'I notice as I pass the bed area the ventilator alarming. I stop to observe. The junior nurse ignores it at first, finishing off writing on the chart. He then goes to the ventilator and disables the alarm, he returns to the 24-hour chart. The alarm continues. I can see the alarm is indicating low tidal volumes (size of breath) and I intervene. I ask him what the patient's normal volumes are. I ascertain that they are now half of what they were and I begin to make the patient safe and check out why the volumes are so low. The staff nurse appears unconcerned at this point. I call an intensivist and after 20 minutes we find the cause of the problem. A bronchoscopy reveals the patient has a flap of skin at the end of his airway (from surgery to his trachea) which is partially occluding his airway. The nurse looks troubled, we reflect on this incident and I point out to him the importance of attending to the alarms immediately' (Field notes ICU: 12.05.04).

Nurses saw the ventilator in ICU as a medical technology and therefore the responsibility of the doctor and as such limited their role to the monitoring and recording of observations³⁷. They also perceived doctors

³⁷ A critical care nurse, Amanda Jenkinson, was sentenced to 5 years imprisonment for manslaughter in 1996 after being found guilty of tampering with the ventilator. The

to have had a 'special' training which enabled them to use the technology. As a consequence nurses were happy to relinquish responsibility and control. It is evident from this study that interpreting the ventilator in this way limited the role that nurses played in using and taking control of technology. Within this context nurses will continue to see the ventilator as no more than work (Melia 1987). However in HDU where NIV was used nurses were keen to demonstrate their knowledge and skill but this applied to acute illness and weaning from NIV was new to them. There was a lack of documented weaning plans in HDU, when asked why this may be so, one nurse replied:

'It may be a lack of confidence or a lack of realisation. I have said to a junior nurse 'let's get a weaning plan' and they have looked a bit shocked and said 'can we do that? Maybe if I had said it is OK to write one and it is Ok for you to use your judgement and ask them if they would like to write one, then maybe they would not feel it is some one else's responsibility' (Interview: P12).

For nurses weaning was about trial and error. Confidence and experience came from learning 'on the job'. Training was informal and ad hoc. This was apparent when junior nurses were allocated to look after the patients who were weaning. There was little supervision from more experienced nurses. On one occasion a junior member of staff was receiving training

appeal court transcripts (1997) revealed that it was difficult to distinguish when nurses checked the ventilator and if this was witnessed. Despite this case no reports were written advising Critical Care units on governance issues. A subsequent appeal has resulted in the case being over turned on 24th November, 2005.

from the practice development nurse. A discussion with him about what he hoped to achieve revealed that he wanted to know about the ventilator. This was interpreted as learning how to write down the observations and change ventilator settings and had little to do with weaning, yet he frequently looked after patients who were weaning.

‘Ventilation, again it is the very simple things like CPAP to ASB, it is just recording it correctly, this is very important [.....] so it is the ventilation at the moment and dealing with her (the patient), she is not septic at the moment, she does not have the problems she could have, it is asking (about) the potential problems she could have and how would I deal with that as a nurse in intensive care, what is my role?’ (Interview: P6).

Whilst nurses saw their role as monitoring and recording of observations there was no need for them to develop further skills. In a phenomenological study of 10 critical care nurses, Little (2000) found that nurses emphasized the necessity of acquiring technological competence. Their inability to work in harmony with everyday technology prevented efficient and meaningful practice and resulted in anxiety for these nurses. Technological mastery was identified as an essential component in the development of competence in critical care nursing practice. In contrast to this view Bevan (1998), in an examination of dialysis nursing, stated that the presence of technology obliges the nurse to become competent. The mastery of technology becomes a driving force in order to control it and have control over their work. As

such the novice nurse does not master technology but rather learns superficial survival skills that enslaves the nurse to the technology (Bevan 1998). In this ethnography the allocation of junior nurses to patients who were weaning meant that as novices these nurses did not gain mastery of the equipment but only learned 'survival skills'. Gaining mastery or being technically competent is a recurrent theme in the nursing literature (Wilkstrom & Larson 2004, Alasad 2002, Barnard 2000, Little 2000, Barnard & Gerber 1999, Locsin 1998, McConnell 1998, Cooper 1993, Walters 1995, McConnell 1990, Ray 1987). It is often associated with caring, interpreted as bridging the gap between technology and nursing care (Little 2000, Cooper 1993, McConnell 1998, 1990, Ray 1987) in contrast to the literature that puts nursing in opposition to technology (Gadow 1984).

Analysis of data in this study (sections 4.1, 4.2, 4.3) has demonstrated that nurses saw weaning as a task, devolved to them from the medical staff with the potential to disrupt their work. Nurses devised strategies to manage this. Weaning was never a high priority, as demonstrated in the way it was left until all other nursing care and medical procedures had been completed.

'The parent team had just visited a patient who was weaning and ordered a number of investigations. They however left without consulting with the intensivists who were on the unit or without speaking to the bedside nurse. As a result the bedside nurse was unsure of the order and timing of the investigations. She became concerned with getting the wash

done before the investigations. At this point she overlooked the patient's needs for weaning. It was clear the patient was anxious and struggling on the ventilator. Although the nurse was aware of the patient's condition she did nothing about it. She was concerned with getting on with her work' (field notes ICU 27.04.04).

The removal of the ventilator and placing of patients onto an external circuit was another strategy.

'I³⁸ have noted several incidences where patients have been placed on to an external CPAP circuit when there was no need to do so. The ventilators are really quite sophisticated and allow weaning to the point of extubation (removal of artificial airway). These ventilators have inbuilt strategies to aid weaning such as assisted spontaneous breathing, a type of support, tube compliance, an aid to overcome the resistance of gas from an artificial airway. It also allows the seamless change from one mode of ventilation to another, which frequently happens at night. This expensive machine remains idle at the back of the bed' (Field notes: analysis).

This meant the nurses spent less time tending the equipment. There were few checks to be done, no alarms and a reduced amount of observations

³⁸ I am writing as a nurse consultant. It is important to note that this is a contentious area where there is some disagreement. As an expert I consider the removal of a ventilator in this scenario as unnecessary. The advantage of writing in the genre of confessionalist tales means I do not have to bracket out my views but rather they add to the description of the scene.

that could be obtained. This in turn meant nurses reduced the frequency of observations the patient required.

‘A patient had been on a CPAP circuit for several days firstly on ICU and then on HDU. He had deteriorated overnight and his oxygen requirements had risen significantly (to 80%), yet his cardiovascular observations were still only recorded twice a day and respiratory rate every 4 hours’ (Field notes HDU 30.06.04).

‘I have noticed this happens frequently. The patient was on 40% oxygen and deteriorated overnight to the point where he is requiring 80% oxygen. This is a significant increase, yet nurses have not increased his observations. If this patient was on the ward receiving 80% oxygen he would be on hourly observations whilst waiting for an HDU bed’ (Field notes: analysis).

These were labour saving strategies and made the organisation of work less complex and more manageable. It also gave nurses more control over their work as reported by Alasad (2002). According to Barnard (2000) technology demands levels of attention, time and commitment and can be seen as arduous. However the tendency in the literature suggests that in tending the machine there is less time to tend to the patient (Barnard 2000, Loscin 1998, Wichowski 1994). In this study there was no evidence that weaning in ICU prevented the nurse from being with the patient or that it took them away from performing care. However, in HDU where

the nurse had two patients to look after there was more pressure to get through the work (Melia 1987). When the ventilator alarmed this meant the nurse would need to respond and this had the potential of disrupting their work.

Walters (1995) in a partial replication of Ray's study (1987) conducted a small-scale study of eight critical care nurses using interviews. He identified balancing as a major theme. Balancing related to the role of the nurse in providing holistic patient care in the presence of technology. One way of achieving this was to use technology to care. He gives the example of leaving an arterial line in situ which negated the need to inflict the painful procedure of drawing blood from the patient. Nurses in this ethnography did not use technology to care for patients but used it to help them get through the work (removing the ventilator reduced the amount of work). Barnard and Gerber (1999) refer to this as gaining control over clinical practice whereas Alasad (2002) saw it as making ICU nurses feel safe and in control as well as making it easier for them to look after patients. McConnell (1990) identified that the presence of technology resulted in competing demands for the nurse. On the one hand it took up the nurse's time, tending the machine, and on the other it made caring for patients easier. In this ethnography nurses did not see the ventilator as a technology that made their work easier nor did they see it as making clinical practice safer, rather the technology had the potential to disrupt their work. Nurses constantly removed the ventilator and placed the patient on an external circuit (also called a T-piece) when there

was no necessity to do so³⁹. This had two effects: firstly, the patient was deemed less sick by the removal of the ventilator and secondly, for the nurse this meant less equipment to attend to. In fact, leaving the patient on the ventilator would be safer and provide more information about the patient's progress.

Wilkstrom & Larsson (2004) examined Swedish intensive care nurses' relation with technology after the introduction of a new dialysis machine. Nurses were more concerned with knowing how to use the equipment than knowing the patient. In their study the technology was thought to have replaced the function of the nurse in tending to the patient and replaced the nurses' ability to interpret observations. Nurses turned to the dialysis machine for observations and began to question their ability to perform observations using their own senses. It could be argued that the technology in this instance did not in fact replace the role of the nurse but instead replaced the patient's normal kidney function. What resulted was a change in the nurse – technology relation which brought about an alteration in the nurse - patient relationship. As a result of new technology the division of labour became less flexible and nurses began tending the machine instead of the patient. This resulted in a loss of continuity of care and a disruption to the nurses' work pattern (Wilkstrom & Larsson 2004).

³⁹ Some weaning protocols suggest altering the patient's ventilation for short periods of time with intervals of rest. In the past it was customary to remove the patient from the ventilator and place them on an external circuit, placing them back on the ventilator for rest. There is no need to do this on the newer models of ventilator.

Barnard argues that technology can alter nurses' volition (Barnard 2000). He points out that many nurses mistakenly believe technology to have a neutral influence on nursing practice, that it is nothing more than a tool to be used by nurses and therefore nurses can simply incorporate it into their practice (Barnard 1997:130).

Whilst weaning is seen as a task transferred to nursing the view that nurses become no more than the 'soft technology that ensures the safe, effective and efficient and even compliant use of the hardware of health care' (Sandelowski 1998: 2) prevails. Whilst nurses are linked in this way to technology they become inextricably bound to it. According to Sandelowski the line between technology and nursing becomes harder to discern. Sandelowski states that nurses need to 'actively reconfigure (imaging) technologies for nursing purposes' (Sandelowski 1998: 8). Weaning was shaped by nursing practice to the extent that it was seen as a task and part of a schedule of work. Nurses tried to control their work and used strategies to minimise disruption. Weaning was done after all other tasks had been performed. As a consequence weaning would be delayed. Often no weaning plans were written and patients were removed from the ventilator during weaning when there was no need to do so. Nursing practice also shaped technology. Patients who were weaning were not seen as critically ill and the ventilator perceived as equipment. The ventilator held a different meaning when applied to weaning

Interviews and observation in practice suggest nurses saw technology as machinery and equipment; in particular the ventilator was seen as a medical technology and this held a different meaning when weaning

began. This nurse saw the ventilator as just another piece of 'medical' equipment.

The medical literature describes weaning as the process of assisting the patient to breathe unaided (Knebel 1991) or the transition from ventilatory support to spontaneous breathing (Mancebo 1996) (please refer to section 1:3 for literature on weaning). A paper by the Collective Task Force of the American College of Chest Physicians, the American Association for Respiratory Care and the American College of Critical Care Medicine (2002) reviewed the guidelines for weaning and stated a preference for the term 'discontinuation' from the ventilator rather than weaning. The following excerpt from field notes is typical and demonstrates nurses' definition of weaning parallels that described in the medical literature.

'A long-term patient was being weaned on a conventional ventilator in ICU. She was transferred to HDU to be ventilated on their ventilator (used predominately for non-invasive ventilation). Over night it appeared she required more support than this ventilator could give, she was therefore transferred back to ICU and back onto the conventional ventilator. The nurse-in-charge had interpreted this as a failed weaning and therefore there was to be no weaning today' (Field notes ICU 11.05.04).

Weaning for nurses finished when the patient was removed from the ventilator as evidenced by the transfer from ventilator to external circuits.

Nurses saw weaning as a progressive and gradual reduction of ventilator support to the point where the patient became independent of the ventilator. This was unidirectional, always towards the goal of getting better and appeared not to take into account the different stages of weaning, or the fact that patients may fluctuate.

There was a lack of consensus about when weaning should begin and when a patient was actively weaning. This uncertainty is reflected in the literature (Cook et al 2000). If a patient had taken a step backwards on one day no weaning plan would be completed because the nurse would interpret this as weaning had stopped. Observation in practice revealed that on many occasions the shift coordinator viewed several patients either not ready for weaning or not actively weaning on ICU. However when the nurse consultant came to review the patients her opinion differed. The view of one senior nurse at interview was that weaning was a continuous process and should be considered as soon as the patient was ventilated.

'My concept is that on ICU there is never a day when there is no one weaning, even if the patient is standing still (making no progress), you cannot reduce their pressures or change from BIPAP to CPAP. They are still on a ventilator and therefore they are still weaning. Today we may not be doing anything (progressing weaning). There is a pause and they are still weaning and should go through the same assessment, can we do anything? If not, that is fine, they may stay on that regime today but we need to assess tomorrow, it is just the understanding and perception that certain individual has, but

that can have quite an impact, especially if they are in charge and how is this portrayed to the rest of the team? Because if the shift coordinator says there is no one weaning today, this will have an effect on the bedside nurse. If they are, then they may not even have had an assessment and think is there anything we should do? They will say, 'oh no, we are not weaning today'. (Interview: P10).

This nurse recognised the effect a senior member of staff would have on the definition of weaning and how this may be communicated to junior staff.

The next excerpt from field notes was an unusual event but highlighted the different definitions of weaning and as a result challenged the traditional view of weaning:

'A patient on HDU was told by the respiratory physician that he felt he would require home ventilation. As such he planned to reduce the level of support on the ventilator in HDU and swap to a ventilator that could be used at home. This was the first time this had occurred in HDU. Staff were unsure and at first resisted the change in ventilator. After a period of time it was planned that the patient would be prepared for discharge home from HDU (this is extremely rare, usually patients go to the ward first). Staff were divided, some wished to continue to wean with the hope that the patient would not require home ventilation whilst others wanted to transfer the patient to the

ward as weaning had failed and there was nothing more to be done' (Field notes HDU 29.06.04).

This excerpt demonstrates the differences in perceptions of weaning. Never before had a patient gone home on a ventilator from HDU. It was however not unusual for the respiratory physician to discharge patients home on ventilation from the ward. The viewpoint of the respiratory team had challenged the perception of weaning in the context of critical care.

It was clear that there were different interpretations of weaning among the nursing staff. This was compounded by the fact that there were also differences between different groups of staff, in particular the respiratory physicians. They were thought to have a different view of weaning from the intensivists and the nursing staff.

'I think that is true (respiratory physicians have a different view of weaning) and that has been the case on a few patients we have had. Most of the patients get on to low flow (oxygen) or have their tracheostomy removed before they leave critical care. So we feel a bit funny sending home any one with a tracheostomy or oxygen support. With any patient it is quite interesting because they come at it from a different angle and that is why you need to document because you get differences between the intensivists. They (the intensivists) see chronic chests on the ward and they see things from that angle, whereas we like to wean and make them better and send them off again. They (the patient) won't have a tracheostomy

in or need ventilation' (Interview: P 9).

Analysis of the field notes revealed that nurses saw weaning as a therapeutic activity and therefore not appropriate for those patients who were not expected to survive. On one occasion the nurse consultant wrote a weaning plan for a patient who was thought unlikely to survive to leave intensive care (Field notes HDU 29.06.04). It had not occurred to the nurse to wean this patient as he was dying. Another patient thought unlikely to have any chance of long-term survival was being weaned with the aim of discharging him to the ward where he was expected to die. There was much debate about where he should spend his time in hospital. Many staff were in favour of transferring him to the ward. This patient was now thought not to be critically ill and therefore was not in need of a bed on HDU, yet he was still weaning from ventilation albeit on a different piece of equipment NIPPY).

Egerod (2003) demonstrated that the weaning stages, transitions and endpoints lacked definition. In this ethnography when a patient had been weaned from one mode of ventilation to another, for example from BiPAP to CPAP (CPAP gives less support), staff felt that weaning had been completed. Frequently they would transfer the patient from the ventilator onto an external circuit when there was no need to do so. Until recently it was only possible to deliver CPAP via an external circuit. This can now be delivered through modern ventilators and has allowed weaning via the ventilator to continue to the point of disconnection. This however is not reflected in the definition of weaning in the literature or the way nurses on the unit perceived it. The patient was still in the

process of weaning but the equipment was different. This therefore had consequences for how the nurse viewed weaning. Once off the ventilator the patient was deemed to have finished weaning, and this was reflected in the fact that weaning plans were rarely written for these patients. Although a CPAP circuit was not used on the general wards, it was commonplace in ICU and HDU. When a piece of equipment becomes commonplace, it loses its status (Bernard 2000, Sandelowski 2000, Sandelowski 2000a, Sandelowski 2000b, Sandelowski 1998, Sandelowski 1997, Fairman 1992).

Weaning mirrored the medical paradigm in the literature. Weaning finished when the patient was discontinued from the ventilator. Weaning was seen as a therapeutic act and patients were expected to survive. The actual equipment, rather than the patient's progress was central in determining the different stages of weaning. The introduction of new or different pieces of equipment, albeit for the same purpose had the effect of challenging the definition of weaning. For ICU nurses weaning finished when the patient came off the ventilator in ICU. There was no link to HDU or ventilation on the ward; these were separate and discrete. Differences in how weaning was perceived were noted among the different professional groups and between the same professional group. It was difficult to reach a consensus as demonstrated by Egerod (2003).

4.4:2 Weaning: A Technology Transferred

In this section I aim to distinguish between the terms 'technology transferred' and 'technology transformed'. I will go on to demonstrate

that weaning as a technology, was in the main, in the process of being transferred to nurses from doctors but there was some evidence of weaning 'transformed' by nurses. I draw on the analysis of results in previous sections as evidence and add to the discussion using relevant literature. I will go on to describe the characteristics of both a 'technology transferred' and a 'technology transformed'.

The transfer of weaning from medicine to nursing was formalised in 2001 in the Trust's ICU and HDU when nurse-led weaning was introduced. Previously weaning had been under the sole jurisdiction of the medical staff in ICU but there were no clear boundaries in HDU. Non-invasive ventilation had been introduced in to HDU in 2001 by one of the intensivists. Whilst he introduced the technology it was left to the nursing staff to implement it into practice. Sandelowski (2000) demonstrated that it was the nurses who were often left to introduce new technologies into practice. However, as Sandelowski stated, doctors retained control of the technology in the way they used devices (Ibid.). Doctors used a variety of strategies to ensure they remained in control (see chapter 4.2). Indeed Blackwood et al (2004) identified that doctors felt they should be in control.

The transfer of technology occurred at two levels, between one professional group and another (doctor to nurse) and from one geographical place to another (ICU to HDU). The aim was to transfer patients from ICU to HDU to continue their weaning from ventilation. Once thought stable enough patients could be transferred onto the non-invasive equipment and moved to HDU. Sandelowski (2000) states that a

transfer of technology occurs at different levels to include cultures and genders, stating that

‘technology transferred is not simply the hardware component but also the values, norms and practices that may be in conflict with the receiving culture’ (Sandelowski 2000: 15).

There was a reluctance to transfer patients who were weaning to HDU and to use the non –invasive ventilators on ICU. Part of this was seen as a lack of familiarity with the equipment.

‘It is not routine. Yes they could have been weaned for a couple of days and then it just comes to a halt. I think those patients who were on CPAP / ASB then came round here (to HDU) for CPAP could have come round for immediate BiPAP and we could have weaned from there. We see more patients on CPAP. It (NIV) is still not familiar to them (staff on ICU), they (ICU staff) are still ringing us (HDU), it is the same if we had their ventilators, we are not familiar with them, it is familiarity and not being comfortable with the machine’ (Interview: P12)

However another reason could be that ICU nurses saw weaning in the traditional view and that this must be completed on ICU.

As described in this ethnography nurses saw weaning as a task. This was clearly demonstrated when nurse-led weaning was added to the list of

daily tasks for the shift coordinator. This task, that once had been the remit of the medical staff, had now been devolved to nurses as the following excerpt suggests.

‘May be nurses realise that weaning is a doctors’ role but have extended it into their role so it is seen as some thing we have nicked from the doctors, or taken over from the doctors’
(Interview: P 12).

Weaning plans were rarely written or updated on a daily basis. Junior nurses appeared reluctant to take on the responsibility for weaning. This was never demonstrated verbally but it became apparent when the nurse consultant would check on a daily basis if weaning plans were in place. Weaning was mostly described using the 24-hour observation chart and plans were therefore rarely formalised. The result was that it was difficult to see how the patients had responded to changes in ventilation and their progress was difficult to discern. As a result this information was rarely passed on at handover. The next extract is typical.

‘Weaning had been delayed all morning, first the wash, followed by physiotherapy followed by sitting out of bed. Eventually weaning commenced and the nurse went to break. There was no one there at the patient’s bedside to monitor progress. When the nurse at the next bed was asked how the patient was doing, the answer was ‘ I have no idea’ (Field notes ICU 25.05.04).

Weaning as a technology was shaped by the need to control the nurse's work. Nurses saw it as a task and this was usually the last on a list of tasks. Yet for weaning to be most effective it should be done when the patient is refreshed from a good night's sleep and feels energised. Washing, physiotherapy and sitting out of bed result in fatigue. Weaning would often be discontinued if the nurses were too busy. On this occasion the nurse had not commenced weaning until 13.30, six hours after the commencement of her shift. At the time weaning started the nurse immediately left the bed area leaving another nurse with no information about the patient or the weaning plan and therefore the patient was unsupported. In this way weaning was a procedure just like attaching a patient to an intravenous drip.

I suggest that the transfer of technology creates what Allen (1996) refers to as 'organisational turbulence' (Ibid.:165). In her study she refers to this as the constant fluctuations in health care that resulted in an expectation that the ward nurse would absorb new activities into existing work. This ethnography has demonstrated that weaning was in the process of being transferred. I now go on to define a technology transferred and describe its characteristics.

Technology Transferred: A definition

The transfer of technology refers to tasks, roles or use of equipment formally undertaken by one professional group that are devolved to another. This is commonly seen in the devolvement of tasks to nurses formally undertaken by doctors and referred to as an extension to nursing

practice. This transfer does not include the devolvement of power or control of that technology. The transfer of technology may not always result in improvements to patient care / outcomes.

The transfer of technology often results in blurring of boundaries but also can result in the creation of new roles specific to that technology as was suggested by nurses in this study (examples from nursing include clinical nurse specialists or advanced practice roles). In this ethnography the transfer of technology served to limit the nursing role and as such the nursing contribution was marginalised. The transfer of weaning as seen in the context of critical care revealed that technology transferred had the following characteristics (see table 5):

In chapter 4.1 data revealed nurses never really got to know their patients. Three inhibiting factors were identified, a lack of continuity of care resulting in multiple caregivers, a reliance on technology-generated data and the allocation of junior nurses to patients who were weaning. These junior nurses were advanced beginners, not proactive and missed patient cues. Patients were expected to follow a pre-determined weaning trajectory and the patient role was a passive recipient of care. Care was not patient-centred or individual but rather task-orientated.

In chapter 4.2 the division of labour in weaning was dominated by the allocation of junior nurses to patients who were weaning. There was a lack of teamwork with professional groups working in isolation. Whilst the technology was transferred the control of weaning was not. Weaning was medically led. The nurses' role was limited and they relied on the

medical staff for support. Nurses felt doctors had a special knowledge and they therefore regarded them as experts in weaning.

In chapter 4.3 nurses' reluctance to write weaning plans and the concentration on getting the work done meant they were often invisible in the weaning process. A lack of participation in ward rounds resulted in a lack of communication between the professional groups about weaning with a reliance on the 24-hour chart. This meant information about the patient was biomedical in nature which lacked the psychological aspects of patient care.

In chapter 4.4 nurses saw weaning as a medical technology devolved to them from the medical staff and weaning defined as the gradual withdrawal of ventilation. There was no consensus regarding when weaning began or finished and no agreed norms. As such there was often no consensus regarding how weaning should progress and plans were seldom written. The result was that patients experienced delays in their weaning.

Table 5. Characteristics of Weaning: A Technology Transferred

Weaning: A Technology Transferred	As Evidenced by
Doctor controls weaning	Division of labour
Nurses' role reduced to the monitoring and recording of observations. 'Survival skills'	Nursing visibility Nursing – technology relation Division of labour
Care fragmented with multiple caregivers	Knowing the patient
Task-orientated care	Nursing visibility
Technology-generated data	Knowing the patients, Nursing – technology relation
Technology seen as equipment	Nurse's definition of technology
Weaning defined as the gradual withdrawal of the ventilator in ICU / HDU	Nurse's definition of weaning
Weaning reactive	Nursing – technology relation
No consensus, no plan	Division of labour
Novice nurses allocated to patients who were weaning	Division of labour Nurses render themselves invisible
Patient seen as unpopular, passive recipient of care who follows a predictable weaning trajectory	Knowing the patient: the patient role in weaning
Patient known in relation to technology	Knowing the patient
Weaning seen as a medical technology devolved to nurses	Nursing – technology relation

4.4:3 Weaning: A Technology Transformed

There were a few examples when nurses interpreted technology not as a medical technology transferred to them, but used it to improve the care and therefore outcomes of patients who were weaning. I refer to this as a technology transformed. I have used theoretical sampling to illustrate this

concept in two ways. Firstly, I pick out examples from the data where nurses transformed technology to care for patients who were weaning. This form of theoretical sampling is also described as purposeful sampling and taken here to mean that data were identified from the corpus of data that had one or more of the characteristics of technology transformed (Glaser & Strauss 1967). Secondly, I use theoretical sampling by drawing on the literature that has theoretical relevance to the evolving theory. The literature does not clearly differentiate between a 'medical' technology transferred to nurses and a technology transformed by nurses. I therefore draw on a composite of literature to help interpret this concept beginning with a definition of a 'nursing technology'.

Alexander & Kroposki (2001) describe a nursing technology as the total of all the work accomplished by a group of nurses to achieve the goals of a nursing unit and define it as

'The nursing care processes used to change the status of an individual from a patient to a person no longer requiring nursing care' (Ibid.: 780).

They identify three attributes of a nursing technology firstly, specialised knowledge secondly, raw materials (patients) and thirdly nursing care processes.

The following excerpt from this ethnography demonstrates how an expert nurse uses his skills and knowledge of weaning to enable him to assess patients.

'You need to look at why patients are not weaning. It is not a case of just turning down the pressures you need to ask have they developed another hospital acquired infection? What is their fluid balance like? We know full well those patients who are long-term weaners get repeated infections. It's obvious if they are producing loads of sputum and they have a high temperature and you cannot wean. You need to look at other things like their fluid balance, if someone is exceptionally boggy (over hydrated), patients do accumulate fluid over a period of days so that is another reason why they do not wean. You need to look at the patient holistically' (Interview: P2).

His view was based on the need to see the patient holistically, using a systematic assessment in order to draw information about the patient's ability to wean. Furthermore he saw weaning not just as following a protocol but in looking for and recognising patient cues that would allow for an individual weaning plan to be made.

Alexander and Kroposki state in their description of a nursing technology that nurses require specialised knowledge of patients and their biophysical and psychological responses to ill health. What they fail to mention is the knowledge that constitutes 'knowing a patient'. This cannot be gained from biomedical data alone but requires the nurse to actually get to know the patient as an individual (Radwin 1996, Jenny & Logan 1992, Tanner et al 1987) and getting to know the patient requires

expertise (Benner 1984, Tanner et al 1987, Manley et al 2005). The provision of individualised and continuous care increases the probability of knowing the patient and is essential to successful weaning (Jenny & Logan 1992).

A patient who had been on the unit for 20 days was demonstrating signs of altered mood. The next excerpt from field notes suggests the nurse was aware of the psychological needs of patients and the influence this had on weaning. The patient was withdrawn and anxious. His anxiety often resulted in an increase in respiratory rate and as such he would tire easily, thus weaning was often problematic.

‘The night nurse was frustrated that the patient had not progressed in fact his weaning was deteriorating. There was a discussion about the patient’s psychological status and it was decided to move the patient’s bed so that he could see what was happening on the unit’ (Field notes ICU 9.0.04).

The next excerpt indicates how the nurse recognised patient cues and her ability to respond to them in a timely manner.

‘I know from experience that when you come on to your shift and have handover about the patient, you start by looking at them from the baseline, by looking at the gases and look at the patient overall. You get a feeling what works and what doesn’t. If it doesn’t work you have a discussion with the intensivist or the nurse in charge. I think we are really good.

We have initiated weaning and paid no attention to the doctors when it first came out (nurse-led weaning), so this is what we (nurses) do. We are quite eager not to sit on some body and wait for a certain time or wait for the doctors to come along' (Interview: P3).

In this example the nurse does not wait for the doctor but confident to initiate weaning but recognises that there are a number of experts and when one strategy does not work she would draw on the expertise of others in the team. Interestingly she indicated she was eager to embrace nurse-led weaning by ignoring the medical staff when they were felt to interfere. This nurse indicated clearly that she needed to know her patient in order to plan weaning and this meant planning her work around the patient. Knowledge, experience and exposure were identified by Ball & McElligott (2002) as key nursing attributes to the recovery of critically ill patients and this related to the ability to identify patient cues.

'What works for one patient will not work for some one else and you need to get to know them, their personality has a lot to do with it, if they are anxious and you know what makes them anxious. You can see their pattern of respiration changing a lot of the time and the intervention you give, so you can plan your day and your daily tasks around them and support them' (Interview: P3).

The next excerpt is an account of my role as a nurse consultant. In my daily rounds of patients I would review all patients who were weaning.

The following patient has been on the unit a number of days and was therefore known to me. The patient was struggling to breathe but this was interpreted by the bedside nurse as a panic attack.

‘I intervened by increasing the respiratory support for a patient who was breathless. The nurse had interpreted this as panicking but when I spoke to the patient she explained she had been unable to get her breath during the night and this frightened her. She was also anxious that she had not made progress, she was obviously tired and fed up (Field notes ICU 27.04.04).

In knowing the patient I was able to pick up on the cues the patient was displaying and intervene. I was able to reassure her and ask her how she was feeling. I understood she was anxious and was able to use my expertise and experience to help the patient cope with her fear and frustration. I explained she had made progress but that weaning often meant going forwards and backwards and every patient’s weaning was individual to them. We discussed her weaning plan and she appeared calm, her breathing was easier.

Alexander and Kroposki identify raw materials as patients and state they influence the technology used for the patient. This view does not take into account the nursing – technology relation and how this is affected by issues such as power, gender and the control of technology. The patient role is central in weaning. In this example the patient were seen as an active partner in their care.

As most nurses did not contribute to the ward round they therefore could not contribute to the development of weaning plans, adding information about the patient and their responses to weaning. I did observe one nurse in particular who was very involved in the ward round. She actively engaged with the medical staff and her aim was to coordinate a medical procedure. At interview the nurse was asked how she viewed the medical ward round.

‘When I was a staff nurse you were always there to participate in the ward round, you listened to the plan and you put your assessment forward. That does not seem to be a priority (with some nurses) but you need to know what is going on and what the (medical) plan is for the day’
(Interview: P8).

This nurse recognised that the nurse’s participation in the ward round was part of the nurse’s role. It was important that the nurse was able to contribute in order to add to the medical knowledge about the patient. She was also proactive in finding out about the plan for the day in order that she could organise her activities accordingly. Field notes reveal that she planned her work around the patient, leaving her break until after the patient had been cared for and ensuring she did not miss the ward round. She was late getting to her break because the medical staff agreed to perform a tracheostomy that morning. Following the tracheostomy the nurse continued to be proactive, making up for lost time (waiting for the tracheostomy to be performed).

‘What we did is we went for a really quick wean and see if she can tolerate it. She had a tracheostomy so we gave her time to recover from that, after all it is a general anaesthetic. She just needed a bit of time, she was irritated by it (tracheostomy), she was coughing and coughing. We put her on CPAP, but that was a little too much for her. We did not want to push her, so we gave her some sedation to ease the cough. We gave her a little longer time and she did settle and she was more comfortable’ (Interview: P 8).

Important in weaning according to Egerod (2003) is the need to experiment, at first if one approach does not work then another is tried. The importance of recognising that each patient has an individual trajectory is demonstrated here.

‘I think a long day is a good thing because you know it is over a longer period of time and you can try different approaches to your weaning. Like the other month I went from the ventilator to low flow in a 12-hour shift which was fantastic. This was beneficial for the patient and I could tell within three hours that he was not going to be a slow wean. He was going to be quick and I would let him take the lead and I would support him gently and that was fantastic. He was a successful wean. Every patient is an individual’ (Interview: P3).

The role of the patient in this excerpt is not as a passive recipient of care but as a partner and the nurse demonstrated she worked with the patient in order to move his weaning on, she acted in a supporting role, monitoring and responding to his cues.

Nursing care processes include the actions taken by a nurse to improve a patient's health status and this according to Alexander and Kroposki (2001) requires individualised care. The next excerpt indicates that nurses were frustrated by a delay in medical treatments. In this case the patient required a tracheostomy in order that she could tolerate the tube without the need for sedation. The delay in performing a tracheostomy meant the patient required sedation resulting in additional complications. In her view this could be avoided by performing a tracheostomy which would allow weaning to move forward.

'We were being held back (waiting for the tracheostomy), every thing was dependent on getting the tracheostomy and we were going know where. We were having to sedate her (the patient) and therefore having to use inotropes (to keep the blood pressure up as a result of the sedatives which reduce it) when we really did not need to, our hands were tied'
(Interview: P8).

One nurse demonstrated how she was working proactively in order to expedite the weaning process. She used her skills as a nurse to assess and plan the care of her patient.

'I am very interested in weaning myself and I really enjoy nurse-led weaning on the unit. I think it is very beneficial and I think when you come and you have a patient with so many problems, just looking at them visually, struggling to breathe. There are so many things that could be rectified to support them and that could be the underlying reason why they are unsuccessful. I like to sort that out. For example he (the patient) had no feed going and I started it again because yesterday he was vomiting and constipated and that is now resolved. I like to kick in with the nutrition and underlying support for him to get back to normal. If I could start looking at the weaning process and then to initiate it and you know contribute something to it. To start weaning his pressures or the level back down to whatever support he needs' (Interview: P3).

This staff nurse demonstrates she was able to assess and plan the care of her patient on an individual basis. She knew him as a person and there had been some continuity of care. She actively enjoyed patients who were weaning. There was a sense of achievement if she managed to progress the care of her patient.

On occasions as a nurse consultant nurses would ask my opinion or ask for advice in order that weaning progressed.

'Nurses were actively planning their weaning, asking my advice. The patient on this occasion was unsure when the

tracheostomy planned was going to take place. I advised them to continue to wean by reducing the sedation and let the patient breathe, reducing the respiratory rate on the ventilator until such time when the procedure would be carried out. That way weaning would not be delayed when the time was right' (Field notes ICI 27.05.04).

On other occasions nurses felt at liberty to alter weaning plans in order that weaning was continuous and reflected the needs of the individual patient.

'One of the respiratory physicians had written a weaning plan and the nursing staff ignored it. When I asked them why, they replied that the patient was doing well, so rather than take a step back by following the doctors plan they continued with their own plan' (Field notes: ICU 20.07.04).

More frequently I intervened in the patient's care when I recognised nurses needed help. On this occasion I was approaching the patient's bed when I noticed the ventilator alarm.

'I noticed the ventilator alarm was reading apnoea, the nurse came over and said it had been happening a lot that morning. I was concerned but she did not appear to share this concern. I immediately changed the patient's mask, completed an assessment and explained what I was doing. I began to write a plan but the nurse felt the patient had only just arrived and

therefore there was no need for a weaning plan yet. I explained weaning is not just about reducing the support sometimes it needs to go up as well and that was what I was doing. What was also important was the need to communicate this to ensure continuity of care (Field notes: HDU 12. 08.04).

Planning for weaning is as important as actively weaning. Delays in weaning are experienced when nurses do not plan in advance. Although on this occasion the patient had just arrived it was important to make a plan from the beginning of (non-invasive) ventilation. I was also able to see that the patient was mouth-breathing and therefore a nasal mask meant the patient was not effectively ventilating. I changed the mask to a facemask.

The next extract from field notes is an example of my role as nurse consultant who is asked to review a patient in HDU. The nursing staff felt they were unable to progress the patient's weaning further.

'I am asked to visit a patient on the unit by a G grade who wants my advice on a patient they are finding difficult to wean. I visit the patient and the nurse at the bedside gives me a summary of the patient's medical problems. Whilst this is occurring I watch the patient. I notice how he is breathing, the rate, depth of the breath, use of accessory muscles, he looks a little sweaty but his pulse and blood pressure are OK. I speak to the patient and introduce myself, asking him 'how are you and how is your breathing to day?' Whilst I do this I place my

hand on the patient in order to feel his temperature, assess if the sweatiness is clammy skin or just hot, I am also able to take his pulse, all the time though I touch him in a way as to say 'you are in safe hands, trust me'. He can answer me by mouthing sentences (he has a tracheostomy) but he does not appear breathless and can complete his sentence. He is fed up and appears to have lost trust in the nurses. After reading his medical notes and scanning the observation charts I listen to the patient's chest and examine the chest X-Ray. I complete a head-to-toe examination, noting his fluid balance over the last few days, I note he is oedematous (swollen). I scan his drug chart for drugs such as steroids, antibiotics (for course, strength and duration), diuretics (water tablets) and antidepressants (always essential in long term weaning) etc. any information which builds a picture of this patient and how this will affect his weaning. I note he has pseudomonas on his chest and this will inevitably increase the amount of sputum. He has been with us now for 12 days, the course of events lead me to believe his weaning will need to be gradual and he will require periods of rest (he has been septic and has had some renal impairment). After I finish my physical examination I return to talking with the patient. I ask him about how he is at home, what he hopes to achieve and how he feels his progress has been. It is obvious he had hoped to progress much quicker and is frustrated by the pace of weaning. I explain what the options are and suggest we devise a weaning plan together, the three of us, the patient, the

bedside nurse and me. I negotiate goals, small periods of time off the ventilator with periods of rest, we plan one day at a time. The patient appears happy with this and after a chat about his family I leave. I return the next day to see he has met his goals and we repeat the process, this time increasing time off the ventilator. He appears happier today. Five days later the patient is off the ventilator and waiting to be discharged to the ward' (Field notes: HDU 13.08.04).

This is an example of how a 'medical' technology transferred to nurses was transformed by the nurse consultant and used to improve patient outcomes. This excerpt demonstrates a number of characteristics of a technology transformed. The nurse is an expert and used her expertise and experience of weaning in order to assess and plan for weaning. An evaluation of previous weaning attempts was made. The patient is very much the focus of attention and involved in the assessment and planning stages. Goals are set that are patient-focused and reviewed daily. The plan is individual and communication of that plan is an important factor to ensure this the nurse consultant includes the bedside nurse. Continuity is achieved as the nurse consultant reviews the patient on a daily basis. The nurse consultant takes responsibility for weaning, setting parameters for the bedside nurse and by providing informal teaching.

The characteristics of a technology transformed are listed in table 6. Nurses require knowledge, experience of and exposure to weaning. Experienced nurses work in a proactive manner providing close surveillance and immediately respond to patient cues and in this way are

able to reduce the risk to patients (Ball & McElligott 2002). Weaning is nurse-led, with patient-focused goals. Technology in this respect is an embodied approach to care, seen not as an adjunct to care, or as a means of bridging a gap between technology and care, but as a total process including the knowledge, skills and equipment that encompass the nursing care of the individual. Weaning is planned when ventilation begins and is therefore proactive. Weaning is the nurses' responsibility. Nurses do not work in isolation but appreciate there are a number of experts in weaning to draw on. They work as part of a team.

Table 6. Weaning: Characteristics of a Technology Transformed

Technology Transformed	Evidenced By:
Nurse led	Purnell (1998), Alexander & Kroposki (2001), Interview 3, 8, Nurse Consultant, Field notes (27.05.04)
Patient-focused goals	Alexander & Kroposki (2001) Nurse consultant
Patient an active partner in weaning	Egerod (2003), Interview 3, Nurse consultant, Field notes (12.08.04)
Continuity of care	(Jenny & Logan 1992) Interview 3, Nurse consultant
Individualised, patient-centred care	(Jenny & Logan 1992), Interview 2, 3, 8, Nurse Consultant, field notes (9.03.04)
Close surveillance and immediate response to patient cues	Ball & McElligott (2002), Interview 8, Nurse consultant (field notes 27.04.04)
Technology seen as an embodied approach to care	Purnell (1998), Alexander & Kroposki (2001), Interview 3, 8, Nurse consultant
Weaning identified on a continuum of respiratory support based on the maximum potential of the patient	Egerod (2003), Nurse consultant Interview 10
Weaning proactive	Ball & McElligott (2002) Interview 3, 8, Nurse consultant, Field notes (1.06.04, 8.06.04)
Weaning the nurses' responsibility and authority (domain) but there are a number of experts to draw on.	Purnell (1998) Interview 3, Nurse consultant
Expert nurses allocated to patients who were weaning	Jenny & Logan (1992), Manley et al (2005) Interview 8
Team working with respect for each others contribution	Felten et al (1997), Wright et al (1996), Thomas (1989). Interview 3
Patient seen as an individual, there is no one weaning trajectory	Egerod (2003), Interview 3, 8, Nurse Consultant
Knowing the patient is a central concern for nurses	Benner (1984), Radwin (1996), Ball & McElligott (2002), Manley et al (2005), Interview 3, Nurse consultant

Conclusion

This discussion has examined the relationship between nursing and technology. Weaning both shaped nursing practice and was shaped by nursing practice. It began with an illustration of nurses' definition of technology and demonstrated how their views of the same equipment changed depending on the context in which care was delivered. For nurses the ventilator was a medical technology, a piece of equipment or machinery transferred to them from the doctors that nurses used. The nurses' role was limited to the monitoring and recording of observations. Nurses did not demonstrate what the literature refers to as technical competence (Wilkstrom & Larson 2004, Alasad 2002, Barnard 2000, Little 2000, Barnard & Gerber 1999, Locsin 1998, Cooper 1993, Walters 1995, McConnell 1990, Ray 1987). Instead, nurses developed what Bevan (1998) describes as superficial survival skills.

Weaning was shaped by nursing practice. It had the potential to disrupt the work of the nurse and stopped when the nurse was too busy. Nurses used strategies to manage the equipment. Weaning had the potential to alter nursing practice much more profoundly but was limited by nurses' definitions of technology and weaning. The nurses' role in weaning was limited and nursing practice defined by a series of tasks and a schedule of work (Melia 1987) and as such nurses will continue to be seen as an extension of the doctors' senses and a soft technology (Sandelowski 2000). It was apparent from interviews and observation that many nurses saw weaning as a continuous but gradual process to the eventual removal of the ventilator, a view dominant in the medical literature.

From an analysis of data it is apparent that weaning was a technology transferred. This refers to a task-focused approach to technology as 'equipment' by critical care nurses. As such the actual nursing contribution to weaning was marginalised.

I was able to show through a process of theoretical sampling how technology could be transformed and by that I refer to an embodied approach to care delivery. I am able to demonstrate that some nurses did in fact transform technology and used it to improve weaning. I have described the characteristics of a technology transformed.

The next chapter is a synthesis of the main findings. I define a 'nursing technology' and differentiate this from a 'medical technology'. I go on to identify the conditions required for weaning to become transformed into a nursing technology. The traditional definition of weaning is partial and restricted and I suggest a new definition of weaning that places the patient, rather than the technology, at the centre.

The Nursing Contribution to the Development of Critical Care in the New Millennium

Introduction

The purpose of this research was to demonstrate the nursing contribution to the development of critical care in the new millennium. Demonstrating the nursing contribution to patient care and outcome is difficult. Available research is disparate and a range of methodologies has been used which makes comparisons difficult as Spilsbury and Meyer (2001) demonstrated in their review. Their findings suggested there is evidence which reflects the positive impact of nursing care on patient outcome but this research fails to describe the structure and processes of care that contribute to what they call 'nursing-sensitive' outcomes (what nurses do). However the research fails to address the 'invisible' aspects of nursing work (for example coordination of care, leadership and judgement). Therefore they conclude that it may never be possible to define the nursing contribution to patient care due to the ever-changing nature of nurses' work. It was not my intention to identify the nursing contribution to patient outcomes specifically however the introduction of nurse-led weaning was intended to reduce delay in commencing weaning and reduce length of time on the ventilator (Crocker 2004). I have suggested that the nursing contribution to the development of critical care

in the historical and policy literature is hard to discern. Some authors describe this representation of nursing as being invisible (Wolf 1988, Sandelowski 2000, Manias & Street 2001, Ball & McElligott 2002). Nurses have been able to adapt and change the sphere of their work. One example of this is the adoption of technology into their practice. A review of the literature established that nurses have been using technology in the care of their patients but this was a double-edged sword. On the one hand it could be used to reveal what nurses did and on the other it had the effect of masking their contribution (Sandelowski 2000). Weaning from mechanical ventilation was used to demonstrate the nursing contribution to the development of critical care.

5.1 Synthesis of the Study's Findings

There were four themes identified from this study, knowing the patient, the division of labour in weaning, nurses' visibility and the nursing – technology relation. I shall take each one in turn and after summarizing the main points I will go on to provide a synthesis of the study's findings culminating in the nursing contribution to the development of critical care. I will discuss what I think are the main implications of this research. I will conclude with recommendations for practice and future research.

Knowing the Patient

Knowing the patient was inferred during interviews as essential to the delivery of patient centred care. This implied having an understanding of

the patient's physical and psychological reactions to weaning. However observation of practice revealed many nurses' knowing was framed in technological terms. Nurses assimilated information about their patients from a number of sources. One major source of information was the 24-hour observation chart. This chart focused on physical data mostly generated from the available technology such as the ventilator and monitors. This had the effect of reducing patient care to a series of tasks with little attention paid to the psychological needs of the patient (Henderson 1997). In this sense technology limited the extent to which nurses were able to get to know their patients. Knowing the patient is an important aspect of nursing (Tanner et al 1993, Ball & McElligott 2002). Many studies have been conducted in order to define the exact meaning of knowing and attempts have been made to describe and analyse how this is realized in nursing (Luker, Austin, Caress & Hallett 2000, Radwin 1996, Radwin 1995, Sandelowski 1998, Henderson 1997, Jenny & Logan 1992, May 1992, May 1991). The common premise is that an individual is known as a person and this encompasses their physical, psychological, emotional and social responses to illness. In order to know a patient as an individual a number of factors have been identified from the literature; mutual trust and rapport, a positive nurse-patient attitude and sustained patient contact (Henderson 1997), the delivery of individual patient care (Radwin 1996, Henderson 1997) and continuity of care (Morse 1991, Ball & McElligott 2002). However knowing the patient required nursing expertise (Benner 1984, Jenny and Logan 1992, Radwin 1996, Manley 2005).

Nurses were prohibited from knowing their patients and a number of factors were identified. These were a reliance on physical data related to the patient's medical condition, the allocation of junior nurses to patients who were weaning, a lack of continuity of care and a task-focused approach to care. Nurses espoused individual care, and getting to know the patient was a central concern for them, yet the prevailing culture prevented this. Nurses of all grades engaged in behaviours that were orientated to preserving and reinforcing task-focused care. Yet nurses have the potential to make a difference to patient care and can positively affect outcome (Thorens et al 1995, Radwin 1996, Kollef et al 1997, Ball & McElligott 2002, Tonnelier et al 2005) and this has been specifically shown to be the case in weaning (Jenny & Logan 1992, Logan & Jenny 1997).

The role of the patient in critical care is under researched. This ethnography has revealed an insight into patient's role in relation to weaning. The very nature and fabric of intensive care has resulted in some writers comparing it to Foucault's panopticon (Lawler 1991, Henderson 1994) and the patient as an object of the 'gaze' (Henderson 1994). Henderson (1994) demonstrated that the use of the 24-hour chart in intensive care had the effect of putting the patient on display. The patient became objectified separating the patient into physical components that can be measured. According to Henderson (1994)

'This knowledge has not only empowered particular kinds of practice but also has invented a new patient, 'the recorded body', a body about which little is known at an emotional

level but everything known at a biophysical and physiological level' (Henderson 1994: 938).

Practice which is focused on eliciting information in this way leads to task-focused care. Prioritising the physical needs of patients over other needs will limit the quality of the nurse – patient interaction. For the nurse this brings power in being able to decipher the chart on which much attention is focused by health care practitioners but does not necessarily contribute to knowledge which allows them to know their patient. For Henderson

'The paradox for the intensive care nurse is that the constituted knowledge is not powerful in the development of a meaningful nurse – patient relationship, but is only powerful in promoting communication which the doctor deems meaningful' (Henderson 1994: 938)

The subjectification of the body to the 'gaze' has implications for how the body is known and how this manifests itself within the context of critical care. The role of the patient in critical care and particularly in weaning is worthy of further investigation. In this study patients were treated as passive recipients of care yet their co-operation with weaning plans and strategies was essential. This is in contrast to Allen's (2001) work where she identified patients were more actively involved in the provision of their care, resulting in a move away from the traditional passive patient role. However the nature of critical care nursing and the complexities of patient conditions may have a bearing on the role of patients in their care.

Failure to meet the typical weaning trajectory was met with terms such as 'weaning failure', or the patient being considered as 'too lazy' or had given up. Nursing care practices served to limit patients' autonomy in weaning. The role of the patient was a passive recipient of treatment. Patients who were weaning were thought not to be critically ill and were unpopular patients to look after. Nurses in a study by Ball and McElligott (2002) emphasised the difficulty in caring for patients who were weaning because they were awake, confused, agitated or had diarrhoea. They were seen to be recovering and therefore the nurse patient ratio was reduced to 1:2. Patients were expected to follow a weaning trajectory. This was a predictable course of recovery with goals set by the medical or nursing staff rather than the patient. This resulted in the patient assuming a passive role with little autonomy. When patients deviated from the trajectory physical explanations were sought, if none could be found then psychological explanations were considered. This is contrary to Lawler (1991) where the recovery trajectory was dependent exclusively on the patient's medical condition. As a result patients were labelled 'failure to wean' and the cause often attributed to the patient. A study conducted by Manley et al (2005) revealed that one attribute of nursing expertise was knowing the patient. Knowing is inextricably linked to the role of the patient. This referred to promoting the patient's own decision-making, a willingness to relinquish control to the patient and recognising the patient's expertise (ibid.). Many of the nurses allocated to look after patients who were weaning were advanced beginners. The paradox is that whilst these patients have complex physical and psychological needs they are not deemed to be critically ill and with a diminishing skill mix in

critical care are more likely to be cared for by nurses who have not yet developed nursing expertise.

The Division of Labour in Weaning

The introduction of nurse-led weaning highlighted tensions inherent in boundary working. The transfer of technology to nurses resulted in a change in the content of nursing work which created tensions between nurses and between doctors and nurses. These tensions manifested in several ways; the organisation of nurses' work, control of nurses' work and cross-boundary working.

In Allen's study the organisation of work created tensions for nurses. Nurses found they did not have the time to spend doing what they perceived as tasks related to the core of their role (Allen 1996). Nurses in her study stated at interview that they would control this by leaving doctor-devolved tasks until after all nursing tasks had been completed. However Allen observed that nurses continued to complete these tasks regardless of their work pressures. In this ethnography nurses would leave weaning until other tasks had been completed, often if they were too busy weaning would either not progress or fail to commence. There are a number of reasons put forward for this. One is that the majority of nurses allocated to look after patients who were weaning were junior and therefore as advanced beginners they work to a schedule and were orientated to getting the (nursing) work done (Melia 1987). Many nurses believed that weaning was under the jurisdiction of the medical staff. This was made apparent when nurses asked the medical staff, rather than the

shift-coordinator, for advice or waited for instructions from the intensivists. Weaning plans were often left blank giving an appearance that nurses were reluctant to commit themselves to decision-making. Another explanation may lie with the complexity of weaning itself. Egerod (2003) found that the stages of weaning were difficult to identify leading to confusion regarding the onset of weaning. Nurses, on the whole did not take responsibility for weaning, with many believing this lay with the medical staff. However those nurses who did embrace nurse-led weaning found this created conflict with the medical staff. Nurses would become frustrated when doctors overruled their weaning plans or changed ventilator settings without discussing this with them. Nurses also worked hard to move weaning forward and this often necessitated the placement of a tracheostomy. Nurses would again become frustrated when medical care was delayed and this impeded weaning.

Styles of decision-making adopted by junior nursing staff was a combination of the doctor – nurse game (Stein 1967) and informal covert decision making as described by Porter (1991). However this was not as unproblematic as previously described in the literature (Stein 1967, Hughes 1988, Stein et al 1990, Porter 1991, Allen 1997). Nurses became frustrated when doctors were seen to overrule their weaning plans or disregard their efforts. Some nurses carried out doctors' instructions knowing them to be wrong, often seeking reassurance from colleagues. Nurses also used an intra - occupational mediator this was the nurse consultant. This term has not been used in the literature before. This approach was usually used by more senior nurses. This had the effect of giving the appearance that nurses were working in harmony with medical

staff whilst at the same time influencing patient care. Nurses may have felt powerless. Their position in the hierarchy meant they had little power to influence the senior medical staff as identified by Allen (2001). One-way to overcome this was to use the nurse consultant.

The nurse consultant was the only nurse, with one or two exceptions, to use formal overt decision-making strategies. The nurse consultant challenged traditional ways of working. This could result in a difference of opinion with medical teams. This may also have had the effect of causing a level of discordance for some nurses and may be interpreted as their reluctance to carry out the nurse consultant's requests. One reason for the disharmony may have been as Egerod found in her study, that the goals and methods of weaning were not clear and therefore competing strategies and frequent mode changes occurred (Egerod 2003).

It was clear that the medical staff controlled weaning. There were a number of competing 'experts', the nurse consultant, the intensivist and the respiratory physician. The medical staff had the final say. This was due, in part, to their position in the organisation and this related to their presumed level of knowledge. Nurses attributed medical staff with a 'special kind of training' and this was thought to be superior to nurses' knowledge. Nurses may feel that they lack knowledge regarding ventilation and in particular weaning from ventilation. This was a finding in Egerod's study where she noted that Swedish nurses lacked formal competencies (defined by educational courses) in relation to mechanical ventilation and these did not increase with the acquirement of formal qualifications. Informal competencies (defined as the characteristics of an

ICU nurse) did increase with experience. Blackwood et al (2004) identified doctors also felt nurses required experience and knowledge of weaning as this was variable they preferred to retain control over weaning.

Unlike Allen's study (1996) where she noted boundary realignment was accomplished with little overt conflict and minimal negotiative effort this study has demonstrated there was conflict. Some nurses worked hard to coordinate doctor's activities for the benefit of patient care but this was not always through boundary blurring as described in the literature (Allen 1997, Ball & Cox 2003) but more through traditional working, which some authors describe as subordination and handmaiden roles (Devine 1978, Tellis-Nyak & Tellis-Nyak 1984).

There have been several suggestions for improving weaning for patients. Egerod (2003) suggests weaning teams and the use of protocols, Blackwood et al (2004) also recommends the use of protocols but recognises the inherent difficulties. Gelsthorpe and Crocker (2004) found junior nurses used protocols whilst more senior nurses used their experience and judgement. In this way weaning may not be consistent and this makes the development of shared norms harder to discern. Egerod (2003) found that weaning was not a series of discrete decisions, but rather a process of experimentation. The development of protocols therefore is difficult and there would need to be a degree of flexibility (Blackwood et al 2004). Furthermore this deviates from the individual approach to weaning.

Practitioners in this study suggested the development of an advanced practitioner role would assist nurses to wean more effectively. The difficulty lies with the purpose of such a role. If this is described as a 'gap-filler', with the aim of replacing what was a doctor's role then I suggest that this would reduce the nursing contribution further. Conflict would not be avoided, just moved to another role (Scholes et al 1999, Scholes & Vaughan 2002). The division of labour would become more fragmented and the nurse's role in weaning would remain limited.

Nursing Visibility

I hypothesise that in this study that nurses rendered themselves invisible or were rendered invisible. Although nurses also attempted to exert some control over their work and make visible their contribution to care through the ritual of the 'wash'. This had consequences for weaning.

An analysis of the results demonstrated that nurses rendered themselves invisible in two ways firstly, by their lack of participation in the ward round and secondly, through the allocation of junior nurses to patients who were weaning. The ward round was seen as the 'medical' round and was seen as separate from nursing (Busby & Gilchrist 1992). Both the bedside nurse and the shift coordinator were frequently absent from the round. When the shift coordinator was present their role was limited to an information broker (Manias & Street 2001), transcribing medical information to the next shift with minimal attention to nursing care (Erkman & Segesten 1995) or as Porter (1991) refers to it as 'listening in on the side lines'. Nurses therefore missed the opportunity of the ward

round to meet as a multi-professional team to discuss and plan the care of a patient, which in turn enhances quality patient care (Felten et al 1997, Wright et al 1996, Thomas 1989). Nurses' reluctance to participate on the ward round may have been a result of the conduct of the ward round itself. Nurses were rendered invisible by the medical staff. This occurred in part by the control by doctors of the nursing contribution on the ward round. Manias and Street (2001) suggested nurses were often marginalized, silenced and their contribution controlled by doctors. Their study demonstrated that doctors adopted an authoritative position in directing communication and decision making on the ward round, with the ability to adjust the nurses' capacity to contribute to decision-making by a process that Sweet refers to as 'differential visibility' (Sweet & Norman 1995: 51).

Nurses attempted to make visible their contribution to care through the wash. 'The wash' or bed bath was seen as an important and essential part of the routine aspects of nursing care. This study demonstrates that this routine was ritualised. Walsh & Ford (1989) define rituals as routine care, tasks performed without logic whereas others have suggested a number of reasons why nurses engage in rituals. Wolf (1993) suggests this can be a therapeutic act whilst Melia (1987) interpreted rituals as a way of getting the work done. Menzies (1970) suggested that decision-making can be stressful and rituals serve to limit decision-making. For nurses this ritual gave them structure and helped organise their shift. Failure to get the wash done resulted in criticism from peers and a sense of failure in the individual nurse. Attempts were made by the nurses to ensure the wash was made a priority. This ethnography demonstrated that nurses used the

ritual of the wash in order to impose some control over their work. Nurses washed patients knowing this was done at the same time as the ward round. This meant that they could not be present during the round and this may have been deliberate. Nurses therefore may have used the wash to avoid being involved in decision-making and were complicit in their own invisibility. Alternatively nurses chose to perform the wash at this time because it had become an unwritten rule (Melia 1987). Pressure from other nurses, including the shift coordinator ensured this was adhered to.

The Nursing – Technology Relation

Interviews and observation in practice revealed nurses saw technology as machinery and equipment and is congruent with the study by Barnard and Gerber (1999). However nurses' view of the ventilator as a technology changed depending on the reason it was used. The ventilator has become a symbol of critical illness. Although nurses related to the ventilator in terms of equipment it held a different meaning when weaning began. This is congruent with Sandelowski who stated that technologies are context dependent and this is reliant upon how they are used (Sandelowski 2000). Patients who were weaning were not considered critically ill. The ventilator was seen as a medical technology. This limited their role to the monitoring and recording of observations. It is clear from this study that interpreting the ventilator in this way served to limit the role that nurses play in using and taking control of technology. Within this context nurses will continue to see the ventilator as no more than work. Whilst nurses saw their role as monitoring and recording of observations there was no need for them to develop further skills. Technological mastery has been

identified as an essential component in the development of competence in critical care nursing practice (Wilkstrom & Larson 2004, Alasad 2002, Barnard 2000, Little 2000, Barnard & Gerber 1999, Locsin 1998, Cooper 1993, Walters 1995, McConnell 1990, Ray 1987). It is my belief that this literature fails to identify the reality of the work place. In this study nurses did not master the technology but rather they learned what Bevan described as superficial survival skills (Bevan 1998). This was demonstrated by the recording of data onto the 24-hour chart, by their lack of weaning plans and lack of documentation of ventilator parameters and ventilator checks.

Walters (1995) described 'being busy' as an emergent theme in his study. He revealed nurses conceptualised caring with technology and used it to preserve a patient's dignity. I suggest that when a 'medical' technology is transferred most nurses in this ethnography did not view technology in ICU as an interconnected pattern of integrated nursing activities as suggested by Walters (1995), neither did they see it as dehumanising or an infringement of a patient's dignity. What determines whether a technology is dehumanised according to Barnard and Sandelowski (2001) is not the technology *per se* but how it is used and the meanings attributed to it by individuals and groups. Nurses, on the whole, had no active role in ventilation. This was the domain of the medical staff. There was no formal jurisdiction for nurses to change ventilator settings (a policy was being written at the time of the study). Nurses acted as monitors, recording technology-generated data and reporting this to the medical staff. Nurses in this study did not see the ventilator as an adjunct to care, nor did they see the ventilator in opposition to care. It became apparent

from observation that nurses saw weaning as a task devolved to them from the medical staff and this had the potential to disrupt their work (Wilkstrom & Larsson 2004, Alasad 2002). Nurses devised strategies in order to manage this potential.

Nurses' view of weaning was a reflection of the medical literature (Knebel 1991, Mancebo 1996, American College of Chest Physicians, the American Association for Respiratory Care and the American College of Critical Care Medicine 2002). This view of weaning renders the patient as a passive recipient of care and serves to limit the nursing role. Nurses did not fully understand weaning in terms of the need to optimise and plan for weaning in advance of the patient being ready. There was little agreement about where weaning began and weaning finished.

5.2 Weaning: A New (medical) Definition

This ethnography has demonstrated the role of the patient to be a passive recipient of care. This may in part be due to the restricted definition of weaning as presented in the literature. As a result of this study I offer a new definition of weaning⁴⁰. This encompasses the whole weaning process and makes explicit the role of the patient as an active participant in care. It takes in to account the work by Egerod (2003) who demonstrated the patients who were weaning have their own individual trajectories and that these are often not predictable.

⁴⁰ This definition of weaning is concerned with weaning as a medical condition, a physical process of withdrawal from mechanical ventilation and not as weaning as a 'technology'.

This definition is in contrast to the commonly used definition. It questions the values and ideology associated with the traditional view of weaning. Weaning is defined as:

The gradual reduction of respiratory support (excluding oxygen). This can be delivered by mechanical means (IPPV (ICU), NIV (HDU), NIPPY (ward) or external circuits (T – piece, CPAP) until the point has been reached when either the patient no longer requires assistance (for 24 hours a day) or has reached their maximum potential and has therefore has come to a position when a further reduction of support cannot be achieved. In this case the patient may still require respiratory support continuously or intermittently for up to 24 hours.

The method of respiratory support required and the geographical location is immaterial. Weaning begins as soon as the decision to reduce the level of respiratory support is made (excluding oxygen). There are two stages to weaning, pre-weaning and active weaning. Pre-weaning involves preparation for weaning in order to optimise the weaning process and should begin as soon as the patient is ventilated. The weaning process should involve the patient. One single weaning trajectory is not possible, patients are individuals and as such weaning must be individualised. A description of patients' weaning trajectories as described by Egerod (2003) illustrates this.

This definition challenges the traditional view of weaning in that it does not place at the centre the machinery or equipment rather, the patient is central and weaning is determined by the patients' potential to reduce the

level of support required. This view was reiterated at a conference when Dr John Shnearson, the lead for Papworth weaning centre stated 'machines do not wean patients, patients do' (Field notes: Mid Trent critical Care Network Conference 24.06.04). The inclusion of the patient at the earliest opportunity means the patient is not a passive object to which weaning is applied but rather is seen as an autonomous and active participant. Weaning finishes when the patient has reached their maximum potential. Definitions used in the literature such as 'weaning failure' and 'terminal weaning' (Modernisation Agency 2002) are not useful.

5.3 Weaning: A Technology Transferred

I have demonstrated that weaning was transferred from doctors to nurses and created what Allen describes as 'organizational turbulence' (Allen 1996). I have defined technology transferred to mean a task-focused approach to technology as 'equipment'. What appeared on the surface to be a relatively easy transfer of responsibility from doctor to nurse has not been the case. The transfer of a technology can also relate, as it does in this study, to different geographical places. There was a reluctance to transfer patients who were weaning to HDU and to use the non-invasive ventilators on ICU. Nurses saw weaning as a task devolved to them from the medical staff. Their role in weaning was limited by the technology. They focused on recording technology-generated data on to the 24-hour chart. Barnard and Sandelowski describe the tensions that certain technologies present to nurses and suggest this is not the technology per

se but the way nurses use and perceive them (Barnard & Sandelowski 2001). This view assumes that technology is value free until rendered meaningful by the user. The values assigned to any technology will be context dependent. This ethnography has demonstrated that there were conflicts for both doctors and nurses. The cause of this was the differences in control over the technology and how this affected the division of labour. However, on the other hand Sandelowski suggests that technologies transferred are not simply the hardware components but also the values, norms and practices and these may be in conflict with the receiving culture (Sandelowski 2000). Receiving cultures she suggests may alter these technologies (Sandelowski 2000). She goes on to state that nurses should determine which technologies are congruent with the values of nursing or as she puts it 'authentic tools of the trade' (Sandelowski 1996: 13). The difficulty is in knowing what these are. I suggest one way of achieving this is to transform those (medical) technologies for nursing purposes thus creating nursing technologies.

5.4 Weaning: A Technology Transformed

Although Sandelowski alludes to the transformation of technology she fails to define this. There has been no clear consensus on what constitutes a nursing technology (Purnell 1998, Alexander & Kroposki 2001). Furthermore the existing nursing literature does not adequately distinguish between a nursing technology and a medical technology that nurses use. Purnell states that a 'medical technology' is one designed by and used by medical staff. Technology cannot be value free as it

represents the values of the designer. Medical technologies therefore cannot be nursing technologies according to Purnell (1998). As such these terms have been poorly understood, and often used interchangeably in the literature. She implies that technologies are no more than objects, pieces of equipment and rendered meaningful by the user. Whilst this socially constructed view of technology is helpful it is limited. Timmermans and Berg (2003) state that the development or usage of technology depends on how it is transformed during technological practice, that technology represents dominant ideologies. For this critical care unit these are medically led. According to Scarbrough and Corbett (1992) technology is seen as a process which involves the hardware and the flows of knowledge associated with that hardware. Powerful groups are able to assert their own interests into the technological process by determining the flows of knowledge and shaping the user context. This shaping *for* nurses rather than shaping *by* nurses is an interesting point. There was evidence in this ethnography of a number of competing 'experts' or 'technical gatekeepers' controlling the flow of information. Within critical care these experts were the senior medical staff, although often wearing what Becker refers to as a 'cloak of competence' (Becker 1966). The nurse consultant was not recognised as an expert by the medical staff. This therefore raises the question about how far nurses can control technology.

5.5 Definition of a Nursing Technology

Weaning from ventilation as a nursing technology is characterised by a number of factors. I suggest a nursing technology can be defined as the delivery of proactive, patient-centred and individualised care. Where care delivery centres on knowing the patient, drawing on nursing expertise with clearly defined lines of accountability, responsibility and autonomy. Nursing technologies are those developed by nurses in order to improve patient outcome. A nursing technology incorporates not just the object (equipment) but also the processes of care and knowledge associated with that technology. The definition of a nursing technology (see pg 80) proposed by Alexander & Kroposki is, in my view, limited. It assumes that everything nurses do is a nursing technology however as seen in this ethnography technology can be transferred and as Purnell (1998) has pointed out not all technologies used by nurses are nursing technologies. Alexander and Kroposki identify three attributes of a nursing technology; knowledge, raw materials and nursing care processes. Firstly, they say, nurses require specialised knowledge. This ethnography has demonstrated that nurses with limited experience, knowledge and exposure were often allocated to look after patients who were weaning. This in turn leads to task orientated care and failure to appreciate cues which in turn hinder patient progress (Ball & McElligott 2002). Alexander & Kroposki fail to mention the knowledge that constitutes 'knowing a patient'.

Secondly, the raw materials are patients and they influence the technology used for the patient. Nurses in this study actively resisted the

introduction of technologies that they were unfamiliar with and therefore reduced the range of technology available. Nurses also removed the ventilator before weaning had been completed. This has been interpreted as exerting control over the content of nursing work. The division of labour affects the content and control of nursing work (Allen 1996) and this was evident in weaning. In this study the senior medical staff controlled weaning. This affected how nurses perceived their role in relation to weaning. Alexander and Kroposki also fail to mention the role of the patient.

Thirdly, nursing care processes include the actions taken by a nurse to improve a patient's health status. This requires individualised care. In this ethnography nurses did not provide individualised care. Rather, they reverted to task orientated care with the result that patients were unsupported during the weaning process and patient cues could therefore be missed. It was noted by Ball & McElligott (2002) that a decrease in the nursing resource and / or increased activity affected the nurses' ability to be patient-centred. When nurses were busy, weaning was either delayed or abandoned. In this study nurses were task orientated and saw weaning as work. Patient-centred care may not always be care that is individualised and it is my view that nurses thought what they delivered was patient-centred care. However as was demonstrated in weaning, this was not necessarily individualised care as patients were expected to follow a weaning trajectory. This determined the care given to patients who were weaning and as a result all patients who were weaning were treated in a similar way.

Nurses defined technology as equipment or machinery and saw weaning as a task devolved to them from medicine. Their view of weaning was context dependent (Sandelowski 2000) and changed depending on the equipment used and the environment in which care was delivered. Patients who were weaning were deemed not to be critically ill. Weaning was defined in the traditional way (Knebel 1991, Mancebo 1996) and this limited the nursing role.

The characteristics of a technology transformed are listed in table 6. Nurses require knowledge, experience of and exposure to weaning. Experienced nurses work in a proactive manner providing close surveillance and immediately respond to patient cues and in this way are able to reduce the risk to patients. Weaning is nurse-led, with patient-focused goals. Technology in this respect is an embodied approach to care, seen not as an adjunct to care, or as a means of bridging a gap between technology and care, but as a total process including the knowledge, skills and equipment that encompass the nursing care of the individual. Weaning is planned when ventilation begins and is therefore proactive. Weaning is the nurses' responsibility. Nurses do not work in isolation but appreciate there are a number of experts in weaning to draw on. They work as part of a team.

Conclusion

In this study I have addressed three main aims. Firstly, I have described what technology means to nurses in critical care and how nurses used this technology in practice. Nurses saw the ventilator as a 'medical'

technology, a piece of equipment or machinery and weaning as a task, devolved to them from doctors. Technology had a different meaning depending on, what Sandelowski (2000) describes as, the user context. The ventilator had a different meaning when weaning began. This may not be as straightforward as Sandelowski portrays. As Scarbrough and Corbett (1992) have pointed out the 'user context' is shaped not necessarily by the users themselves but by powerful groups. In this ethnography the most powerful group were the senior medical staff. They shaped the user context by acting as technical gatekeepers and 'experts'. Weaning was a technology transferred to nurses from doctors. Technological control however was not transferred.

The second aim was to determine whether weaning from ventilation could be used to demonstrate the nursing contribution to the development of critical care. In this study the nursing contribution was demonstrated through the transfer of technology. The nursing role in weaning was limited to the monitoring and recording of technology-generated data. This marginalized and obscured the nursing contribution. Nurses were rendered invisible by doctors and were also complicit in their own invisibility. Whilst technology remained transferred the full potential of the nursing contribution would not be revealed. Technology transformed was in evidence through some nurses including the nurse consultant. When this occurred weaning was accelerated and the nursing contribution was made explicit.

The third aim was to define a 'nursing' technology and identify the conditions required for this technology to be transformed. I have

identified a number of factors that are required in order to transform a 'medical' technology into a 'nursing technology'. A nursing technology is not just simply 'good nursing care' it is a process of care used to improve patient outcomes. Providing individualised care that is patient-centred and maintaining a routine that is safe, is no easy accomplishment in today's climate of nurse shortage and fiscal constraints. At the same time nurses are facing changes to their roles often imposed on them in order to fill gaps in service or provide more effective and efficient ways of delivering care. It is therefore not surprising that nurses have difficulty reconciling the transfer of technology. As a result of the study I have devised a diagrammatic representation of technology transferred and technology transformed (Figure 7). Nurses have the potential to improve the patient's experience and quality of care as well as to improve the eventual outcome for patients. Nurses can and do make a difference to patient care (Manley et al 2005).

I began this thesis by challenging the view that the development of critical care was due solely to the introduction of new technology and by commenting that the nursing contribution was invisible in the political and historical literature. I have suggested that the technology was not new but was transferred from the operating room and that nurses have contributed to this development by providing the conditions for intensive care to develop. One important factor was the grouping together of sick patients who were closely 'watched over'. Nurses used technology in their care of patients. The question was 'were nurses *required* to adapt and change their roles or was it *because* nurses adapted and changed their roles?' This ethnography suggests that when technology is transferred it

is because nurses' are *required* to change and adapt their roles but when technology is transformed this is *because* nurses' chose to change and adapted their roles for the benefit of patients. The nursing contribution to the development of critical care is demonstrated through the transfer and transformation of technology. It is most clearly seen via nursing technologies which have developed as a result of expertise in nursing. Weaning is one example.

An ethnographic approach to studying technology in the workplace has provided a way of exploring the conditions in which technology is used in every day practice. Observation is fraught with tensions and in particular the role of participant observer. Researching whilst being part of the team under observation is challenging. It became apparent to me during the period of writing up that in fact part of what I was observing in practice was my self and I have reflected on these issues in chapter two. As a nurse consultant, a senior role in practice, I had introduced and led nurse-led weaning. This study has helped clarify the role of the nurse consultant and identified areas where these roles can improve patient outcomes. This ethnography is written in the genre of confessional tales. I adopted the position of expert and represent the views of the fieldworker rather than the native. I offer my interpretation of the data but try, as far as I can, to represent this as truthfully as possible. However it must not be overlooked that we all come to research with our own prejudices and assumptions and whilst I was aware of my role I did not see its true impact until reading the observation transcripts. At times in my own writing (of field notes) I show my frustration with the nursing staff. On reflection I now understand the complexities of nurse-led weaning and

can offer some explanation regarding why this has not taken the course I had hoped. Whilst there are disadvantages associated with participant observation it is my belief that in my position as a participant in my own work place I have been forced to confront my assumptions and everyday practices in a way that has truly helped me understand what it is to be a critical care nurse.

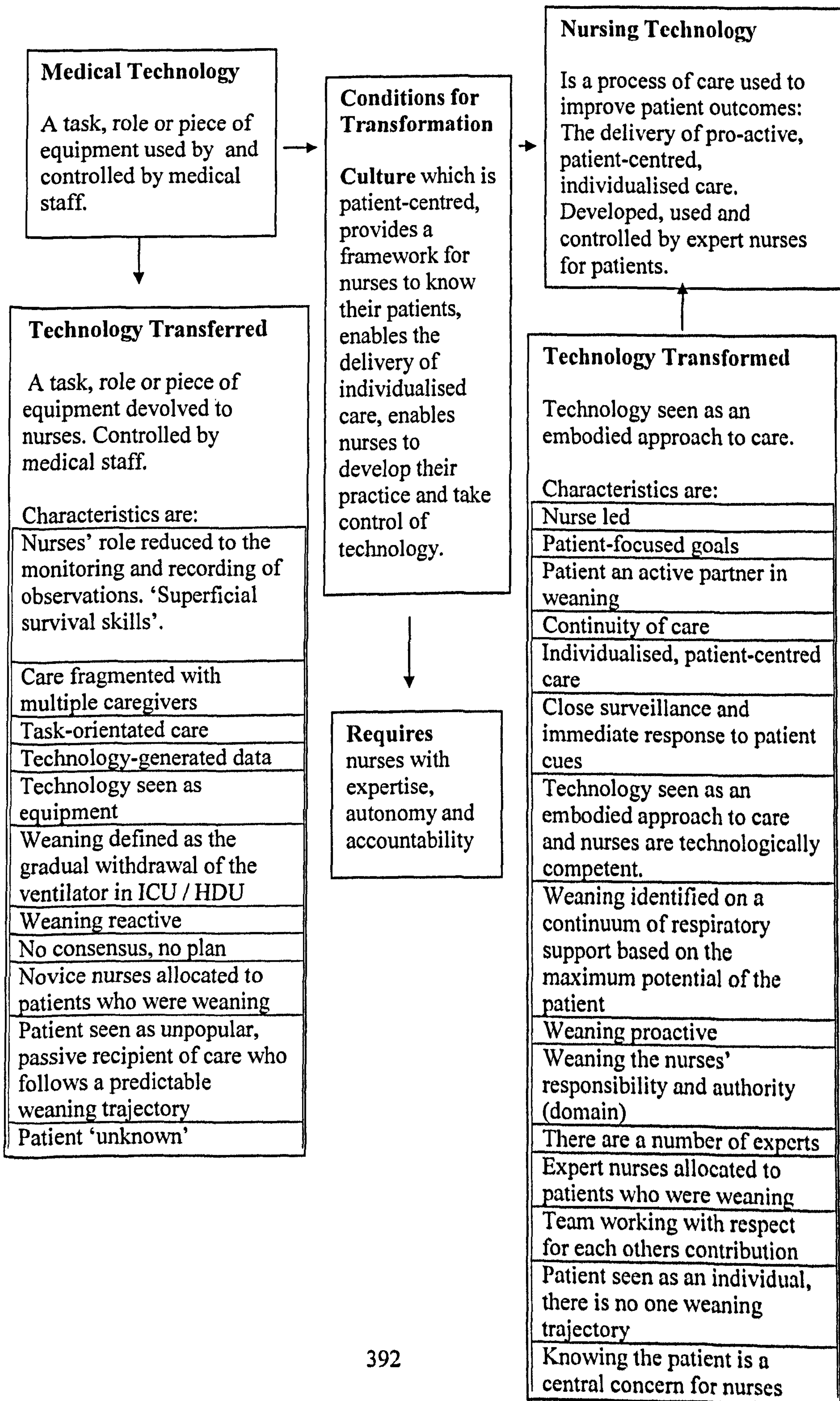
I chose to interview nurses only but observed the interactions of nurses with patients and medical staff. My reason for this was to understand the views of nurses, how nurses used and understood technology in practice⁴¹. As such this ethnography may be described as partial or representing a sub-culture of critical care. The views of the medical staff have not been totally ignored. I suggest for a complete insight into the culture of critical care the views of all the actors would need to be explored, including patients and their relatives.

This thesis has been informed by the work of Sandelowski. I have found Sandelowski's work useful in helping me to contextualise technology in critical care. Through the tradition of work place studies I have been able to examine technology in action. From this I have been able to build on Sandelowski's work by developing the concepts technology transfer and technology transformed. The changing nature of nurse's work is exactly where researchers should focus if they want to examine the visible and invisible nursing contribution to patient care. I have demonstrated that

⁴¹ I was guided by Sandelowski's work in the nursing – technology relation, she conducted 31 telephone interviews with nurses who had practiced in the 1960's and 1970's as part of her research.

examining the nursing - technology relation is one way this can be achieved.

Figure 7. Defining Concepts of Technology Transferred, Technology Transformed and their Relationship



5.6 Implications of the Study

There are several implications of the study and these relate to nursing and the organisation in which nursing occurs.

There were several issues identified in this study that directly relate to patient outcome and these have implications for nursing practice. Knowing a patient has been shown to improve patient outcome by shortening weaning time and reducing nosocomial pneumonia (Jenny & Logan 1992). Multi-disciplinary team working, sharing of patient information on the ward round improves the quality of patient care (Felten et al 1997, Wright et al 1996). Nursing attributes as defined as exposure, experience and expertise have been demonstrated to affect patient recovery (Ball & McElligott 2002, Manley et al 2005). In this study junior nurses (advanced beginners) ability to get to know their patients was limited to knowing them through technology.

I have suggested that shared norms for weaning are not evident in practice, that weaning is itself a complex procedure. Patients do not follow a predetermined trajectory (Egerod 2003) and therefore the use of protocols may not be appropriate. The role of the patient has been discussed and it is evident that patients are not considered to be partners in their care. It is Government policy that patients must be given choice and placed at the centre of care (DoH 2004).

Nurses may feel they lack the skills and knowledge required to wean patients from ventilation and this needs to be addressed in formal education programmes and in-service training. Whilst formal qualifications are not mandatory to work in critical care they are desired. However nurses can chose whether they do these or not. Nurses must acquire competency in mechanical ventilation and in weaning from ventilation. Technological competency needs more clarification and exploration. Failure to do this will result in what Bevan (1998) described as survival skills rather than mastery and this will limit the nursing role. Governance procedures for checking ventilation are required and will help to enforce best practice as well as protect the patient and practitioner.

This ethnography has demonstrated that the transfer of a technology from nurses to doctors or from one geographical place to another will have consequences for the division of labour notably the content of nursing work. Nurses are not 'endlessly absorbent sponges' but will try and control the content of their work. The acceptance of a technology into nursing practice will be determined by the culture of the organisation in which nursing occurs. A transfer of technology is not a simple one as Sandelowski and Allen have demonstrated. Yet in the history of the NHS the management of change has often overlooked these important sociological findings. It is important to understand how nurses use and perceive technology in the workplace and to clearly differentiate between a medical technology that nurses use and a nursing technology. Issues of power and control are important and although this ethnography has not addressed these explicitly they are nevertheless implicit.

This ethnography has contributed to future role development by firstly, clarifying the role of the nurse consultant and secondly, by clarifying and distinguishing between technology transfer and technology transformation and what this means to patient care.

The final part of this chapter is concerned with recommendations for practice and future research.

5.7 Recommendations for Practice and Future Research

As a result of an in-depth analysis of nurses using technology in the workplace I offer the following recommendations for practice and suggest areas for future research.

Recommendations for Practice

1. Chapter 4.1 examined 'knowing the patient' demonstrating that nurses on the whole did not know their patients. This was compounded by the lack of individualised care. Care became a series of tasks and one area in particular, 'doing the wash' identified in 4.2 as a nursing ritual. In light of this I recommend that nursing as a profession needs to distinguish between the rhetoric espoused both in policy documents and from individual nurses and the reality of nursing work. A framework for nurses, which helps them know the patient needs to be developed.
2. In order to define 'knowing a patient' I draw on Benner's work, Novice to expert (1984) and Tanner et al (1997) and assert that this may only be possible by 'expert' nurses. Roles such as the nurse consultant who are deemed 'experts' (DoH 2001) are pivotal in developing practice and I recommend these posts as a way forward. In this way the nursing contribution to critical care can be acknowledged. I also urge caution in the creation of new roles, such as those described by Scholes et al (1999, 2002) to fill gaps in service delivery or substitution roles which have the

potential to remain controlled by medicine and do little to advance nursing. There is also the need to examine the culture of the workplace before new roles are introduced, what may work well in one area may not in another and a blanket approach to the introduction of new roles may not be the best way forward.

3. In chapter 5.2 I offer a new definition of weaning from ventilation that places the patient at the centre and I urge clinicians to think carefully about the future of service delivery for patients who were weaning. There is a view that patients who were weaning have become an 'economic burden' and the development of 'weaning centres' is a way forward (Modernisation Agency 2002). Whilst patient outcomes are known (Pilcher et al 2005) this needs careful consideration that the economics of care do not override the quality of the patient experience. We also need to consider that patients should not be re-assigned to another area simply because they have become unpopular as demonstrated in chapter 4.4 or they do not fit the restricted definition of being 'critically ill'. Nurse-led weaning centres may be the way forward.

4. Nurse-led weaning appears to be given some consideration in recent literature but this is tempered by the restraints of protocols. Results from my study suggest this may not be the way forward and chapter 4.4 describes in detail many of the issues and complexities. Patients do not fit neatly into protocols of care. I have suggested the weaning trajectory identified in this study does not allow for individual variation in weaning. The unintended consequence of protocols may be to try and fit patients

into a narrow definition of weaning with the result that neither patient nor clinician is satisfied.

5. In the first part of the literature review I have examined the history of the development of critical care and suggested that the grouping together of critically ill patients 'watched over' by critical care nurses was a contributing factor for its development (Fairman & Lynaugh 1998: 3) I now assert that critical care nurses need to re-examine their role and 'go back to basics'. There is a tendency to designate this fundamental part of the role to 'basic care' and to devolve it to unqualified nurses. In doing so the experience and expertise of critical care nursing will be lost. Nurses will remain no more than 'an extension of technology', or an extension of the 'physicians senses', unable to pick up on patient cues, to read and interpret complex data and to use their skills to comfort and reassure patients. We must be careful not to throw the baby out with the bathwater or be seduced by glamorous 'new ways of working'.
6. I suggest an examination at grass roots level of how nurses can adapt, and to use Sandelowski's phrase 'reconfigure' technology so that it can be transformed into a nursing technology. Those technologies that do not fit with nursing may have no place there. Rather than simply extending and expanding their roles through the transfer of technology, nurses transform those technologies that preserve the essence of nursing and can contribute to a positive outcome for patients.
7. Finally I recommend that managers of critical care need to re-examine the current skill mix. More nurses with experience and expertise are required

(Alexander & Kroposki 2001, Manley et al 2005). Without additional funding this may mean compromising the nurse-patient ratio, however I assert this is a worthy sacrifice if we are to adequately care for patients with complex physical and psychological needs. There has been a tendency to employ more junior nurses or un-registered nurses in order to maintain the nurse-patient ratio. We need to examine what support is available for these nurses and how they are to develop their expertise without adequate mentors and role models.

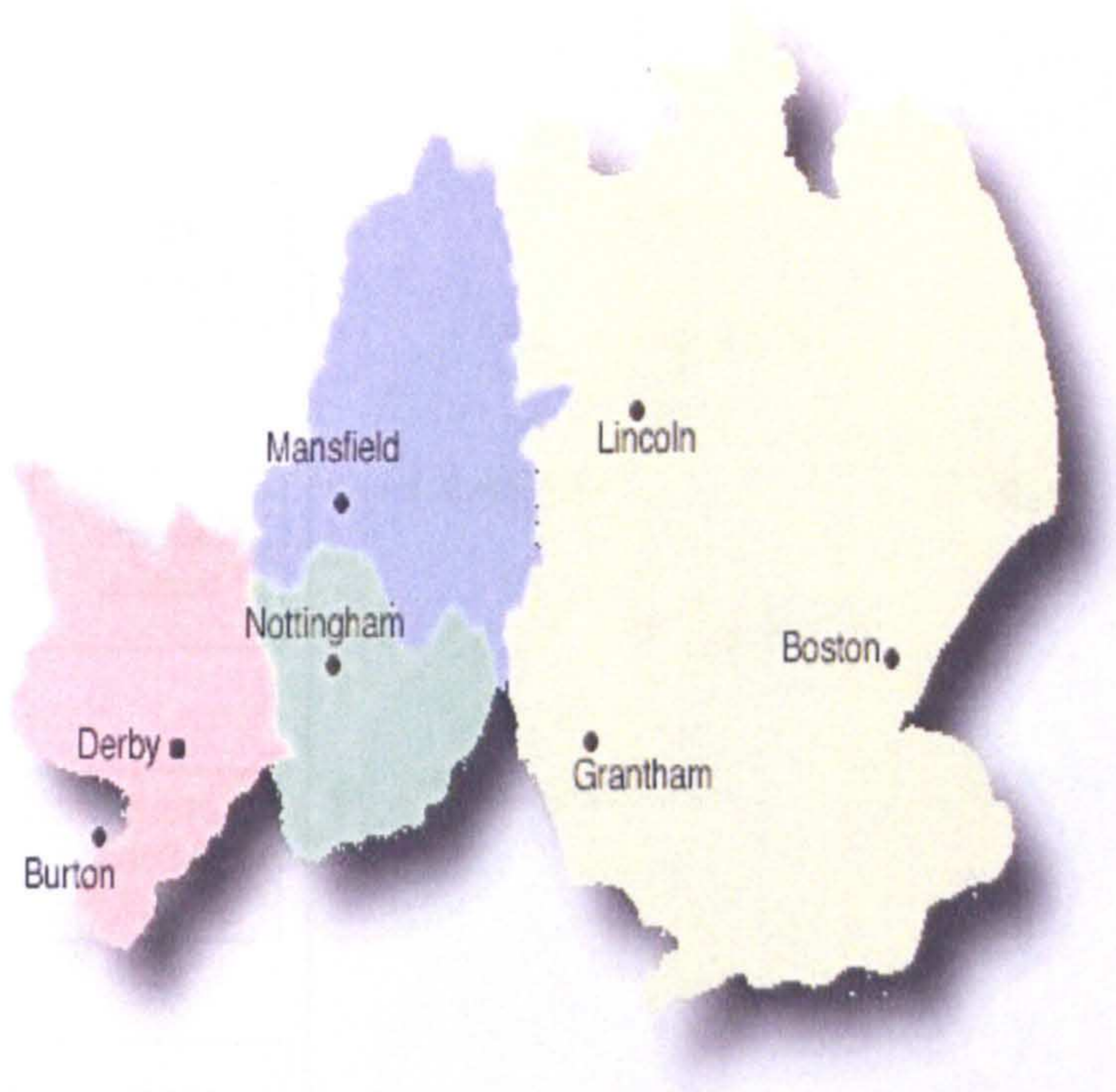
Areas for Future Research

1. The patient experience of weaning is limited in the literature. Patients give valuable accounts of their experiences and should, as consumers of care, be involved in developing that care. As Cook et al (2001) states in this way health care professionals can better appreciate the needs of patients during the weaning process and can develop and understand their own roles (Ibid.: 469).
2. An examination of nursing rituals is a prolific area of study. These tend to be specific to a particular area of care (such as the ward round, or oral handover) rather than identifying what rituals exist in different nursing locations (such as critical care). I have only described one ritual 'doing the wash' in chapter 4.2 but this was not an intention of the study and consequently I have not approached it at the level that a separate research study would do. Further research of nursing rituals in critical care is therefore recommended.

3. I have offered a definition of a nursing technology and have described the attributes in chapter 5.6. Using the conceptual framework developed by Ball & McElligott (2002) I recommend identifying individual nursing technologies and applying these to the framework in order to establish whether nurses make an actual difference to the recovery of patients who are critically ill, for example as outreach teams or in the role of the nurse consultant.

4. I have offered a hypothesis for technology transformed and the characteristics that describe this concept. I have described one characteristic to be nursing expertise. Whilst I have given some examples where this occurred in this ethnography these are limited. I therefore recommend further research to test this hypothesis and to examine the relationship between expertise in nursing and a nursing technology.

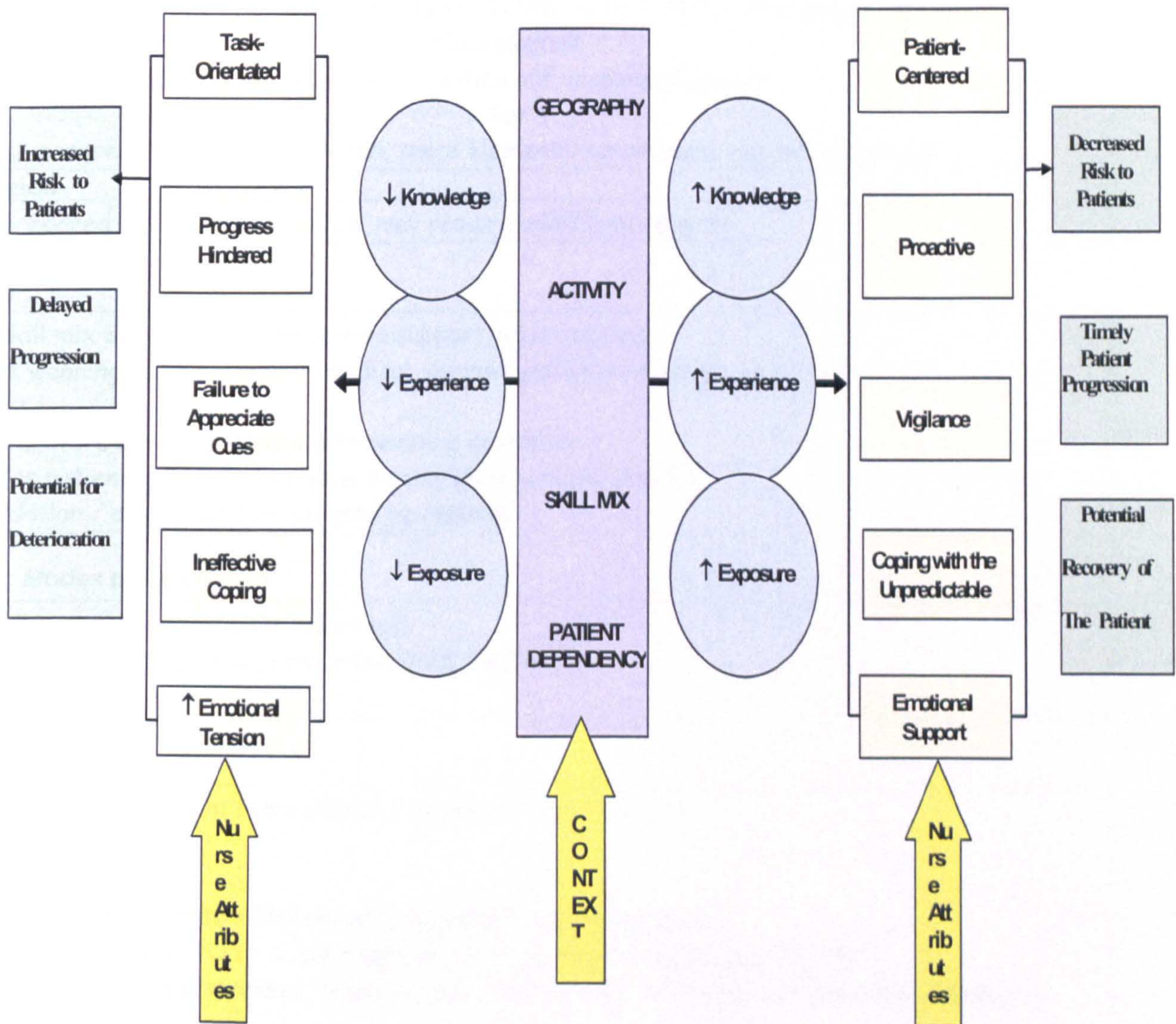
Map of Mid Trent Critical Care Network



Appendix 2

Realising the Potential of Critical Care Nurses (Ball & McElligott 2002)

Ball C, McElligott M (2003) Realising the potential of critical care nursing. An exploration of the factors that affect and comprise the nursing contribution to the recovery of critically ill patients. *Intensive and Critical Care Nursing* 19 (4) 226 - 238



**TEXT BOUND INTO
THE SPINE**

Appendix 3

Example of Nurse - Led Weaning Protocol

Guidelines for Nurse - led weaning

Assessment criteria

Physical

Respiratory

FIO₂ < 0.5, low levels PEEP, Acid / base balanced, ABG's acceptable and normal for patient, chest secretions acceptable.

CVS

CVS Stable (+/- inotropes), Hb >8, or 10g / dl for COAD, temp < 38.5 > 35 degrees centigrade

Neurological

Respiratory drive in tact, pain controlled, sedation off or minimal amount

Gut

Feeding in progress or being considered, trace elements normalised, gut not distended

Psychological

Patient prepared, involved, has rested, may require additional support

Planning

Assess skill mix of nurse. Coordinator to support junior nurses

Timing of weaning to coincide with medical, nursing and physiotherapy activities

Equipment :

Evita 4, XL and Dura for patients with weaning problems

Evita 2 for patients expected to wean quickly (within seven days)

Night sedation / anxiolysis therapy may be required

Process: Modes of ventilation

BIPAP (when total ventilation is indicated)

Pressures adjusted to provide prescribed PaO₂ and PaCO₂

Modes of weaning

BIPAP + ASB (when patient has reached assessment criteria)

ASB + CPAP

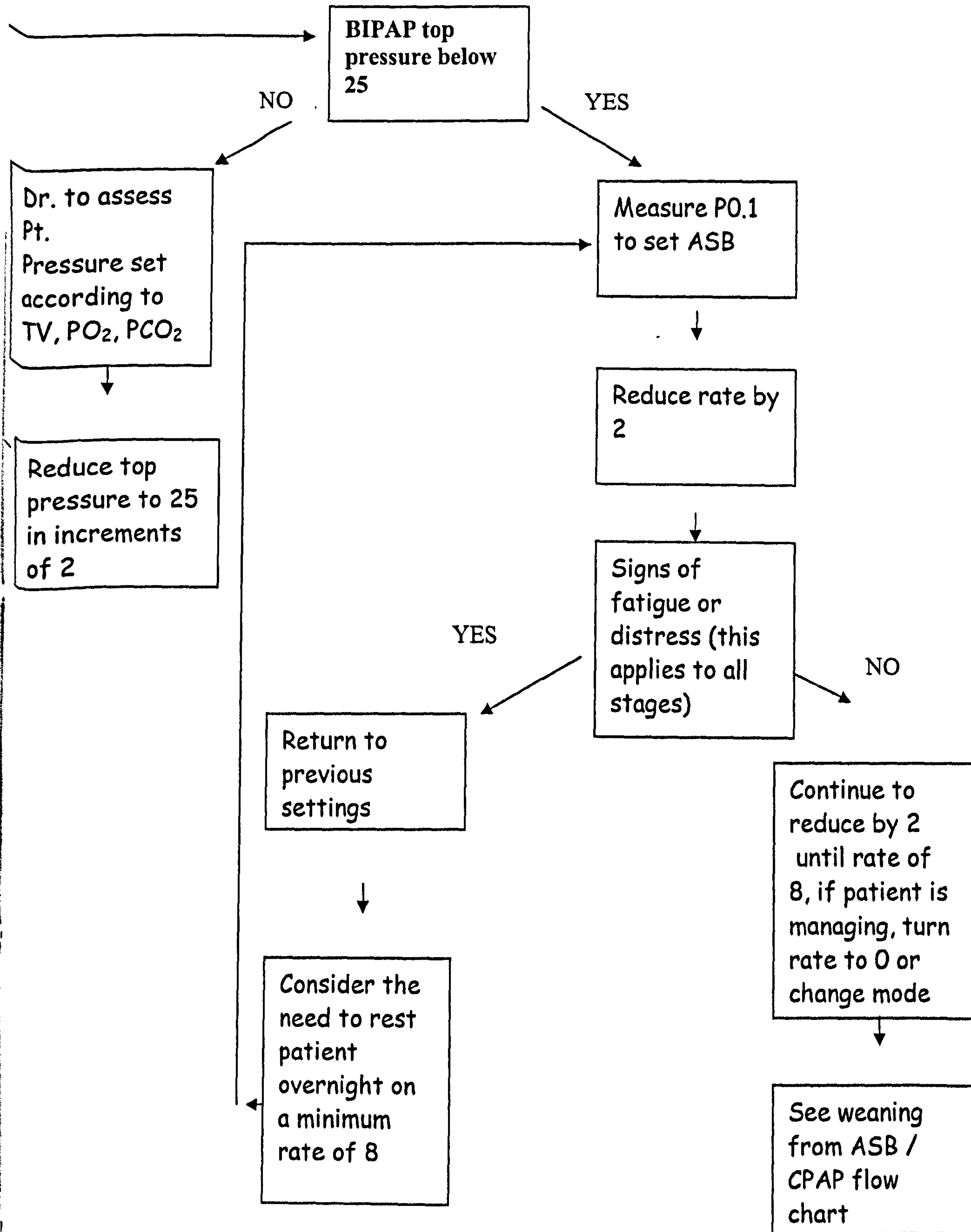
Signs of fatigue:

Increased respiratory rate > 35 bpm or exceeding 10 above baseline

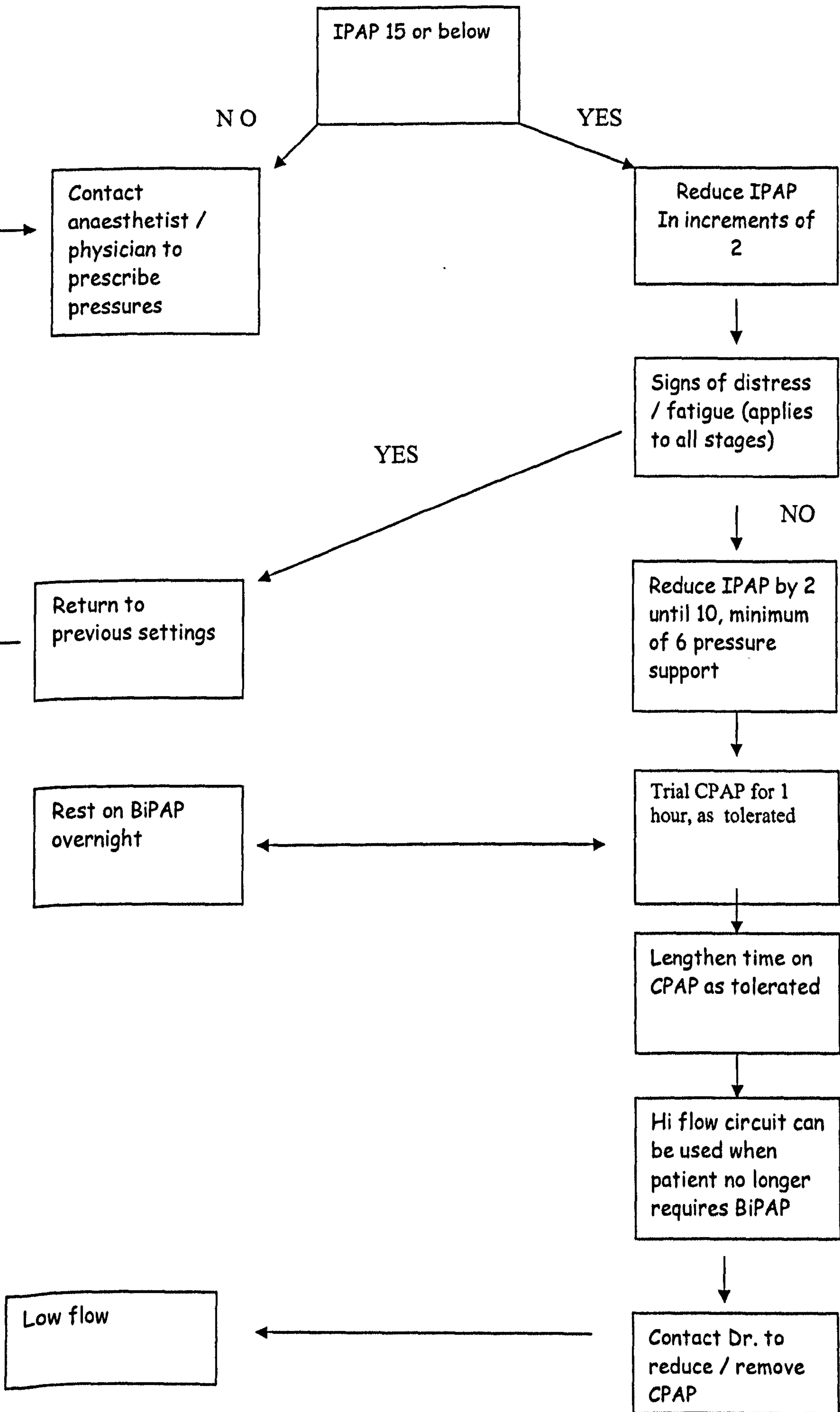
Decreased tidal volume, PO.1 > 6, Decrease in PaO₂, SaO₂ and increase in PaCO₂

Patient looks and feels distressed, hypertension, tachycardia, sweating and there are changes in mental state.

Weaning from BIPAP / ASB

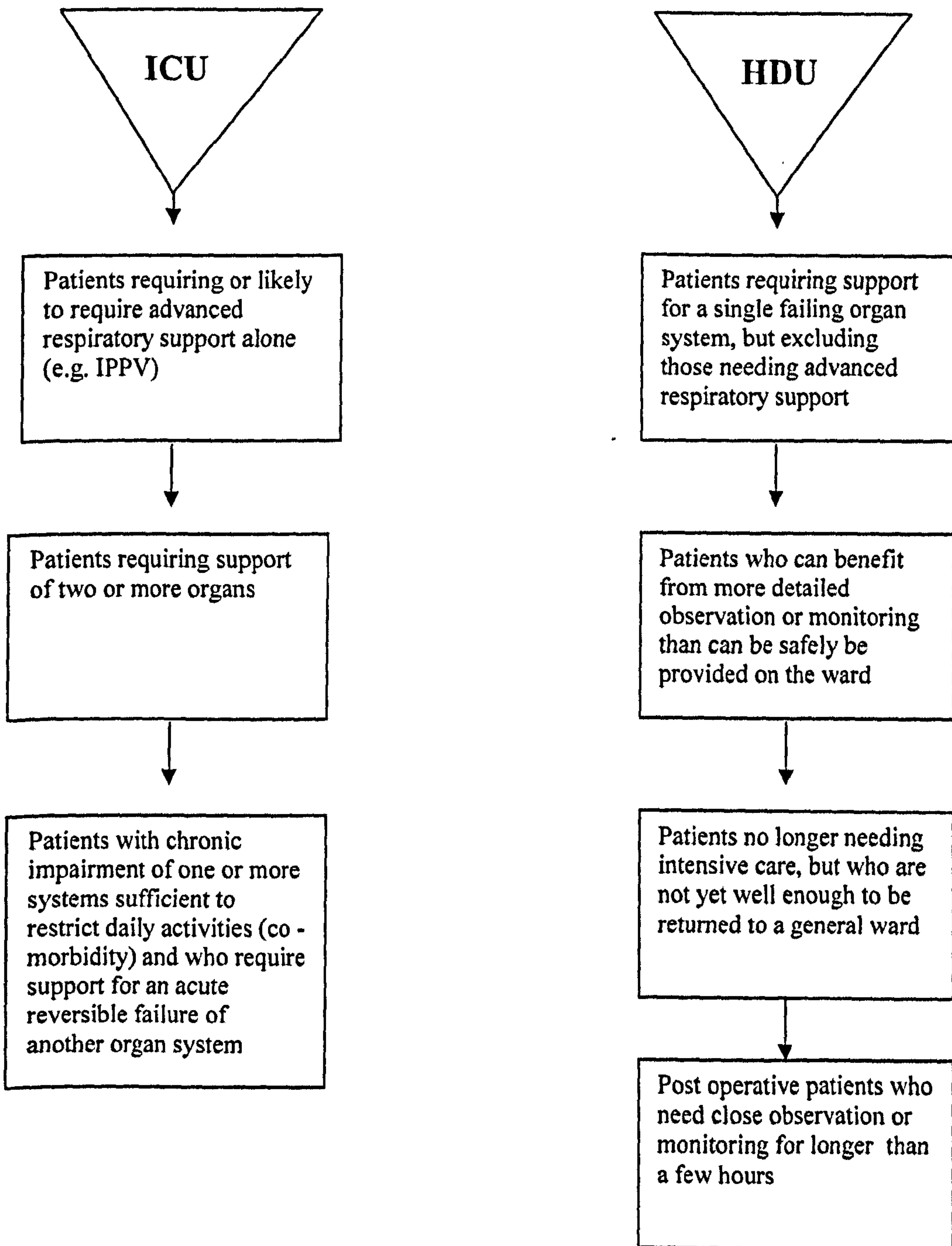


Weaning from Non-Invasive BiPAP / CPAP (non COPD patients)



Appendix 4

Guidelines on Admission to and Discharge from Intensive Care and High Dependency Units (DoH 1996: 8)



Appendix 5

Consent Sheet

Title of Study:

The nursing contribution to the development of intensive care: making nursing work visible through weaning from mechanical ventilation

Please cross out as necessary

- Have you read & understood the participant information sheet YES/NO
- Have you had opportunity to ask questions & discuss the study YES/NO
- Have all the questions been answered satisfactorily YES/NO
- Have you received enough information about the study YES/NO

- Who have you spoken to Dr/Mrs/Ms
- Do you understand that you are free to withdraw from the study
- at any time YES/NO
- without having to give a reason YES/NO
- without affecting you in any way YES/NO
- Do you agree to take part in the study YES/NO

Signature (Patient)

Date

Name (In block capitals)

I have explained the study to the above participant and he/she has indicated his/her willingness to take part.

Signature (Researcher)

Date

Name (In block capitals)

Appendix 6

Information Sheet (staff)

Title of Study

The nursing contribution to the development of intensive care: making nursing work visible through weaning from mechanical ventilation

Cheryl Crocker, Nurse Consultant, Critical Care

This research is part of a doctoral (PhD) study at The University of Nottingham, Faculty of Medicine

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Background to the study

The first established intensive care units (ICU) in Britain originated from the poliomyelitis epidemic of the 1950's. The development of intensive care thereafter was as a result of the transfer of technology from other disciplines and professions in response to patient need. This medical technology, including what is commonly seen as equipment, drugs and therapeutic measures in intensive care is used by nurses. No clear definition of nursing technology exists, that is the care delivered to patients by nurses. Indeed the nursing contribution to the development of intensive care has not been defined. The written history of ICU is mainly concerned with medical diagnoses and treatments and the adaptation of existing technologies to the intensive care environment.

The aim of this study is to make the nursing contribution to the development of intensive care visible through weaning from mechanical ventilation.

Why have I been chosen?

All the nursing staff on the unit who are involved in patients who were weaning from mechanical ventilation are being invited to take part in this study. The study is thought to last for 6 months and therefore you may be asked to participate on more than one occasion.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any

time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect you in any way.

What will the study involve?

The study will involve participant observation and interviews. Participant observation means the researcher will be working as a nurse in the unit whilst observing nurses patients who were weaning from mechanical ventilation. You will also be invited to take part in an interview in order to clarify any points with the researcher. The researcher will also observe medical ward rounds and nurse handovers.

Can I refuse to take part?

Yes you are free to refuse at any time, without giving a reason. There may also be times when you feel it would be inappropriate to be observed and you are free to make this known to the researcher.

What will happen to the results of the study?

Data, including audio – taped interviews from the study will be strictly confidential and locked in a cupboard in a locked office. This data will only be shared with the researchers supervisors (Dr. Liz Hart and Dr. Stephen Timmons). Data from the study will be publicised through informal and formal presentations, such as journal papers and conferences and a copy of the PhD thesis will be kept at the University of Nottingham library.

You will be given a copy of the information sheet and signed consent form to keep.

Contact for further information

Further information can be obtained from the lead researcher Cheryl Crocker.

Information Sheet (patients)

Title of Study

The nursing contribution to the development of intensive care

Cheryl Crocker, Nurse Consultant, Critical Care

This research is part of a doctoral (PhD) study at The University of Nottingham, Faculty of Medicine

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Background to the study

The first established intensive care units (ICU) in Britain originated from the poliomyelitis epidemic of the 1950's. The development of intensive care has relied on medical equipment and technology. Most of the literature published is concerned with diseases and treatments. This has meant the contribution of the nurse is often hidden.

The aim of this study is to uncover the nursing contribution to the development of intensive care. The best way of doing this is to observe nurses at work using the equipment. The research will be to observe the care that you or your relative receives when coming off the ventilator.

All the nursing staff on the unit who are involved in looking after patients are being invited to take part in this study as they are to be observed in practice it inevitably means your care will be observed also. The study is thought to last for 6 months and therefore your carer may be asked to participate on more than one occasion.

What will the study involve?

The study will involve watching how nurses work (it is not you, the patient who is being observed), in particular how they use the equipment. This is not a test of the nurses ability or competence, all nurses on the intensive care unit are trained to look after sick patients and are skilled in using the equipment. This means the researcher will be working as a nurse in the unit whilst observing other nurses she will be wearing uniform and will introduce herself to you.

Can I refuse to have my care observed?

Yes you are free to withdraw your consent at any time, without giving a reason. There may also be times when you feel it would be inappropriate to have your

care observed and you are free to make this known to the researcher or your nurse. No further observation will take place.

What will happen to the results of the study?

Data from the study will be strictly confidential and locked in a cupboard in a locked office. This data will only be shared with the researchers supervisors (Dr. Liz Hart and Dr. Stephen Timmons). Data from the study will be publicised through informal and formal presentations, such as journal papers and conferences and a copy of the PhD thesis will be kept at the University of Nottingham library.

Contact for further information

Further information can be obtained from the lead researcher Cheryl Crocker

Information Sheet (relatives / friends and carers)

Title of Study

The nursing contribution to the development of intensive care

Cheryl Crocker, Nurse Consultant, Critical Care

This research is part of a doctoral (PhD) study at The University of Nottingham, Faculty of medicine

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Background to the study

The first established intensive care units (ICU) in Britain originated from the poliomyelitis epidemic of the 1950's. The development of intensive care has relied on medical equipment and technology. Most of the literature published is concerned with diseases and treatments. This has meant the contribution of the nurse is often hidden.

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All the nursing staff on the unit who are involved in looking after patients are being invited to take part in this study as they are to be observed in practice it inevitably means your care will be observed also. The study is thought to last for 6 months and therefore your carer may be asked to participate on more than one occasion.

What will the study involve?

The study will involve watching how nurses work (it is not the patient who is being observed), in particular how they use the equipment. This is not a test of the nurses ability or competence, all nurses on the intensive care unit are trained to look after sick patients and are skilled in using the equipment. This means the researcher will be working as a nurse in the unit whilst observing other nurses she will be wearing uniform and will introduce herself to you.

Can I refuse to be observed?

Yes you are free to withdraw your consent at any time, without giving a reason. There may also be times when you feel it would be inappropriate to be

observed and you are free to make this known to the researcher or your nurse.
No further observation will take place.

What will happen to the results of the study?

Data from the study will be strictly confidential and locked in a cupboard in a locked office. This data will only be shared with the researchers supervisors (Dr. Liz Hart and Dr. Stephen Timmons). Data from the study will be publicised through informal and formal presentations, such as journal papers and conferences and a copy of the PhD thesis will be kept at the University of Nottingham library.

Contact for further information

Further information can be obtained from the lead researcher Cheryl Crocker

REC C1120306

(please quote this number on all correspondence)

06 February 2004

Mrs CG Crocker
Nurse consultant
Critical care

Dear Mrs Crocker

Re: The nursing contribution to the development of intensive care: making nursing work visible through patients who were weaning from mechanical ventilation

The Chair of the Research Ethics Committee 1 has considered the amendments submitted in response to the Committee's earlier review of your application on 13 January 2004 as set out in our letter dated 15 January 2004. The documents considered were as follows:

- . Application Form
- . Protocol
- . Patient Information Sheet Version 2 dated 27/01/04
- . Staff Information Sheet Version 2 dated 27/01/04
- . Relatives/Friends and Carer Information Sheet Version 2 dated 27/01/04
- . Ward Summary Sheet for Staff Version 2 dated 27/01/04
- . Ward Summary Sheet for patients friends and relatives Version 2 dated 27/01/04
- . Consent Form
- . CV for Mrs Crocker

1. The members of the Committee present agreed that there is no objection on ethical grounds to the proposed study. On behalf of the Committee I am, therefore, happy, to give full approval for this study on the understanding that you will follow the conditions set out below:
2. The Project must be started within three years of the date on which REC approval is given.

You must not start your project in any institution until you have received written approval from their R&D department. You should have submitted your original application to the R&D office and parallel reviews will have been taking place. Approval should therefore be imminent. If your study is to take place in any of the following units then you do not need further ethical approval but you do need R&D approval.

If your study is to take place in units outside of XXXX but still within the boundaries of the Strategic Health Authority, then you do not need further full ethical approval. You will however need your study approved by the R&D unit of the institution concerned and an assessment of 'locality issues.' These 'locality issues' (such as appropriate status of research aspects of local research subjects, information sheets) are usually addressed and reviewed by the local ethical committee and you should clarify this point with the administrator of your local REC. These reviews should take place quickly.

You must not deviate from, or make changes to, the protocol without prior written approval of the REC, except where this is necessary to eliminate immediate hazards to research participants or when change involves only logistical or administrative aspects of the research. In such cases the REC should be informed within seven days of the implementation of the change.

- 4 You complete and return the standard progress report form to the REC one-year from the date on this letter and thereafter on an annual basis. This form should also be used to notify the REC when your research is completed and in this case should be sent to this REC within three months of completion.
- 5 If you decide to terminate this research prematurely you send a report to this REC within 15 days, indicating the reason for the early termination.
- 6 You advise the REC of any unusual or unsuspected results that raise questions about the safety of the research.

Yours sincerely



Chair/Administrator
XXXX Research Ethics Committee 1

cc Research and Development

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