Understanding the Work of Intensive Care Nurses;
a Time and Motion Study

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Submitted in fulfilment of the requirements of the degree
of Master of Philosophy

February 2008

Abstract

Internationally and nationally it is recognised that there is a shortage of Registered Nurses (RNs), which is occurring within a context of increasing costs of health care and limited funding. The specialist area of the Intensive Care Unit (ICU) is one area that requires numerous resources. The patients admitted to ICU need advanced specialist care involving significant human resources (nursing, medical, allied health) and equipment. One method that is utilised to manage the ICU nurse resource is workload tools. Workload tools guide manager's decisions related to the allocation of ICU nurses. In order to develop workload tools that are applicable to the Australian context, it is important to first understand what the Australian ICU nurse does as they work.

The aim of this study was to describe and analyse ICU nurses' activities during the day shift. A non participant time and motion observation method was utilised. Ten ICU nurses were observed for their day shift in a private hospital in South East Queensland. First, the number of activities undertaken was analysed to determine the frequency of undertaking multiple activities at one time. Next, the data were categorised into four major and 25 minor work activity categories. The major categories were direct patient care, indirect patient care, unit related activities and personal activities. Finally, the observed nurses' activities were classified according to a schema of six work activities. This schema included 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility'. Data analysis was performed using Microsoft Excel and Statistical Package for Social Sciences.

The ten ICU nurses were observed for 76 hours 26 minutes. In total 3,081 activities were observed. The ICU nurses were observed performing two simultaneous activities for 43% of their time. The major work activity categories data indicated that the ICU nurses' time was divided up into direct nursing care activities (60.3%), indirect nursing activities (32%), personal activities (4.5%) and unit-related activities (3.2%). The schema of work activity findings indicated that the ICU nurses' activities were predominantly 'routine' (94.2%), versus 'non-routine', requiring 'discretion' for 95.8% of their work activities. The 'discretion' category indicating the autonomy of the ICU nurse as they worked. In total, 95.6% of activities were 'not intense', and 41.2% of them required multiple activities ('multiplicity'). A total of 25.2% of the work activities that

were 'complex' and 94.9% required nurses to use their knowledge as they worked ('accessibility').

This study identified that the ICU nurses spent approximately two thirds of their time involved in direct nursing care and almost a third of their time involved in indirect nursing care. The simultaneous activities that ICU nurses performed equated to greater than 40% of their time. The actions of the ICU nurses were predominantly routine, autonomous and not intense. The work activities were principally regular, however there were complicating factors for this group of ICU nurses, such as multiple and complex activities. This level of analysis of ICU nurses' work is not commonly undertaken, yet it provides valuable information that can be used to inform workforce planning.

It is recommended that the development of workload tools in the Australian context should consider the broad complex nature of providing care for the ICU patient to capture potential workload for the ICU nurses. Research into the frequency with which ICU nurses undertake simultaneous activities suggest that without adequate concentration, errors may occur. Future research exploring the work undertaken during all shifts utilising time and motion observations and the schema of work activities would provide a broader contextual view of their work. The schema of work activities has been adapted and employed for the first time in the ICU environment. Future studies utilising the schema of work activities will provide a comparison and critique of the categorisation of the ICU nurse work activities. Allocation of time for specific direct nursing activities alone does not consider other activities that nurses undertake nor does it consider the complexity of these activities.

Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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Michael Peter Abbey

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Acknowledgement

I would like to acknowledge the great support I received from my supervisors Professor Wendy Chaboyer and Dr Marion Mitchell. Thanks to their knowledgeable guidance and honesty I was able to complete this project.

To my wife Jen and daughters Sara and Katie, I could not have succeeded without your love, understanding, support and indeed patience.

I would like to thank Associate Professor Stephen Billett for the beneficial discussions about the schema of work activities. It was a wonderful opportunity to speak to the person who had created the schema that was used in this thesis.

I would finally like to acknowledge the participant Intensive Care nurses at John Flynn Private Hospital who allowed me into their work place to observe them as they worked.

Chapter 1

Introduction

1.1 Overview

This thesis is a report of a research project studying the activities undertaken by Intensive Care Unit (ICU) Registered Nurses (RNs) as they cared for their patients. The ICU RNs in this thesis will be referred to as ICU nurses. In the Australian and international health environment there are many pressures to maintain safe clinical services within resource restraints. The ICU environment presents a large financial burden for a hospital's budgets related to the number of staff working in the area (Harris & Williams, 2007; Harrison & Nixon, 2002). The patient who presents to the ICU will generally require advanced nursing care that incorporates, invasive haemodynamic monitoring, mechanical ventilation and the use of drug infusions that require constant monitoring. ICU patient presents challenges for carers because their condition can change very rapidly and in an unpredictable way, necessitating the need for constant vigilance (Fairman, 1992). The direct care that ICU nurses are expected to provide to patients has been used to predict appropriate staffing allocation (Miranda, Moreno, & Iapichino, 1997; Miranda, Nap, de Rijk, Schaufeli & Iapichino, 2003; Yamase, 2003). However, because ICU patients can be so unpredictable, it is difficult to accurately identify the care they will require, thus making staffing allocations difficult.

The aim of this descriptive study was to describe and analyse ICU nurses' activities as they worked a day shift (0700 – 1530 hours). The day shift was one of three shifts in the 24 hour day at the research site. The shifts were the day shift, the late shift and the night shift. The research site was a large private hospital with a 12 bed ICU in South East Queensland. A time and motion observation method was used and a convenience sample of ten ICU nurses were observed. After consenting to be part of the research, the ICU nurses were each observed by the same observer for one day shift each. The observations were conducted over a two week period inclusive of Monday to Friday. The work activity data was categorised and analysed using Pelletier and Duffield's (2003) work activity tool and a theoretical schema of work activities theory (Billett, 2001a, 2001b). Combining the observation description with the application of an

Australian schema of work activities (Billett, 2001a, 2001b) provides a unique perspective of ICU nurses' work that has not been identified previously.

1.2 Problem

A number of ICU nurse staffing guidelines exist in countries such as Australia (Australian College of Critical Care Nurses [ACCCN], 2002; The Joint Faculty of Intensive Care Medicine [JFICM], 2003) and the United Kingdom (UK) (British Association of Critical Care Nurses [BACCN], 2001). Generally, the guidelines recommend one ICU nurse to one ICU patient, a 1:1 ratio. The issue with these guidelines is that they are not evidence based; they are consensus based. While a clear delineation of the staffing to patient ratios may be important for the coordination of ICU nurses in some instances, it does not consider the ability of the nurse (Harris & Williams, 2007). Observing ICU nurses as they work in a 1:1 ratio with patients may provide further understanding of not only what ICU nurses do but also how often they undertake specific activities. As Galley and O'Riordan (2003, p.2) state, "the skill of the nurse, the complexity of the patient's needs and the physical environment of care will all influence nursing requirements" (p.2). In order to provide a foundation for modifying current workload tools or devising new ones for the Australian context, it is important to first accurately describe what ICU nurse do in the clinical setting. Additionally, given that most of the ICU workload tools to date have focused primarily on the direct care nurses provide to patients (Miranda et al., 1997; Miranda et al., 2003; Yamase, 2003), a better understanding of other activities that occupy ICU nurses' time will help to better predict the actual staffing required in a unit.

1.3 Background

In today's climate there are many challenges that face the Australian health system. The population is ageing, living longer and increasing in size (Australian Bureau of Statistics, 2005). Health care costs are increasing and the nursing population is ageing and decreasing (Australian Institute of Health and Welfare [AIHW], 2004). In 2003-2004 the Australian Government expenditure on health was 9.7% of Gross Domestic Product, which equates to 78.4 billion dollars (AIHW, 2005). As RNs make up 42% of the health system (AIHW, 2004) this means that a large amount of financial outlay is directed towards RNs. As well as financial outlay, this significant proportion of workers

will, by virtue of volume and role, influence the health system. The decreasing and ageing nursing population means that there needs to be careful consideration of how health services will be delivered in the future. Eighteen years ago Aiken (1990) discussed the potential nursing shortages and posited that staffing would be an issue at the turn of the century. In 2008 it appears that Aiken's (1990) predictions have become a reality.

It is not surprising that the role of the RN working in acute care hospitals is changing (Albarran & Scholes, 2005; Davidson, Bloomberg & Burnell, 2007; Pearson, 2003; Spilsbury & Meyer, 2001). The alteration to the RNs' role has been described in relation to RNs performing activities that were previously performed by 'novice doctors' (Albarran & Scholes, 2005), or where there are a reduced number of RNs which has led to nursing activities being devolved to unregistered staff (Albarran & Scholes, 2005). Pearson (2003) suggests that the work of RNs can be ambiguous in relation to what is considered "nursing and non nursing work" (p.625). Different tasks that have been described as non nursing tasks include, "Delivering and retrieving food trays", "Housekeeping duties", and "Transporting patients" (Aiken, Clarke, Sloane, Busse, Clarke et al., 2001, p. 49). The change in the RN's role is related to a number of other factors including: nursing shortages (Aiken, 1989; Aiken & Mullinix, 1987; Armstrong, 2003; Bleich et al., 2003; Buchan, 2002; O'Brien-Pallas, Duffield & Alksnis, 2004; Spetz, 2004); financial pressures (Buchan, 2000, 2004; Duffield & Lumby, 1994; McLaughlin et al., 2000; Senate Inquiry into Nursing, 2002), higher workloads (Aiken, Clarke, Sloane, Sochalski & Silber, 2002; Hegney, Plank & Parker, 2003), and advancements in technologies (Blendon, Schoen, Des Roches, Osborn, Raleigh et al., 2004). Given the changing nature of the RN role, it seems logical to undertake periodic formal examination of current practices.

Employees and in particular RNs are considered a major financial burden for health organisations and because of this, nursing can be viewed in a negative light (Buchan, 2000). Buchan (2000) suggests that a different way to view the nursing workforce is to regard it as a way of ensuring that quality of care is maintained within a health facility. Quality of care has been explored in relation to outcomes for patients in the acute care setting (Needleman, Buerhaus, Mattke, Stewart & Zelevinsky, 2002). In the United States (US) quality indicators related to nurses and patients have been developed by the

American Nurses Association (ANA) (Gallagher & Rowell, 2003). The National Database of Nursing Quality Indicators (NDNQI) identifies ten indicators for acute care settings: ‘nursing hours, skill mix, nurse satisfaction, pressure ulcers, falls, patient satisfaction – pain management, patient satisfaction – patient education, patient satisfaction – overall care, patient satisfaction – nursing care and nosocomial infections’, that have been compiled to provide a method of measuring quality and outcomes for patients and nurses (Gallagher & Rowell, 2003, p.281-283). The NDNQI data can be benchmarked nationally or at a local site. The NDNQI is one method to provide evidence of high quality care for patients by reporting on the outcomes for the patient during their hospital admission. The focus on the benefits of quality care and patient outcomes including the financial outlay for RNs is a pragmatic approach to the realities of the nurse/patient interaction in the acute setting. It seems reasonable to suggest that the actual workload nurses are expected to manage may influence nursing quality indicators.

This section provides the background to some of the issues that RNs face when working in the health system and in particular the acute health setting. Topics that will be discussed include workload and skill mix. These broad topics provide the background to factors that can impact on the nurse and their activities in the work environment.

1.3.1 Nursing Workload

This study is set against a context of increasing attention on nursing workload. The concept of nursing workload is discussed in the literature in relation to the issue of the nursing shortage. Organisations are devising means to outline what a nurse’s workload will be and then allocating nursing resources based on these estimations (Duffield, Roche & Merrick, 2006). That is, workload equates to what a nurse will do in a given situation and how long it takes to do this work. Taking the concept of workload a step further, it is important to understand the smaller unit of work which can be described as nursing activities. The sum total of nursing activities can provide an indication of nurses’ workload. Nursing activities are discussed in Chapter Two. In this section research into nursing workload will be discussed to provide an understanding of the concept as outlined in the literature, which will help to situate the current research in the wider body of knowledge. Importantly, ICU nurses’ workload is a combination of many factors with a basic element of this workload being the activities that they do.

Research into nursing workload provides an indication of what processes are used to allocate nursing work and what kind of tasks nurses are expected to undertake during their shift. In a review of different methods that are used to assess workloads, Hughes (1999) asserts that workload assessment is a prediction of time taken and nursing skills needed to provide care. Fundamental to this is an understanding of what nursing care RNs provide. In the UK different methods of assessment are based on activity, patient dependency and statistical predictions (Hughes, 1999). Activity methods focus on the elements of nursing activity related to patient care (Hughes, 1999). Dependency methods categorise the patient into groups of acuity (Hughes, 1999). Statistical predictions take into account the previous shift information, including admissions, discharges and current shift information, and then calculations are performed to define the need for the skill mix for the coming shifts (Hughes, 1999). These methods provide data on nursing cares or potential workloads but as Hughes (1999) indicates, it is often the patient that defines workload rather than the nurse who is completing the task. This suggests that patient acuity and co-morbidities could also influence workload. For example the nursing care required for young fit individuals compared to the nursing care required for old individuals who are debilitated who have undergone the same procedure or treatment may differ greatly. This could alter the workload that the RN experiences. Ball and McElligott (2003) suggest that the nurse's experience and ability could impact on a patient's recovery and Hughes (1999) indicates that the patient may be a significant factor in the workload of the RN caring for the patient. Yet these variables in the nurse's working day may not be considered a part of their workload.

Various workload tools have been developed. The Therapeutic Intervention Scoring System (TISS) (Cullen, Civetta, Briggs & Ferrara, 1974) was developed to provide a measurement tool based on the patient severity of illness and care involvement by health professionals. It was designed also to provide an indication of financial requirements for an ICU. There were 76 items in the original TISS (Cullen et al., 1974). The scoring system was further explored and revised to the TISS-28 (Miranda, de Rijk & Schaufeli, 1996) which had a reduced number of items to 28. This tool was further revised to the Nine Equivalents of Nursing Manpower (NEMS) (Miranda et al., 1997). The NEMS classifies the ICU nurse's workload into nine categories to provide a simpler method of scoring ICU nurse workload. Other European workload tools include: the Intensive Care Nursing Scoring System (ICNSS) (Pyykkö, Ala-Kokko,

Laurila, Miettunen, Finnberg et al., 2004) that consisted of 15 patient health problems, broken down into four categories per health problem and related to ICU nursing workload; the Nursing Care Recording System (NCR11) (Walther, Jonasson, Karlsson, Nordlund, Johansson et al., 2004), which focussed on eleven categories of nursing care and medical procedures related to the patient; and the Time Oriented Scoring System (TOSS) (Italian Multicenter Group of ICU Research [GIRTI], 1991), which utilises different groups of nursing activities that could be scored depending on the patient needs. The cultural contexts of the workload tools may have influenced their development. How this may affect the use of workload tools in Australia is difficult to surmise, however, factors such as the scope of practice of Australian ICU nurses will be different to other countries and must have an impact on their working day. The Australian context may present different cultural and work practices that are not considered in the workload tools that have been published internationally. It is important to have a contextually appropriate workload tool that will have a greater potential to work effectively in the Australian environment.

Research studies into workload have explored what constitutes an appropriate workload, how this workload meets up with organisational requirements; and questioned how quality outcomes are related to a RNs' workload (Adomat & Hicks, 2003; Aiken et al., 2002; Brooks & Anderson, 2004; Fletcher, 2001; Harrison, 2004; Hegney, Plank & Parker, 2003; Hughes, 1999; Needleman et al., 2002; O'Brien-Pallas et al., 1997). Measuring nursing workload has proven to be a challenge due to the variability of the nurses' role in a clinical setting (Hughes, 1999; O'Brien-Pallas, Irvine, Peereboom & Murray, 1997), and the compounding problem of the nursing shortage (Aiken, 1987, 1989; Aiken & Mullinix, 1987; United States General Accounting Office [GAO], 2001). Health organisations have a duty of care to provide a safe environment for patients and staff in their care yet decisions can often be influenced by financial factors. The majority of the ICU workload tools require baseline information of what ICU nurses do as they work to develop predictive models of workload. This study will contribute further information of what the ICU nurses do in the Australian context as they work.

1.3.2 Skill Mix

Skill mix in the health sector refers to the utilisation of staff from the same or different work groups to achieve quality of care for patients within budgetary goals (Buchan, Ball & O'May, 2001). Skill mix has been defined by Buchan et al. (2001) as:

...the mix of posts in the establishment; the mix of employees in a post; the combination of skills available at a specific time; or the combinations of activities that comprise each role, rather than the combination of different job titles. (p.233)

Defining and allocating the correct combination of nurses and unskilled workers to achieve the balance of high quality of care and budget expectations is a challenge. The skills of each individual combine to make the sum total of the skill mix in a particular work environment. The definition incorporates a macro and micro view of the working environment. The macro definition of skill mix relates to different sections in an organisation. The micro definition relates to the skill mix of staff working in one section of the organisation such as a ward. Buchan et al. (2001) believe that it is not the title of the person that defines the skill but rather it is the abilities of the individual (Buchan et al., 2001). Spilsbury and Meyer (2001) agree and highlight that skill mix is often confused with grade mix. They define grade mix as relating to a person's years of nursing experience in an area; whereas skill mix is a reflection of competence, experience and qualifications (Spilsbury & Meyer, 2001). In another perspective, Aiken, Clarke and Sloane (2002), define skill mix simply as the percentage of RNs to other workers in a work environment. The definition of skill mix such as Buchan et al. (2001) provides a guideline for anyone who is considering the sum total of a work area but demands additional knowledge of individual's capabilities.

Skill mix has been explored from a number of perspectives. There has been research into the combination of different levels of nurses working on the ward (Aiken, Clarke, Sloane et al., 2002; Hegney et al., 2003; McGillis Hall & Doran, 2004; Spilsbury & Meyer, 2004) and in relation to clinical outcomes (Aiken, Clarke, Cheung, Sloane & Silber, 2003; Aiken et al., 2003; Rogers, Hwang, Scott, Aiken & Dinges, 2004; Tourangeau, Giovannetti, Tu & Wood, 2002). One reason for research into the different levels of staff and/or skill mix is in relation to the decreasing RN population (Senate Inquiry into Nursing, 2002; GAO, 2001). The decreasing number of RNs leads to a

different skill mix arrangement being employed and explored. It is a conundrum though when research suggests that having RNs as the major group of workers benefits patients by decreasing mortality and ‘failure to rescue rates’, reducing length of stay for patients and decreasing the incidence of iatrogenic hospital events (Aiken et al., 2002; Needleman et al., 2002), yet there is a diminishing nursing population (Senate Inquiry into Nursing, 2002; GAO, 2001). The challenge of providing quality care as the RN work force diminishes is impacted by differing conceptualisations of what skill mix entails.

An alternative view on skill mix is provided by Rischbieth (2006), who suggests that skill mix should be replaced by ‘skill-matching’. It is described as a process that “...links nurse skill to patient acuity, with the objective of reducing risk of adverse events and poor outcome” (Rischbieth, 2006, p.399). A component of the argument for ‘skill-matching’ by Rischbieth (2006) is that skill mix is based on the assumption that all nurses with the same qualifications are equal in their experience and skill. By not considering the potential variance in the nurse’s ability when allocating there is the potential for negative outcomes for patients such as adverse events. Rischbieth (2006) believes that ‘skill-matching’ can be utilised to improve the ‘nurse-patient allocation’.

The concept of ‘skill-matching’ in ICU is based around a number of factors. The nurses’ qualifications, their experience in the unit, their demonstrated competence, the layout of the unit and where patients are located, the availability of support staff for nurses, the ability of the RN to work independently, other staff’s knowledge of the RN, the RNs knowledge of ‘unit-specific technologies’, knowledge of patient acuity and knowledge of prospective clinical activities for the patient (Rischbieth, 2006). Rischbieth (2006) argues that both permanent RNs and agency staff in the workplace need to be encompassed in the concept of ‘skill-matching’. In the ICU there is either an all RN workforce or at least a high proportion of RNs of varying skill at the bedside. The concept of ‘skill-matching’ staff to the patient population provides an opportunity to consider factors outside of the standard nurse/patient ratio (ACCCN, 2002) and/or nursing hours per patient day (Duffield et al., 2006). The focus of ‘skill-matching’ on the nurses’ skills, the clinical support at the bedside, the patient acuity and general ICU geography, provides a unique method to ascertain clinically what is safe and appropriate staff allocation.

In summary skill mix has been conceptualised in various ways. It has also been linked to patient outcomes. There are different perspectives of how skill mix should be defined and viewed. Whether it is skill mix, grade mix or 'skill matching' (Rischbieth, 2006) the key themes reflect the pressure for health organisations to achieve the right combination of staff to provide a safe health care environment for patients while utilising a finite nursing resource. The combination of specialist RNs and skill mix has also been explored in areas such as ICU. Due to the large financial investment and the critical nature of ICU patient's conditions, the skill mix in this area is of high importance for health organisations and will be discussed next.

1.3.3 Skill Mix and Intensive Care

Skill mix studies have been undertaken in the ICU (Hind, Andrewes, Fulbook, Galvin & Frost, 1999; Hogan & Playle, 2000; Johnson, Ormandy, Long & Hulme, 2004; Ormandy, Long, Hulme & Johson, 2004). The ICU area is regarded as a significant part of a hospital and nursing budget, due to the labour intensive nature of the patients and the high ratio of RNs to patients (Hampton & Norton, 2006; Ward, Teno, Randall Curtis, Rubenfield & Levy, 2008). This increases the importance of understanding and effectively managing the various staff and skill levels in the ICU.

One aspect of skill mix in the ICU that has been explored in the literature is unlicensed personnel (Hind et al., 1999; Hogan & Playle, 2000; Johnson et al., 2004; Ormandy et al., 2004). The unlicensed personnel in the ICU have been described using a number of titles such as, nurse extenders (Fritz & Cheeseman, 1994), health service support workers (Chang, 1995), non-regulated health personnel (Canadian Association of Critical Care Nurses [CACCN], 1997), unlicensed assistive personnel (Chaboyer, McMurray & Patterson, 1998), health care support workers (Hind et al., 2000), health care assistant (Hogan & Playle, 2000; Wainwright, 2002), critical care assistants (McLeod, 2001) and healthcare workers (ACCCN, 2006). In this discussion this group of workers will be referred to as Nurse Assistants (NAs). The work activities NAs perform in the ICU environment have been discussed from the perspective of direct care and indirect care (ACCCN, 2006; BACCN, 2003; CACCN, 1997; Chaboyer et al., 1998; Chang, 1995; Wainwright, 2002).

The use of NAs in the ICU environment for direct nursing care has been described in the literature from different organisational perspectives. The Canadian Association of Critical Care Nurses (CACCN) does not sanction the use of NAs for direct patient care (CACCN, 1997). The organisation believes that the quality of care for critically ill patients would be compromised by allowing NAs to perform direct patient care in the ICU environment. CACCN suggests that the nursing process ‘assessment, planning, implementation and evaluation’ were the domain of RNs and it was in the public’s interest to maintain this approach. The BACCN position statement allows for a greater utilisation of NAs for direct nursing activities based on formalised education and competency assessments (BACCN, 2003). The BACCN organisation believes that the development of specific competencies and focussed education will provide an environment for the introduction of NAs into the ICU. The Australian College of Critical Care Nursing published a position statement asserting that the introduction of NAs was not supported, was problematic and they should only do limited direct nursing care activities such as manual handling of patients (ACCCN, 2006).

ACCCN’s position is that the use of ‘unlicensed personnel’ in the ICU environment will impact on the ICU RNs as they will have a greater supervisory role, which increases their workload, and workload has been attributed to issues with retention of ICU RNs. The different positions of the professional critical care organisations highlight a challenge of defining acceptable direct nursing care roles for this group of workers in the ICU. Perhaps a greater challenge for professional critical care organisations is defining the direct care nursing activities that are the sole domain of the ICU nurses. Describing/defining clearly what direct care activities can only be performed by ICU nurses would provide clarity as to what activities could be performed by NAs. In the literature there are a number of different perspectives of direct care for ICU nurses. Direct nursing care for ICU nurses from a broad perspective have been described as all actions by ICU nurses directed toward the patient with or without the family present (Pelletier & Duffiel, 2003; Urden & Roode, 1997). In the literature the diverse perceptions of the utilisation of NAs in direct nursing care of patients is also evident.

Research exploring the perspectives of RNs working in the ICU related to the introduction of NAs suggests that RNs can see the benefit of working with NAs (Hind et al., 2000; McLeod, 2001). However there was divergence from the viewpoint as to

what is considered appropriate direct nursing care to delegate to NAs in the ICU (Chaboyer et al., 1998; Chang, 1995; McLeod, 2001; Wainwright, 2002). The different views of what is appropriate for NAs to perform in the ICU environment reflect the varied opinions as to what constitutes direct nursing care and the skill level and training expected of the NA. One example of the direct nursing care activities that may be undertaken by NAs in the ICU is manual handling of the patient (ACCCN, 2006). Other activities include washing patients, taking blood glucose measurements, mouth care and eye care (Hind et al., 1999). McLeod (2001) described direct care activities such as, 'recording patient monitor observations, recording mechanical ventilation observations', the preparation of non invasive ventilation, 'taking blood samples from arterial lines' and assisting with invasive procedures (p.178). Chang (1995) described NA activities that were agreed as appropriate by professional nurses. Some of the activities listed include 'oral feeding of patients' 'offer and collect bed pans and urinals' 'perform last offices for patients', 'bedmaking – occupied' 'meet patients' hygiene needs' (p.69).

The studies listed demonstrate a varied perspective of what is appropriate for a NA, which is similar to the different views of the professional critical care organisation's positions on NAs in ICU as described previously. The varied views in the literature of NAs providing direct nursing care in ICU demonstrates the lack of consistent approach to this group of workers. However, there appears to be a greater consensus in relation to NAs performing indirect nursing activities. Importantly, if an accurate understanding of all the activities ICU RNs undertake is known, it may be easier to determine which of those activities may be delegated to less skilled workers.

The allocation of activities for NAs in the ICU that are considered to be indirect nursing is less problematic (Chang, 1995; Hogan & Playle, 2000; Johnson et al., 2004). This may be because there is no obvious risk for the ICU patient. Whereas the indirect activities of ICU nurses still incorporate activities that are related to the ICU patient (Pelletier & Duffield, 2003). The activities involve cleaning or the unit requirements. Chang (1995) identified 12 'non nursing duties' that RNs agreed were appropriate for NAs: 'Clerical work, emptying bedpans, filing and tracing patient's records, statistics, computer entry of data, checking, collecting, ordering consumables, secretary of meetings, general cleaning and tidying of the ward, requisitions for repair of equipment, making and receiving telephone calls, tidying treatment room, care of patients' property

and valuables' (p.72). The activities listed by Chang (1995) reflect activities that can be performed by RNs, yet are perceived as actions that can be devolved from the RN role (Hind et al., 2000). Wainwright (2002) suggests that NAs in intensive care would be useful performing administrative or housekeeping tasks only. The indirect or non-nursing activities for NAs reflect actions that do not include clinical judgement toward the patient. With a better understanding of how often ICU RNs undertake these kinds of activities, it may be that NAs could be used more advantageously

The different studies that have explored the skill mix of RNs and NAs have highlighted an important issue. The clarity of the role in the workplace is crucial. What is defined as direct and indirect nursing care and how this is then applied to the working environment to guide the delegation of workload is also important. The roles and skill mix issues for NAs in acute hospitals remains a challenge. Financial pressures and decreasing nursing workforce pressures drive the changing skill mix. Another factor that may influence the ICU nurse is the environment they work in.

1.3.4 The ICU Work Environment

The ICU environment may have aspects that influence what RNs do. These can be related to the clinical and social environment or to physical factors. For example, ICU nurses may work in either private or public hospitals, which may influence access to both medical and nursing assistance (Williams, Ogle & Leslie, 2001). They could be working in either an 'open' or 'closed' ICU (Gutsche & Kohl, 2007; Multz, Chaffin, Samson, Dantzker, Fein et al., 1998), influencing the variety of medical staff they will have to deal with. In the 'open' ICU the primary treating physician/surgeon is managing the ICU patient and the ICU intensivist manages specific health needs of the patient (Gutsche & Kohl, 2007), whereas a 'closed' ICU has a dedicated intensivist who directs the ICU health team with consultation of the physician/surgeon (Gutsche & Kohl, 2007).

The operational aspects of the ICU environment will influence how the ICU nurse functions. The management practices of the private and public hospital may differ in relation to staffing models. While there will generally be one ICU nurse to one ICU patient the support nursing staff may be different between the two hospital systems. The 'open' and 'closed' ICU will have a different communication and management

strategies between the health personnel and for the ICU patient (Gutsche & Kohl, 2007). This may affect the amount of time the ICU nurse has to spend directly with the ICU patient.

Another factor that may affect the ICU nurse is the physical environment that they work in. The ICU nurses are exposed to a variety of environmental factors that can impact on the work they do (Ball & McElligott, 2003). These can reflect the clinical or physical as combined factors that need to be considered when ICU nurses are working in relation to safety and quality of work. One way that the environment has been considered in the past is through the magnet hospital concept.

In the US the concept of magnet hospitals was developed in the 1980s (Cimiotti, Quinlan, Larson, Pastor, Lin et al. 2005). A magnet hospital has positive organisational, management and leadership practices that lead to positive outcomes for nursing staff and patients (Cimiotti et al., 2005). In essence a magnet hospital has met a number of standards that reflect the ability to provide a positive work environment for nursing staff that enables the hospital to attract and retain staff. Providing a work environment that nursing staff are eager to work in and will remain in provides an organisation with the human resources they require to operate effectively (Upenieks, 2003). The magnet hospital concept provides a positive work environment for the nursing workforce. A complementary factor within this concept is to understand what nurses do as the work environment changes. The specialist area of ICU is a labour intensive area that can benefit from a relevant description of ICU nurses' work.

In this section the challenges of an ageing population, a decreasing nursing workforce and financial pressures have been discussed in relation to the RN and the ICU nurse. While workload tools provide a macro perspective of the prediction of nursing work. There is the challenge of understanding the smaller aspects of workload, the nursing activities. The ability of the ICU nurse is one factor that can affect their work; another is what the ICU nurses do as they work.

1.4 Aims of the Research

The overall aim of this research study was to describe the activities undertaken by bedside nurses during a day shift in the ICU. Thus the main research question was:

What are the activities undertaken by bedside ICU nurses providing patient care?

Subsequently in the analytic phase the following questions were answered:

1. What is the frequency of activities performed by RNs in ICU?
2. What is the proportion of time ICU nurses spend on direct care, indirect care, unit-related and personal activities?
3. To what extent are the activities ICU nurses undertake routine, autonomous, complex, multiple, intense and accessible?

1.5 Significance of Research

The ICU nurse workforce is a decreasing human resource in an area that is labour and equipment intensive. There is the potential that staffing decisions may be made based on financial pressures with less focus on the RN (Duffield & Lumby, 1994). However there are varying opinions of what ICU nurses do when they are working (Harrison & Nixon, 2002; Lundgrén-Laine & Suominen, 2007; Miranda et al., 2003; Yamase, 2003). This study will provide evidence about the actual work ICU nurses perform throughout their shift.

The ICU environment by its nature is an area where there is risk for the patient (Needham et al., 2004; Valentin, Capuzzo, Moreno, Dolanski, Bauer & Metnitz, 2006). It is important to reduce the risk of harm to patients. This can partly be in the form of proactive management and understanding of ICU nurses' work. The use of workload tools potentially provides a uniform application and monitoring of ICU nurses' work. However, workload information should be based on relevant and current knowledge of the working ICU nurse. The variables that ICU nurses may face include the illness process of the ICU patient, their own clinical ability and the environment they are working in. The puzzle remains how to coordinate ICU nurses to maintain patient safety, manage workload and achieve financial goals. This study will provide a beginning foundation of evidence that can be used when devising or modifying workload tools.

This study is significant because it provides a description of the Australian ICU nurse in their work environment for the day shift. The observation method allows for an

uninterrupted study of the ICU nurse's activities and generates pertinent information that can be considered in workload tools. Classifying the work activities into structured categories (Pelletier & Duffield, 2003) allows for comparison with other research that has explored nursing activities. This provides current information on the ICU nurse. By combining the observation data with an Australian work theory (Billett, 2001a, 2001b) there is the opportunity to develop a deeper understanding of the complexities of the work that ICU nurses actually undertake on a daily basis in a way that has not been previously identified.

The findings from this study have implications for understanding the ICU nurse in their work environment and the decisions that they make. In a setting where ICU nurses formulate important, multiple and simultaneous decisions (Bucknall, 2000; Currey & Worrall-Carter, 2001), it is essential they have sufficient time to consider various alternative courses of action. The application of the schema of work activity theory (Billett, 2001b) to the observed work activities of the ICU nurses presents a better depth of understanding of the complex nature of ICU nurses' work; the context in which their decisions are made.

Lastly the findings in this study provide valuable information when considering developing ICU nursing service delivery guidelines. At present there are two staffing guidelines that can be utilised by Australian ICU nurse managers, ACCCN (2002) and JFICM (2003), both of which suggest a 1:1 nurse to patient ratio. The ACCCN (2002, p.6) guidelines include provision for "ACCESS" nurses. The acronym outlines the roles for the support ICU nurses on the clinical floor, "Assistance, Coordination, Contingency, Education, Supervision, Support" (2002, p.6). The ratio of ACCESS ICU nurses to bedside ICU nurses is based on the number of RNs with post-graduate ICU qualifications in the workplace. The findings in this study provide further information regarding the ICU nurse that may challenge or assist in the application of these guidelines. While it is important to consider the one-to-one ratio in the ICU environment and the ACCESS nurse support, there needs to be consideration of the complexity and totality of the work undertaken by ICU nurses.

1.6 Structure of Thesis

In Chapter One a rationale is provided for describing what RNs do as they work in the ICU environment. The problem and background section discuss the focus on nursing workload and skill mix and the challenges faced by nurses and health organisations. The aim of the research was described as well as its significance.

In Chapter Two, the literature review, a description of factors that impact on the ICU nurse in the work environment is provided. Legislation and professional nursing organisation's definitions are discussed from the perspective of what foundations guide health care organisations and nurses' scope of practice. Theories of work and Billett's (2001b) schema of work activities is described. The final section of Chapter 2 explores how nursing activities are described in the nursing literature.

In Chapter Three the research question and a description of the participants is provided. The research methods are outlined including the strengths and limitations of the method chosen. The development of the observation tool and its testing, the use of informal group discussions to assess Billett's (2001a, 2001b) schema and the pilot study are detailed. Data collection is outlined and the analysis of the data presented. Ethical considerations are discussed in the final section in the third chapter.

In Chapter Four a summary of the findings is presented including a description of the nurse participants and the ICU patients. The observation data is presented from the perspective of the time and motion observations and the work activity categories. Findings regarding simultaneous activities of the ICU nurses are identified. In the last section the analysis of the schema of work activities (Billett, 2001a, 2001b) are described.

In Chapter Five a discussion of the findings and conclusion are presented. The findings related to current nursing research literature are considered and discussed. The limitations of the research and implications for nursing practice and future research are also discussed.

1.7 Summary

This chapter has discussed some of the challenges facing acute care hospitals. The concepts of nursing workload and skill mix were discussed in relation to staff satisfaction and positive patient outcomes. An overview of workload and skill mix in nursing was provided. While skill mix, grade mix and workload are key factors in deciding the requirements and needs of a clinical area to allocate effectively and safely, there is another factor that needs to be considered; identifying what activities bedside ICU nurses attend to when providing care to patients. In this study the focus is on the activities of the ICU bedside nurses. It is important to continue to describe what ICU bedside nurses' work activities are in relation to their work day in the ICU environment. The development of workload tools in the Australian milieu will benefit from relevant contextual research content.

Chapter 2

Literature Review

2.1 Introduction

Nursing practice has been described as a “dynamic activity” (Jones, 2003, p.124) suggesting that nurses adapt their practice where necessary, their role as acute care RNs is constantly changing (Solveig & Segesten, 2002). Some of the purported factors that influence these changes include nursing shortages (Aiken, 1983, 1987; 1989, 1990; Bleich, Hewlett, Santos, Rice, Cox et al., 2003; Buchan, Ball & Rafferty, 2004; O'Brien-Pallas et al., 2004; Spetz, 2004), financial pressures (Buchan, 2000, 2004; Duffield & Lumby, 1994; McLaughlin et al., 2000; Senate Inquiry into Nursing, 2002), nursing workloads (Aiken et al., 2002; Hegney et al., 2003) the ageing nursing population (Buerhaus, Staiger & Auerbach, 2000; O'Brien-Pallas, Duffield & Alksnis, 2004), and advancements in technologies (Blendon et al., 2004). In order to better plan for the future nursing workforce and proactively develop new models of care to meet changing patient characteristics, it is important to re-examine contemporary nursing practice to understand how roles are changing for RNs. It is important to take a step back and identify what RNs actually do.

This literature review chapter first critically assesses the implications of legislation and organisational role expectations for RNs nationally and internationally. A critical examination of the theories of work will be provided, incorporating Billett's (2001b) schema of work activity theory. The last section of the chapter will be an analysis of the nursing literature that describes nurses' work, both in the general hospital setting and then in the ICU.

2.2 Legislative and Organisational Definitions

In professions, such as nursing, an essential goal is the provision of high quality patient services. The nursing profession is comprised of Enrolled Nurses (ENs) and RNs. The practice of ENs and RNs in different parts of the world such as the United Kingdom (UK), the United States of America (USA) and Australia are guided by legislation and by national or state nursing bodies. Rules, regulations and guidelines are designed to provide a clear understanding of nurses' scope of practice. These regulations are one influence on how skill mix maybe defined and applied in the work environment, and how the chain of responsibility is perceived by those involved.

2.2.1 International Code of Conduct and Legislation for Nurses

In the UK the Nursing and Midwifery Council developed a Code of Professional Conduct (Nursing and Midwifery Council [NMC], 2004) for RNs. The code of conduct is an outline of specific expectations for the RN operating within the UK health system. The code covers the areas of accountability, respect, confidentiality, teamwork, maintaining competence, ensuring patient safety and indemnity insurance. The revised recent publication of the NMC Code highlights a challenge faced by regulators; to ensure practicing RNs are aware of changes and updates to their legislated scope of practice. The Code of Professional Conduct (NMC, 2004) principally provides transparency of nursing actions with clear indications that an RN's actions must demonstrate professional conduct. In addition, the Code of Professional Conduct (NMC, 2004) allows for assessment of professional practice by RNs, the public, and health organisations as nurses work within the profession.

ENs are classified as second level RNs by the NMC (2008). These ENs are also required to operate within the NMC Code of Professional Conduct (NMC, 2008). The guidelines for the ENs are described in general terms but lack some clarity related to delegation and appropriate measures of competency. The expectation of the NMC is that both the employer and the EN define the appropriate level of responsibility in the workplace. Accountability is based on measuring competence in the workplace and working within the Code of Professional Practice (NMC, 2008).

There appears to be a broad scope for the health employer and second level RN to define what an appropriate nursing role is, and the level of authority for delegation. The potential disparity between what is appropriate work action or delegation and what is not, may only be identified when the question of competence is raised by a patient, member of public, other nursing colleagues or the NMC. The onus of responsibility is on the second level RN to ensure that they are working within their knowledge and scope of practice. The difference between the first level and second level of RN described in the Code of Professional Conduct (NMC, 2008) could lead to a potential confusion of role responsibilities due to the lack of clarity in the Code. The second level RN may believe that they are working within their abilities, but without appropriate documentation of competence to support their actions.

Nursing Assistants (NA) in the UK are now able to achieve a national qualification called the National Vocational Qualification Level 3 (NVQ3). The qualification process targets key competency areas such as communication and personal care procedures providing the NA with important knowledge and skills when assisting with the care of patients. This qualification introduces a third skill level into the health workforce, providing new challenges for those delegating tasks to this group of staff.

In the USA regulations for RNs are state governed thus each state may have slightly different rules. In Texas the Nurse Practice Act (The 78th Regular Texas Legislature, 2003) is an example of legislation that governs RNs (The 78th Regular Texas Legislature, 2003). The Act details what a registered nurse must do to meet and maintain registration requirements. In the state of Massachusetts there are slight differences in how the definition, roles and responsibilities are outlined. Definitions for licensed practical nurses (LPN) and unlicensed personnel are also described (Commonwealth of Massachusetts, 2000). The definition of the LPN is a person who has gained their qualifications from a practical nursing program. A RN is a person who has gained their qualification through a accredited school of nursing. The definition for unlicensed personnel is a trained unlicensed person who works alongside a licensed practical nurse and examples include; assistants, technicians, and nurses' aides (Commonwealth of Massachusetts, 2000).

The description of the RN's role and accountability are clearly outlined in the legislation. The delegation of appropriate nursing activities for unlicensed nursing

personnel indicates what they are legally allowed to do. In the case of Texas, the RN has clear delineation of what cannot be delegated to someone who is not a RN (Texas Board of Nursing, 2003). This provides an understanding of what is considered an RN level of nursing care compared to a NA. The descriptions provided by the Texas Board of Nursing are clear and explicit in direct contrast to the NMC. This may reflect the different health and legal systems of the US and UK. However, the clarity of the Texas Board of Nursing rules would assist when considering the appropriate level of nursing care for the different levels of nurse.

The American Nurses Association has provided a description of direct and indirect care nursing care in relation to NAs (American Nurses Association [ANA], 1992). The direct care activities delegated and supervised by an RN to a NA include basic patient care activities such as grooming, toileting and dressing the patient. Indirect care is the operational activities in the health setting such as; cleaning, housekeeping and transporting patients (ANA, 1992). In a 'Utilization Guide' for RNs, the ANA reaffirmed their position of direct and indirect care activities for NAs (ANA, 2005). The guideline describes a number of nursing activities that the ANA suggest are "basic human needs" that are appropriate to delegate to NAs (ANA, 2005, p.29).

Although the ANA provides guidance to RNs when considering their scope of practice in the clinical setting in relation to delegating work to NAs, the challenge when considering delegation of direct care activities depends on patient acuity and the specialty of the work area. For example, the delegation and supervision of a NA to assist with a bed bath for a stable ICU, oncology or palliative care patient may have different implications. The ICU patient's hemodynamic status may change with a position change. The stable oncology patient having chemotherapy is susceptible to infections that can have fatal outcomes. The palliative care patient may have pain issues that need to be considered. These three patient group examples indicate the potential challenge of delegating and supervising the NA to provide a bed bath. The guidelines by the ANA provide a broad indication of what is expected of RNs, however there are limitations in the guidelines based on the acuity of the patient and how they are applied by an RN.

2.2.2 National Nurse Competency and Role Descriptions

At a national level, legislation directs professional conduct for the nursing profession (National Nursing and Nursing Education Taskforce, 2006). It is not intended to stipulate what individual activities nurses undertake. However, the legislation does provide expected professional nursing standards. Professional nursing organisations provide standards and competencies to measure and document the ability of the nurse as they work (Australian Nursing and Midwifery Council [ANMC], 2002, 2006). The competencies also provide a means of demonstrating to the health consumer practice standards of nurses (Chiarella, 2006).

Historically, Australian nurses were registered under their state Health Acts as early as 1912, but it was not until 1933 that all states legislated the Nurses' Registration Act (Bessant & Bessant, 1991; Russell, 1990). Today, the ANMC is the professional organisation that has developed competencies under the Act for RNs, ENs and midwives (Chiarella, 2006). These competencies provide the framework which underpins assessment of nursing curriculum and can be used for licensure of nurses (Chiarella, 2006). One of the goals of ANMC was to develop national competency standards in conjunction with state and territory registration boards (ANMC, 2006). The competencies provide the foundation for states to assess educational providers' curricula for the Australian nursing profession. The competencies for RNs as described by ANMC (2006) consist of four overarching domains "Professional and Ethical Practice; Critical Thinking and Analysis; Management of Care and Enabling" (p.2-3) with 14 competencies and multiple sections within each competency.

The ANMC competencies inform the community and the workforce of the role responsibilities of RNs. The state nursing registration boards in Australia have endorsed the ANMC competencies for the RN (Chiarella, 2006). This provides a uniform approach for assessment of RNs across the country. The Australian public is provided with a clear description of how RNs are assessed to work in healthcare. Universities using the same definitions of competence in their curriculum provide a consistent educational standard for RNs. Nursing registration boards will assess RNs proficiency based on the same competencies, which leads to a consistent level of assessment for RNs nationally. The use of competency standards nationally can provide a transparent method of assessment for RNs, healthcare organisations and the community.

ANMC also incorporate published national competency standards for ENs (ANMC, 2002). In Victoria the EN is described as a division 2 nurse (State Government of Victoria Australia Department of Human Services, 2008). The competency standards provide overarching professional expectations for this group of nurses in Australia. There are ten competencies with elements within each competency ANMC. As with the RN competency standards, these assist in assessing the proficiency of ENs. The ANMC, (2002) describe the EN as a 'colleague' to the RN. The EN's role involves actions that are delegated and supervised by the RN (ANMC, 2002). The EN's role can involve actions such as patient assessment. Whereby the EN is expected to understand what is normal or abnormal for a patient and have the ability to relay relevant clinical information to the RN. The EN, depending on state legislation, is permitted to administer medications and monitor intravenous fluids (ANMC, 2002). The competencies for the EN provide a national delineation of expected practices, the same as the national competencies for the RN. Assessment of ability can be consistent across states. The EN is accountable for their actions in practice.

In Queensland, unregulated care providers have been defined by the registering body, the Queensland Nursing Council in their Scope of Practice document (Queensland Nursing Council [QNC], 1998a). The definition encompasses Assistants in Nursing (AIN), orderlies and personal care assistants (PCA). An unregulated care provider is defined as a person who is not licensed to practice as a registered nurse (QNC, 1998a). Unregulated care providers are guided and accountable to RNs in their workplace when working in acute care settings (QNC, 2005). Competence in the workplace is assessed by the RN and then appropriate delegation of work occurs. The interaction between the unregulated care provider and ENs is based on collaboration not delegation (QNC, 2005). Providing such a description assists nursing administrators and managers in their staff planning activities and provides individual practicing nurses with guidance when they are supervising, delegating and overseeing this unregulated level of health worker.

RNs, ENs and NAs in the three countries described have a common set of responsibilities to their patients and work colleagues (American Nurses Association [ANA], 1992, 2005; ANMC, 2002, 2006; NMC, 2004). When considering the UK, US and Australian documents there are common themes; patient advocacy, professional actions in the environment of employment, self improvement and understanding the

legislation that governs the person in the work environment. There are varying degrees of responsibility depending on the level of nurse. The RN is responsible for their own actions and has delegation responsibilities (ANMC, 2006).

The Australian EN is responsible for their actions and is responsible for communicating effectively with their RN 'colleague' about patient care (ANMC, 2002). The EN competencies, while similar in some aspects, differed from a RN in key areas. The EN is a complimentary or support role person working in conjunction with RNs and must operate within their scope of practice (ANMC, 2000). The RN must assess the situation and make appropriate delegations of workload for the enrolled nurse (QNC, 1998b). The NA's responsibilities related to work activities are guided by delegation from RNs (ANMC, 2006; Hogan & Playle, 2000). These responsibilities can in part be demonstrated by the work activities that are performed in the clinical environment.

The proficiency of nurses working in speciality areas can in some cases be assessed using competencies developed by their professional organisations (ANMC, 2002, 2006; Cowan, Norman & Coopamah, 2005). In the Australian ICU environment for example, a large national study underpinned the Confederation of Australian Critical Care Nurses development of competency standards for critical care (not ICU) nurses, (Dunn et al., 2000; Fisher, Marshall & Kendrick, 2005). These competencies were originally developed in 1996 to provide a format for consistent assessment of ICU nurses (Fisher, Marshall & Kendrick, 2005). The 20 competencies are comprised of six domains "professional practice, reflective practice, enabling, clinical problem solving, teamwork, leadership" with elements described under each competency (Dunn et al., 2000, p.343). The aim of these competencies is to provide a process where different levels of skills for critical care nurses can be defined and measured. While the construct validity of the competencies and assessment tool has been challenged (Fisher, Marshall & Kendrick, 2005; Marshall & Fisher, 2005) the premise of the competencies is supported (Gill, Leslie & Southerland, 2006). These competencies provide guidance for both the development of critical care nursing courses and performance evaluation of critical care nurses in their clinical practice. Additionally, they provide the opportunity to acknowledge that there is a core group of activities that are relevant to critical care nursing irrespective of the ICU specialty. The principle application of the competencies is valid, however statistical limitations that have been identified by Fisher, Marshall &

Kendrick, (2005) suggest that there are key elements of the competencies that need to be reviewed.

This section has critically examined legislation and professional organisational expectations of nurses as they work. The development of competencies to provide measurable data is crucial when considering the ability of nurses in the work environment. The work by Dunn et al. (2000) provides one perspective of measuring the critical care nurses' ability. It is also useful to explore the broad conceptual theories of work to gain an understanding of what potential factors can impact on nurses in their work environment.

2.3 Theories of Work

Understanding the nature and scope of nursing care provided by nursing staff can be informed by an understanding of work. There are many theories that identify the interactions between a person, the environment and their motivations or actions which can be described as work. Some of these theories include: Cognitive Evaluation Theory (CET), Self Determination Theory (SDT), Goal-setting Theory (GST), Action Regulation Theory (ART), Task-specific Motivation (TSM), Job Characteristics Theory (JCT) and Organizational Commitment (OC) (Gagné & Deci, 2005). Primarily, many of these theories focus on what motivates a person in the work environment and how their work is affected by this motivation. This section will critically examine the theories in relation to workers in a work environment. The theories will then be related to the health environment and RNs/ICU nurses, and will help to understand how both the context and the individual can influence the work undertaken by nurses.

2.3.1 Work Theories in the Literature

Two work theories that focus on goal setting as the motivation for work behaviours include GST (Latham, 2004) and ART (Gagné & Deci, 2005). GST is centred on what goals a person sets and how this impacts on a person's behaviour. To maximise one's own behaviours, a person needs to understand what goals motivate them to achieve a positive outcome and understand how the goals will affect them during the process (Gagné & Deci, 2005). ART is about goal setting for the individual. A major premise of ART is that a person setting their own goals in a work environment will achieve optimal

performance behaviours. The work environment that allows a person greater autonomy to achieve will benefit from the person setting their own goals. These two theories propose that goals and autonomy are major factors in a person's working behaviours. In the ICU environment application of GST and ART could imply that the ICU nurses would aim to achieve goals that they have set themselves. Goals such as, having the patient ready for discharge to the ward by a set time, administering drugs at a specific time or setting up dialysis for a patient within a timeframe. The ICU nurses would be autonomous in their actions as they set out to achieve their goals.

The concept for ART can be challenged when there is no allowance for the person who may not want to set their own goals but would prefer to have the goals set for them. Both the ART and the GST theories are problematic when it comes to their application. For the theories to work effectively, a large percentage of staff would need to understand and apply goal setting to their work and be able to operate effectively and autonomously in an organisation. In the case of the ICU environment, the difficulty in utilising GST and ART relates to the variability of the patients. The reason a patient is admitted to an ICU is based on the need for close monitoring, invasive ventilation, invasive monitoring and advanced treatment modalities. The ICU nurses may work autonomously or may need clear direction on the management of the patient. In extremis the ICU patient may be clinically labile and the goal for the ICU nurse is to maintain life which may not be achievable. Another challenge with applying GST and ART in the ICU environment is the implication that goals are easily identified and measured. It is difficult to identify measurable outcomes when considering ICU patients and their families and the emotional challenges that may present. It is difficult to anticipate the unforeseeable issues, to set goals and demonstrate an achieved outcome for the ICU patient and family.

While ART and GST identify with the individual and their motivation, Job Characteristics Theory (JCT) has a major focus on the job design in the work environment (Hackman & Oldham, 1976; Saavedra & Kwun, 2000; Scott, Swartzel & Taylor, 2005). JCT suggests that a well designed job will be a major impetus for motivation for staff members (Hackman & Oldham, 1976). It is suggested that there are key characteristics that need to be utilised to provide a positive momentum for workers. These characteristics include the need for employers to provide diversity in a job, useful

performance feedback, allow a degree of autonomy and the option for a person to complete a job. In the case of the ICU nursing environment the JCT could be applied as a method or framework to analyse the ICU nurses' roles. By identifying and indicating potential opportunities in the workplace for ICU staff to access, considering what is autonomous practice in the workplace and supporting staff demonstrating these characteristics. Hackman and Oldman (1976) theorise that a worker experiencing these characteristics will be satisfied in their work environment and will become self motivated. This presents a potential theory practice gap. If the work environment is not flexible due to the nature of the work for example data entry clerks may not have the option of job diversity then an important characteristic of this theory is not operationalised. Another point to consider is that there is no guarantee that a worker will respond to these positive characteristics as an employer wishes.

Cognitive Evaluation Theory (CET) asserts that external factors such as rewards impact on a person and these factors will affect a person's intrinsic motivation and satisfaction. CET postulates that positive reinforcement by rewards leads to internal satisfaction, and internal motivation for external rewards is the driving force for workers (Gagné & Deci, 2005). Application of this theory to ICU nursing practice suggests that the external factors for ICU nurses that lead to a positive intrinsic motivation in their workplace need to be identified. In their critique of this theory Gagné and Deci (2005) suggest that the theory was mainly tested in a laboratory and not in the field. This is a significant critique considering that this theory is about the impact on motivation for workers. Another logical critique is that most people need to earn a living which should provide a significant intrinsic motivation in itself. CET has the premise that workers are intrinsically motivated by the external incentives. In contrast Ryan and Deci (2000) suggest that CET was developed as a smaller part of Self Determination Theory (SDT).

SDT describes how social conditions can positively or negatively impact on self motivation and self belief (Ryan & Deci, 2000). It is based on the premise that there are two types of motivation; 'Intrinsic Motivation' and 'Extrinsic Motivation' (Ryan & Deci, 2000). Intrinsic motivation describes how a person will elect to do something that they enjoy or want to by their own choice. Extrinsic motivation results in a person doing what is necessary for a particular job even if they do not want to. Extrinsic motivation is related to a person's particular environment, and is described by Ryan and Deci (2000)

as a continuum of possibilities. A person may respond to extrinsic factors by being unmotivated, or unwilling to be motivated; passively compliant or actively motivated in a social environment (Ryan & Deci, 2000). It is postulated these motivations require specific needs including competence, relatedness and autonomy to be fulfilled. A social environment that fulfils these human needs can assist intrinsic motivation and personal well-being. In a supportive ICU environment there could be the opportunity for an ICU nurse to be autonomous. This can have the flow on effect that the ICU nurse then has an intrinsic motivation to do well in the work environment. In contrast, the opposite motivation can lead to a negative impact on intrinsic motivation and well-being (Ryan & Deci, 2000). Gangé and Deci (2005) believe that by understanding how these two concepts interact in a given social situation helps to understand a person's motivation. While the theory of CET suggests that external factors or rewards are the motivation for a person; the SDT allows that there are circumstances where a person can make a choice and circumstances where they may not make a choice but can still be motivated to work.

2.3.2 Billett's Schema of Work Activities Theory

In another perspective of work theory Billett's (2001a, 2001b, 2006) schema of work activities theory describes work as being part of the life long learning continuum. Activities are the actions that take place in the workplace that are related to the individual. A work activity can be examined in relation to six dimensions or categories; "routineness, discretion, intensity, multiplicity, complexity, accessibility" (Billett, 2001b, p.23). The first category titled 'routineness' (Billett, 2006) describes how work can either be routine or non routine. The frequency of non routine work practices in the work environment, determines how much extended knowledge an individual is required to know. This suggests that individuals who are able to adapt due to the many non routine procedures in a work environment are identified as having a greater knowledge in that particular workplace. Being involved in the non routine practices helps a person to develop greater abilities to deal with future non routine challenges (Billett, 2001b). In the ICU environment, ICU nursing routine activities may relate to what is the norm for the area. If it is a post operative cardiac surgical unit, the routine activities may reflect the admission of elective cardiac surgical patients from the operating theatres. The non routine activities could occur when the patient is acutely ill or requiring extraordinary ICU interventions such as a cardiac re-open in the ICU.

The second category 'discretion' (Billett, 2001a) describes the degree of autonomy or discretion, that a worker is allowed. Billett (2001a) suggests that the workplace culture will dictate the amount of 'discretion' (autonomy) a worker is given. An important point for 'discretion' (autonomy) is that it is tied closely with 'routineness'. If a worker is only allowed limited 'discretion' (autonomy) then the need to deal with non routine situations is limited. When a worker is an independent operator or is given greater 'discretion' (autonomy) then they will tend to have a greater knowledge and ability, and by extension will perform more non routine actions. The category is based on the theory that the type of work responsibilities will define what is required in regards to knowledge and capability (Billett, 2001b).

In the ICU environment 'discretion' (autonomy) may reflect what decisions the ICU nurse makes, such as, when to extubate a patient or when to titrate an IV inotrope to maintain the patient's blood pressure within an acceptable range. The 'discretion' (autonomy) displayed may be a reflection of what is accepted and expected of the ICU nurses in the work environment, and their knowledge/expertise. A lack of 'discretion' (autonomy) may reflect how the ICU is managed, whether ICU staff are permitted to be autonomous when caring for an ICU patient. This may include the attitudes of other ICU staff nurses and whether they allow an ICU nurse colleague to be autonomous in the work environment. The level of ability of an ICU nurse may also be a factor. However, it is reasonable for a junior ICU nurse to ask for help, and hesitate if they are unsure whether a patient is ready for extubation. An inexperienced nurse may demonstrate a lack of 'discretion' (autonomy) but maintain the ICU patient's safety by seeking advice before initiating extubation.

The third category of 'intensity' (Billett, 2001a) recognises that contemporary issues of increasing workloads and decreasing workforce are resulting in longer periods of intense or busy times that a worker experiences. Where in the past there may have been short periods of intensity, Billett (2006) suggests that there is an increase in the length of intensity a worker is exposed to which leads to strategies being developed to help cope with the situation. The strategies can demonstrate an advanced level of work ability by the person involved. The 'intensity' can reflect the individual tasks that are occurring for an ICU nurse. An experienced ICU nurse may have to set up for an

emergency intubation. The 'intensity' of the activity will be in relation to the potential life threatening situation for the ICU patient.

The fourth category of 'multiplicity' (Billett, 2001b) refers to the amount of different tasks that are expected to be done in the work environment. This category identifies the number of activities without considering the type of activity, whether it is intense or part of a group of activities that are not intense. Billett (2006) believes that the changing/downsizing of the workforce has led to work tasks being shared across small groups of workers in a work environment. The smaller workforce leads to "...a greater range of work requirements" (p.225). The 'multiplicity' of tasks is in part a reflection of the environment and a reflection of the work activities experienced by the worker at the time. The number of work tasks that an individual is dealing with could be simple or difficult. In the case of the category of 'multiplicity' it is recognising that there can be a number of activities occurring within a timeframe.

The 'multiplicity' of activities in the ICU environment can be demonstrated using the example of the experienced ICU nurse setting up for the emergency intubation. In the scenario the experienced ICU nurse may be checking the intubation equipment, dealing with a confused patient, communicating to other colleagues the need for the necessary IV medications and coordinating other staff in the area. In this scenario the ICU nurse is dealing with multiple activities related to the activity of setting up for the emergency intubation.

The fifth category of 'complexity' (Billett, 2006) refers to the decision making process at a broader level to the category of 'intensity' and how it may be affected by extraneous factors for an individual. A decision in the workplace to achieve a specific goal will be tempered by the understanding of different potential variables that may impact on this target. Where 'intensity' can reflect individual activities or events, 'complexity' indicates the broader scenario that a person may experience. There can be a number of variables that are impacting on decision making for the person. These variables may be intense, not intense or a combination. Billett (2006) believes that how a person reacts to complex situations can be influenced by their 'expertise and experience' (p.223). The description of 'complexity' reflects what a worker may experience as they work and the work environment they are working in. In essence, the

number of complex scenarios can indicate the ‘complexity’ of the work environment for the individual.

The experienced ICU nurse dealing with the emergency intubation is dealing with the need to prioritise what is required for the ICU patient emergency. The experienced ICU nurse will be communicating with the other members of the team, confirming that there are the specific types of IV medications ready to be used, any critical issues for the ICU patient and ensuring that all of the necessary equipment is positioned correctly. The complexity in this scenario is the prioritisation of the different activities to achieve a potentially lifesaving activity for the ICU patient.

The sixth and final category of ‘accessibility (opaqueness of knowledge)’ (Billett, 2001b) reflects what knowledge is required and available to the worker to perform a task. The description provided by Billett (2001b) suggests that individual workers are faced with two possible scenarios related to knowledge. That knowledge is readily available or knowledge is difficult to access and requires conceptualisation by the worker or help to understand what is not understood. In the workplace Billett (2006) believes this translates into individuals developing a conceptual capacity to understand the inner workings of a work task. Taking this concept one step further it can be suggested that a worker needs to be able to recognise that there is a deeper level of concept to be understood. This would then lead onto the action of creating the symbology for the unseen (Billett, 2006). Billett (2006) believes that workers will develop their own symbols to explain the hidden knowledge (accessibility ‘opaqueness of knowledge’) aspects in their work. The development of a symbolic understanding of these unseen factors Billett (2006) believes is individual and dependent on the experience of the worker.

Experience is one way to develop their own symbols. In the ICU setting the experienced ICU nurse may demonstrate their knowledge (accessibility) as they perform activities. Setting up for an emergency intubation requires knowledge of what is required. The experienced ICU nurses must have an understanding of the intubation equipment, how it needs to be checked prior to use and how to set it out appropriately. The experienced ICU nurse will likely have an understanding of the type of IV medications required, and the order they will be administered. In this scenario there can be a cluster of actions by the ICU nurses that will be based on knowledge. The efficiency and organised

coordination by the experienced ICU nurse can demonstrate knowledge of the procedure. How they communicate to staff in the area also can indicate their knowledge of what is required and how it should be coordinated.

In the case of a less experienced ICU nurse the 'opaqueness of knowledge' could be reflected in the action of titrating an inotrope infusion to maintain a patient's blood pressure within set parameters. The ICU nurse can have an understanding of the chemical interaction with the receptors in the human body and the pathophysiological response of the patient to the increase of the infusion. This conceptualisation will be individual relating to the action of the inotrope, but the result for the patient is an increase in their blood pressure based on the action of the ICU nurse. This intimates a nursing action based on 'accessible' knowledge.

Billett (2001b) provides a schema of work activities theory that considers facets of activities that workers may experience. The theory of the schema allows for consideration and utilisation in the working environment. In the nursing context this schema could help capture the complexity of the work, and not simply the tasks undertaken in the clinical environment as ICU nurses perform their work. Considering the work environment of ICU nurses, there are a number of potential factors that may impact on work activities. In the literature workload tools are generally based on defining the number of activities without considering the potential challenges for the individual to complete the activity (Miranda et al., 1997; Miranda et al., 2003; Walther et al., 2004; Yamase, 2003).

The use of the schema of work activities theory (Billett, 2001b) provides an opportunity to observe individual ICU nurse work activities from a new perspective considering six varied dimensions of an activity. An individual direct care work activity is not regarded as simply an action to be counted in a workload tool. The work activity can be described in a manner that provides further information related to the workload that the ICU nurse may be experiencing. Describing a work activity for an ICU nurse as being routine (routineness) suggests an uncomplicated action. Alternatively, describing the work activity as not routine implies a greater workload pressure for the ICU nurse. Describing the six categories of the schema of work activities will provide a greater understanding of potential workload factors for ICU nurses. A limitation of the theory is that it has not

been used extensively in empirical work and not at all in nursing. Thus its value in examining ICU nurses work is not yet evident.

The knowledge a person utilises as they work has also been described from a theoretical perspective. The Cognitive Continuum Theory (CCT) is a theory that considers the link between cognition and “environmental tasks” (Cader, Campbell & Watson, 2005; Standing, 2008, p.127). The CCT provides a continuum where decisions can reflect an analytic approach to a given situation based on the perceived cues surrounding the task. The other end of the continuum indicates that a person is using their intuition to deal with a task and make decisions (Harbinson, 2001). The intuition end of the continuum can demonstrate a person making decisions where they are aware intuitively how to act for a task, whereas the analytic end of the continuum reflects the activities that require more practical or logical application of the decision making process (Thompson, 1999). The other axes indicate whether a task ranges from “well structured” to “ill structured”, whether there is a time factor and the variability of the task (p.127). The ability of the expert or novice to make decisions can be implied by the actions of the person (Thompson, 1999). Cader, Campbell and Watson (2005) suggest that the CCT is well suited for the application to nurses’ decision making. It would provide nurses with a tool to describe their reasons for their decisions based on CCT.

When comparing the CCT to Billett’s (2001b) schema of work activities theory there are similarities as to how they both can be applied. In CCT there is the ability to describe the complexity of tasks, the variability of the task and where the decision making will fit within the continuum. Billett’s (2001b) schema of work activities theory allows for the consideration of the six factors (routineness, discretion, multiplicity, intensity, complexity and accessibility) for each activity. This provides an observer with the clear set of factors to consider that could impact on a person’s decision making. The cues that occur and influence the decision maker in CCT are along the same principle of the schema of work activities theory (Billett, 2001b). CCT is a framework that can be utilised to observe and postulate on nurses’ decision making with tasks (Thompson, 1999). The schema of work activities theory (2001b) has a description of factors that can be considered when observing, in this case ICU nurses as they work, which also lends itself to observing and considering the decision making of the person and the knowledge that may underpin the decision. The CCT and Billett’s (2001b) schema of

work activities categories suggest a tacit knowledge behind the actions of the observed person.

Authors have described different perspectives of nurses' knowledge, including tacit knowledge (Carlsson, Drew, Dahlberg & Lützen, 2002; Herbig, Büssing & Ewert, 2001), intuition (Billay, Myrick, Luhanga & Yonge, 2007; King & Macleod Clark, 2002) knowing and cognition (Paley, Cheyne, Duncan & Niven, 2007). Similar to Billett's (2001b) schema of work activities the themes in the literature are describing and defining the knowledge process that takes place for workers, in this case nurses. The theoretical discussions reflect similar themes to Billett's (2001b) schema of work activities.

Carlsson et al. (2002) believed that tacit knowledge is "... characteristic of our natural attitude to the world and as such is hidden from ordinary awareness" (p.150). This infers that the observed person will perform actions that can be considered tacit knowledge, without being conscious of the particular actions. King and Macleod Clark (2002) suggested that intuition was intertwined with expertise. The authors described different levels of ability for ward and Intensive Therapy Unit (ITU) nurses, "advanced beginner nurses" (p.324), "competent nurses" (p.325), "proficient nurses" (p.326) and "expert nurses" (p.326). The description of the nurses' actions ranged from the 'advanced beginner nurses' being able to perform basic decisions related to patient observations, to the 'expert nurse' who was able to make quick decisions and identify subtle patient changes in the patient's physiology (King & Macleod Clark, 2002). The beginner nurse could demonstrate hesitancy compared to the expert nurses who can demonstrate efficient and confident actions in their decisions. This suggests that the observation process can identify how a nurse is performing in the clinical setting and this can be extrapolated to indicate the level of knowledge that guides actions of the nurse as they deal with a task. As an observer watches a nurse perform an action an assessment can be made based on their presentation that can indicate knowledge or lack of knowledge in relation to the task being performed. The application of the schema of work activities theory (2001b) can be applied to assess or consider the application of knowledge by an ICU nurse as they perform a task. The benefit of the schema of work activities theory (Billett, 2001b) is the consideration that all situations can be unique. King and Macleod Clarke (2002) consider hesitation to suggest an advanced beginner process, but senior

experienced staff can hesitate or not have the knowledge required for a task also. The schema of work activities theory (2001b) can consider each activity and the impact it is having on the nurse as they perform a task.

In this section different theories of work have been described. The common theme with these theories is the goal of understanding factors that impact on workers as they work in their local environment. When comparing the different theories, the schema of work activities theory by Billett (2001b) provides a logical and applicable theory that can be applied to the dynamic work environment of the ICU RN. Billett (2001b) has presented a logical process of analysing an activity in the work environment. The description of the six work activity categories 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility' (Billett, 2001b), provides an opportunity to classify the worker's action in the complex ICU environment.

As ICU nurses work in an environment with critically ill patients it is important to be able to describe fully their work activities and Billett's (2001b) schema of work activities theory supports this in real time, thus capturing the individual factors impacting on the ICU nurse as they work. The outcome is a description of the work from a holistic approach. Billett (2001b) has indicated that the development of the schema of work activities theory is based on the worker in the workplace. The schema's design and description of the activities lends itself to the application in different workplaces. The type of work, the level of responsibility, the work environment and the management style can provide an indication of how the schema of work activities could be demonstrated by a worker. The generic descriptions of the activities 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility' (Billett, 2001b) enable the schema to be applied to different workers in their environment.

The worker on a factory production line may demonstrate different activities to a barrister working in the courtroom. The schema of work activities (Billett, 2001b) could still be utilised to indicate what activities are being applied. The worker in the factory production line may demonstrate actions, such as monitoring a specific part of the production line that indicate that there is a 'routineness' in their action. Whereas the Barrister's activities may indicate that she/he is dealing with 'non routine' activities as she/he argues a case in court that is new for the Barrister. Both of these workers could have activities that are considered routine or non routine. To understand the different

activities the person observing the two workers would have to have a working knowledge of the observed area. This would provide the understanding of what can be regular or irregular for the worker. Billett's (2001b) schema of work activities theory has the potential to be utilised in many different workplaces. In the case of this study the schema was applied to be applied in the clinical setting of an ICU.

2.4 Nursing Activities

The activities that RNs undertake in the workplace are guided by legislation, moulded by organisational expectations and defined by the patients. Given the changing nature of nurses' work, one challenge faced by nursing administrators and managers is to understand current nurses' work, in order to ensure patients are adequately cared for. When discussing the work undertaken by nurses, it is important to consider workload intensity as this impacts on what activities a nurse can complete in a given timeframe. Factors that affect RNs and their workload include both patient acuity and staff ability (Needleman et al., 2002). Patient acuity may be related to physical or psychological factors or a combination of both. Previous research has shown that nurses' experience also influences workload, irrespective of patient acuity (Aiken et al., 2002; Blegen, Goode & Reed, 1998; Carr-Hill, Dixon, Griffiths, Higgins, McCaughan et al., 1995; Currie, Harvey, West, McKenna & Keeney, 2005; Pratt, Burr, Leelarthapin, Blizzard & Walsh, 1993). Additionally, the actual kinds of activities nurses are required to carry out when they are providing patient care will influence their workload. This section of the review first defines and describes nursing activities and then examines ICU nurses' activities.

2.4.1 Defining and Describing Nursing Activities

A number of researchers have examined the activities that nurses undertake as a foundation for redesigning models of care, nurses' workload and other constructs such as team performance and multidisciplinary practice. Some researchers have conceptualised nursing care as differing groups of activities (Allen, 2004), as dimensions of the role as it is enacted (Squires, 2004) and other forms of classification (Fagerström & Rainio, 1999). This section provides a critical review of the literature that explores nursing activities in the general ward environment, and serves as a

foundation for examining the activities undertaken by ICU nurses in their clinical practice.

The activities of RNs in the work environment have been described as comprising ‘bundles of activity’ (Allan, 2004). In one review, Allen (2004) identified 54 publications of field studies (eight books, ten book chapters and 36 articles) published between 1993 and 2003, which focused on nurses’ activities. A common theme in this body of work was the use of observational methods, ranging from non-participant observation to full participation in the work area, to collect data. While the majority of the studies were undertaken in hospitals in the United Kingdom (UK), some were undertaken in nursing homes and the community. Studies that took place in other countries included, the United States (US), Canada, Australia, Sweden and Belgium. Allen’s (2004) analysis showed that nursing tasks could be grouped into inter-related ‘bundles of activity’ which then provide an overview of nursing work in the clinical environment.

The first bundle, ‘managing multiple agenda’ refers to the multiple competing factors that RNs’ experience as they care for patients and how they coordinate these factors (Allen, 2004). The second bundle, ‘circulating patients’ is a description of how RNs deal with the throughput of patients. Allen (2004) believed that RNs have a focus on the patient population rather than the individual patient so that they are able to achieve and maintain throughput. The third bundle, ‘bringing the individual into the organisation’ intimates that RNs follow more of the procedure and processes when dealing with patients in a health facility. Allen (2004) suggested that while nursing is described as a holistic profession, in reality it is a process driven profession that is based on routines.

The fourth bundle, ‘managing the work of others’ reflects the coordination of health professionals and family carers by RNs to achieve a nursing goal. The fifth bundle, ‘mediating occupational boundaries’ refers to the blurring of nursing roles and the flexibility that is demonstrated by RNs when caring for patients. The sixth bundle, ‘obtaining, fabricating, interpreting and communication information’ suggests that RNs are ‘information brokers’ who are an important key in the communication web. The seventh bundle, ‘maintaining a record’ is the documenting of nursing care that Allen (2004) describes as a nursing activity including all documentation such as wound charts and nursing notes. The final bundle ‘prioritising care and rationing resources’ describes

RNs managing with what they have at hand. It also refers to how a nurse will adapt to dealing with different situations. While Allen (2004) suggests that her review was not about what RNs do (i.e. their activities) but rather the competing factors they are dealing with during their day, the bundles do, in fact, demonstrate aspects of work described by Billett (2001b) such as discretion, uncertainty, and complexity.

Another grouping of work activities has been described by Squires (2004). Using a thematic analysis Squires (2004) examined 28 research articles related to acute care staff nurses roles between 1995 and 2002 from eight different countries. Seven primary dimensions emerged from this analysis; 'autonomy, care delivery, culture management, information management, leadership, psychological management and relationship management' with multiple sub themes. These categories provide a broad description of RNs' work roles which can be grouped by direct and indirect dimensions. The review by Squires (2004) provides a macro view of nursing roles.

An advantage of the review by Squires (2004) is that it included research conducted in eight countries in North America, Europe and Asia and identified common roles despite geographic and cultural variation. Squires (2004) argues that the term 'role' is different from the term 'work'. Her definition of role implies that it is an encompassing group of behaviours and work is a facet that is governed by the role. Whether the terms are used interchangeably as Squires (2004) states; roles and work do imply an action that has a focus. How the terms are applied in the literature will be defined by the authors in relation to their research. Squires (2004) suggest that the acute care nurses' roles are complex and multifaceted which has a similar theme to Billett's (2001b) categories of 'complexity' and 'multiplicity'. However, Squires (2004) suggests that work is part of the role, whereas, Billett's (2001b) schema of work activities theory indicates that each action is a work activities. What Squires (2004) has provided is a clear definition of roles of acute care RNs.

Many different studies have identified specific activities that RNs perform in their working day (Burke et al., 2000; Capuano, Bokovoy, Halkins & Hitchings, 2004; Goossen, Epping, Feuth, van den Heuval, Hasman et al., 2001; Kummeth, de Ruiter & Capelle, 2001; Leppa, 1999; Miranda et al., 2003; Ross, Rink & Furne, 2000; Stevenson, Caverly, Srebnik & Hendryx, 1999; Whitman, Sereika & Dachille, 2003). Consistently, these studies group nursing activities into various major categories of

nursing care, which can be broadly described as direct and indirect nursing actions. Different methods have been used to explore the nursing action categories. Time and motion, work sampling and self reporting studies generally provide categorisation of these activities.

Goossen et al. (2000, p.243) developed “the nursing minimum data set for the Netherlands (NMDSN)” to analyse the combination of nursing activities and to understand the patient acuity. The researchers identified 145 specific daily nursing activities which were then grouped into 32 categories of activities (Goossen et al., 2001; Goossen et al., 2000). Capuano et al. (2004) grouped nursing activities into five major categories, ‘direct care, indirect care, unit related, personal’ and ‘documentation’. Each of these categories then had activities grouped under each major category. Five categories were also described by Burke et al. (2000) which included ‘administrative, patient care, medication administration, clinical activities’ and ‘non-categorized activities’. The study by Miranda et al. (2003) had four categories which were classified as; 1) ‘at patient level’; 2) ‘activities not related directly to patient and not medical’; 3) ‘activities for nurses themselves’; and 4) ‘activities that could not be scored in other categories’.

The studies classify the direct care of patients in a similar manner (Burke et al., 2000; Capuano et al., 2004; Goossen et al., 2001). These activities can include, grooming, administering drugs, providing treatments and communicating. The direct care activities are focussed on the patient and/or the family (Burke et al., 2000; Capuano et al., 2004; Miranda et al. 2003; Urden & Roode, 1997). Indirect care nursing activities occur away from the patient but are related to the patient. This can include nursing documentation, coordination with other health groups involved with the patient, setting up equipment or obtaining supplies (Burke et al., 2000; Capuano et al., 2004; Miranda et al., 2003; Urden & Roode, 1997).

The description of other categories of activities focuses on the non clinical needs of the RNs (Capuano et al., 2004; Urden & Roode, 1997), this can include, rest breaks, social activities in the work place or personal needs (Capuano et al., 2004; Urden & Roode, 1997). Other observed categories in the workplace include items related specifically to the work area (Capuano et al., 2004; Urden & Roode, 1997) and documentation as a

specific item (Capuano et al., 2004). There is a general consensus that activities, such as documentation directly related to patient, can be regarded as direct care nursing actions.

In a study of RNs and 'nurse extenders' Urden and Roode (1997) measured the work activities using four major categories; 'direct care', 'indirect care', 'unit-related' and 'personal'. Within these four major categories, a total of 25 minor nursing activities were identified. The study used work sampling, which was conducted over 6 weeks. The results indicated that overall, nurses were spending about 37% of their time on direct patient care activities, however, paediatric department RNs (including paediatric ICU) spent 42% of their nursing time in direct care. Medical-surgical RNs spent the most amount of time on documentation, which equated to 27% of their time. Nurse extenders were found to spend more time on "personal activities" than RNs. A strength of this study relates to the fact that the researchers were able to demonstrate inter-rater reliability in their data collection. However, there were a number of limitations. First, it was conducted in one hospital. Second, the data collection involved observers from the areas where the observation was conducted, and some of the observers were managers. The authors did acknowledge the Hawthorne effect which may have had a significant effect as they used managers from the areas that were being observed. The observation times were based on the observers finding time in their work schedule to conduct the observations. This may have introduced a bias. Observers may have unconsciously conducted their observations at similar times. Further, given it was conducted in the USA over a decade ago, it may not reflect contemporary nursing practice in other countries.

Other researchers have used or adapted Urden and Roode's (1997) classification system. For example, Capuano et al. (2004) utilised a mixed method of work sampling and focus groups to gauge work flow after changes in a work environment in a pre post implementation study. The major study categories listed were 'direct care, indirect care, unit related, personal, and documentation' (p.249). The staff observed included RNs, 'technical partners (TP), administrative partner' (AP) and 'support partner' (SP) (Capuano et al., 2004, p.248). The TP assisted the RN with care related to the patient, the AP managed the paperwork and the SP attended to cleaning, transporting patient and restocking of supplies and equipment (Capuano et al., 2004).

The pre implementation observations identified that the RNs spent 40.1% of their time doing 'direct care' activities through observation. The authors indicated that after the focus groups the 'direct care' percentage (40.1%) was adjusted to 44%. This was based on the input of the focus groups which indicated that the work sampling had not captured completely the intricacies of the work activities. The 'direct care' percentage (44%) was considered a satisfactory amount of time for the RNs to be doing 'direct care' (Capuano et al., 2004). After the work flow changes had been made a post implementation observation took place. There was a 5.6% decrease of direct care by RNs and an 8% increase of indirect care. The TP's direct care had increased 8.7%. Interestingly the authors attributed the amount of time the RNs spent involved in indirect care activities had a positive effect on the reduction of length of stay for patients.

Capuano et al. (2004) utilised 10 observers pre implementation that had clinical experience in the area. To establish inter-rater reliability, the observers were trained, observed and 'tested' doing a 'dry run' (Capuano et al., 2004, p.249). In the post implementation observations only two observers were utilised, one from the pre implementation observations. The study covered all shifts over a 12 day period which presents a good spread of observations. By using Urden and Roode's (1997) tool the observation data was organised into logical groups of work activity. This allowed Capuano et al. (2004) to identify key areas for work flow adjustment and then to analyse the effect of the change. It is not stated why a reduced number of observers was utilised for the post implementation observations. It may have been related to efficiency or the number of staff available. How this may have affected the observation process is difficult to ascertain. The inter-rater reliability was conducted for the separate observer groups but there was no indication whether the pre and post implementation observers groups were compared statistically. There is the potential for observer differences. This may be more evident with the post implementation observer who was not involved in the pre implementation observations. In the Australian context, an adaption of Urden and Roode's (1997) tool was utilised to assess RNs and Clinical Nurse Specialists (CNS) (Duffield et al., 2005).

In a study that explored the similarities and differences of work time for RNs and CNSs, Duffield et al. (2005) used a work sampling observation method and categorised the

activities into four major categories and 25 minor categories. The four major categories were 'direct care, indirect care, unit-related, personal' (p. 16). The study took place over eight weeks, in six wards of a private hospital, 53,240 observations occurred. The minor activities of the RNs and CNSs were described such as, "Admission and Assessment" (Duffield et al., 2005, p.17). The percentage of time that the RNs (6.5% - 10%) and CNSs (5.0% - 10%) spent in this category was similar. Understandably CNSs spent up to 10% of their work time in "meetings and administration" (p.19) which can reflect the management requirements of the role.

This study in the Australian context was able to capture a robust number of observations (53,240) of nursing staff in their clinical environment. The authors indicated that only one observation was documented when the observer was documenting the work activity. So there was the possibility that more than one work activity was occurring at the observation time. The challenge with the work sampling method is that it captures points or events in time and the observer is making quick judgements of what they are observing (Finkler, Knickman, Hendrickson, Lipkin & Thompson, 1993). The observation may not reflect the actual activity. As indicated by Capuano et al. (2004) the work sampling method may not capture all that reflects the work activities taking place simultaneously. Instead work sampling captures activities in a point in time.

While, there were a large number of activities captured over eight weeks by Duffield et al. (2005), there is the possibility that a number of relevant activities were not captured. The observers were deciding which activity to document. The work sampling method was utilised appropriately and effectively, but still may have missed the essence of the activities that were occurring. The categories utilised by Duffield et al (2005) allowed a logical approach to organising the observed work activities. It is possible to describe nursing work based on the probability of work sampling, the caveat being that it may not reflect what was taking place as the activity was observed.

In another categorisation of nurses' work, Kummeth et al. (2001) divided the nurses' activities into technical tasks and professional interventions, when they examined how NAs and RNs could share work in an acute medical unit. Technical tasks related to the general organisation of the unit and basic hygiene cares of the patient. Whereas professional interventions related to activities that could not be done by the NAs such as discharge planning, medication administration and specific nursing cares that needed to

be attended by a RN. The authors describe a 'task inventory grid' (Kummeth et al., 2001) that outlined specific activities that were regarded as needed to provide patient care. The grid allowed for different staff on the unit to be allocated different activities. The list of tasks was extensive covering admission, discharge and many other activities related to patient care.

This article, while providing insight into a process of work change is a quality activity rather than a research study. What are described are the activities of all staff on the unit. The activities check list in the 'task inventory grid' are broken down into sections for admission, discharge and documentation which includes general patient cares during the patient's admission in the ward. A challenge with this paper is related to the lack of presented data. The authors provided a brief comment that a pilot study took place but no information is supplied about the pilot study making it difficult to consider the worthiness of the pilot study. There was mention of two "team development surveys" (Kummeth et al., 2001, p.261) being conducted but no presentation of the survey information. To effectively critique the processes that were utilised in the paper it is necessary to understand the strengths and weaknesses of presented data. In this paper this was not possible. The consideration of staff activities in the clinical setting is important and Kummeth et al. (2001) have indicated a positive outcome from the changes in work practices. The paper would have benefited from a more scholarly research approach.

While several methods can be used to study nurses' work, observation is one that is favoured (Adomat & Hicks, 2003; Ampt, Westbrook, Creswick & Mallock, 2007; Gertz & Bucknall, 2001; Kerr, 2002; Payne, Hardey & Coleman, 2000; Spradley, 1980; Wikström & Sätterlund Larsson, 2003; Zeitz, 2005). When observation is used, various classification systems are used to categorise nurses' work, however, the Urden and Roode (1997) framework or an adaption of the framework has been used in a number of studies (Capuano et al., 2004; Duffield et al., 2005; Duffield & Wise, 2003; Duffield, Wood, Franks, & Brisley, 2001; Urden & Roode, 1997). Consistently nurses spend their activities in direct or indirect activities. In Table 2.1 some of the nursing observational studies that have been published describing nursing activities are listed. The range of the direct and indirect nurses' work (Table 2.1) reported as research

findings demonstrate the potential variability of nurses' work in the clinical environment.

Table 2.1. Work Activity Studies

Authors	Staff/country	Direct care activities	Indirect care activities
Urden & Roode, (1997)	RNs, USA,	32%	22%
Norrie, (1997)	RNs, UK	41%	^a 22%
Duffield & Wise, (2003)	All staff, Australia,	29%	49%
Wong et al. (2003)	RNs, USA	^b 40.1%	^b 15.3%
Capuano et al. (2004)	All staff, USA	40.1%	Not stated
Leathwick, (2005)	RNs & ^c CNS (perioperative), Australia	^d 51%	^d 29%

Note. ^aNorrie (1997, p.122) definition of "patient assessment" equivalent to indirect care. ^bData reflects direct care after introduction of clinical information system. ^cClinical Nurse Specialist. ^dOnly RN data displayed.

The observation of nursing activities provides an understanding of what is occurring in the natural setting. The challenge is ensuring that the observed nursing activities represent what is taking place for the RN. In the next section nursing activities and the ICU nurse will be critically reviewed.

2.4.2 Nursing Activities in the ICU

Nursing activities in the ICU have been explored for a number of reasons including to understand scope of practice, competencies and to describe the workload. The ICU nurse in the clinical setting is a practitioner who can work with advanced technology (Wiles & Daffurn, 2002) and make multiple decisions (Bucknall, 2000) in a high pressure environment. The knowledge and skill requirements and the contextual factors are important aspects of ICU nurses work, and may influence the activities undertaken. However, the knowledge, skill requirements and contextual factors may not be

consistently or globally considered by some of the tools developed to measure ICU nurses' work. Some of these tools include the comprehensive nursing intervention score (CNIS) (Yamase, 2003), the time oriented score system (TOSS) (Italian Multicenter Group of ICU Research [GIRTI], 1991), therapeutic intervention scoring system-28 (TISS-28) (Miranda et al., 1996), the nine equivalents of nursing manpower (NEMS) (Miranda et al., 1997) and the nursing activities score (NAS). The tools focus on clinical actions and with some consideration of patient acuity (GIRTI, 1991; Miranda et al., 1996; Miranda et al., 1997; Yamase, 2003).

The CNIS described by (Yamase, 2003) is a workload tool that has explored the ICU nursing activities as they are performed at the bedside. Yamase (2003) conducted a three round Delphi survey and initially identified 88 ICU nursing activities which were reduced to 73 ICU nursing activities. Each of the activities was considered from five perspectives, "number of nurses required, muscular exertion, mental stress, skill, and intensity" (p.299). As part of the workload tool Yamase (2003) performed a time study to establish the amount of time required for nursing activities. The time study data of ICU nurse activities were then converted into a numerical factor to be included in the CNIS. Yamase (2003) believed that the CNIS workload tool could be applied in the clinical situation more effectively than other workload tools, because of the ability to assess each of the ICU nurse's work activity.

The challenge with this workload tool as recognised by Yamase (2003) is the number of activities that need to be documented and calculated. While the study by Yamase (2003) provides extensive direct nursing care activities there are exclusions. No indirect nursing activities or nursing documentation was listed in the CNIS. This is a significant omission and implies for this workload tool that only direct nursing care activities provided by ICU nurses are relevant to the care of an ICU patient. Recording the time required for nursing activities for the ICU nurse provided an indication of the time involved with the direct nursing activities. However the acuity of the ICU patient's illness could potentially alter the time required for nursing actions based on the ability of the ICU nurse. A final point of interest in this tool was that of the 73 items listed in the CNIS only one item can be regarded as a communication item "Correspondence with patient's family" (p.303). The communication between other ICU nurses, medical,

allied health staff and loved ones of the patient could have a considerable time involvement that was not recognised in the CNIS.

In addition to a number of studies being undertaken to specifically develop workload tools, other researchers have focused on research about what nurses do in ICU. A study investigating nursing activity in the ICU by Harrison and Nixon (2002) used a “self-reporting diary log sheet” (p.158). The study was conducted in a general intensive care unit and RNs of all levels in the unit were invited to participate. The study involved the early, late and night shift for the ICU. The researchers used a list of seven main categories ‘direct nursing care, clerical nursing duties, patient assessment, time out, patient-focussed activity, non-nursing duties, time-out personal activity’ and ‘other’ and 45 minor categories. RNs were asked to document their activities on a log form in 5 minute intervals. The study was conducted over a seven day period. Harrison and Nixon (2002) found that 85% of nursing activities were focussed on four categories, “direct nursing care 24%, clerical nursing duties 17%, patient assessment 38% and time out, patient-focused activity 6%” (p.162).

Harrison and Nixon (2002) indicated that the top five minor categories involved 47.1% of the ICU nurses observed time. Two of the minor categories were part of the major category “Clerical nursing duties” (p.163). Two minor categories were in the major category of “Direct nursing care” (p.163). One minor category was part of the major category “Patient assessment” (p.163). The category that had the greatest percentage was “observation/assessment of the patient to assess physiological and/or psychological status” (p.163) which was observed for 17.70% of the ICU nurses’ time. Interestingly, Harrison and Nixon (2002) indicated that the amount of time the ICU nurses spent in the four major categories “direct nursing care; clerical nursing duties; patient assessment; time out, patient-focused activity” (p.164) which related to the patient, varied between 83% for the day and late shift, and 86% for the night shift. This suggests that the type of shift the ICU nurse was working had similar work activities. It is interesting that the percentage of activities on the night shift were greater than the day and late shift.

As noted by the researchers, self reporting log reports, while being cost effective, can be affected by inaccurate data collection (Harrison & Nixon, 2002). This can occur because the self reporting log report is reliant on accurate recollection of events that have taken

place (Burke et al., 2000; Harrison & Nixon, 2002). Additionally, ICU nurses' accuracy when documenting the time intervals for the activities may be questionable. The ICU nurses were instructed to list the activity they were performing at each five minute interval. If the ICU nurses were performing more than one activity at the time they may have not captured all their activities. Further, when they were very busy, it may have been difficult to record their activities. The authors recognised the possibility that simultaneous activities could take place for the ICU nurses and that only one activity would be documented which is problematic.

The major groupings of nursing activities can be divided into direct and non direct nursing care. Direct nursing care activities identified in the studies include, hygiene, RN specific skills such as medication administration, charting of observations and patient/family education (Harrison & Nixon, 2002; Miranda et al., 2003; Yamase, 2003). The indirect nursing care activities tend to focus on the activities performed on the patient's behalf either at the bedside or away from the bedside (Harrison & Nixon, 2002). These activities have been described as organising patient procedures, contacting or communicating with other members of the health care team and planning the patient's care. The nursing activities described in the studies (Harrison & Nixon, 2002; Miranda et al., 2003; Yamase, 2003) demonstrate some of the work actions that ICU nurses do during their shift. One aspect of nursing work that needs to be described further is the single work activity. Yamase (2003) recognised that there are other factors that can impact on each nursing work activity, these factors were, "number of nurses required, muscular exertion, mental stress, skill, and intensity" (p.299). The factors described by Yamase (2003) present a perspective of ICU nurses' work activities. Another method of viewing nursing activities could be by utilising the schema of work activities theory by Billett (2001b).

The different tools described focus on nursing actions, and some capture patient complexity related to the individual patient(s) a nurse may be caring for, but none include the complexity from an experienced and inexperienced staff perspective. The uncertainty, multiplicity, and autonomy that ICU nurses may experience are recognised by theorists such as Billett (2001b) as part of the work environment. These are important factors of nursing work that should be considered when attempting to classify work activities. ICU nurses may face a difficult clinical situation where the skill mix

does not match the acuity of the ICU patient. Junior or inexperienced ICU nurses may be required to care for an acutely ill ICU patient and each work activity related to the patient may have an increased importance. The work activity has a greater weighting for the inexperienced ICU nurse but is not considered in the workload tools. The integration of a schema such as Billett's (2001b) schema of work activities theory may provide a new perspective of work activities performed in the natural setting.

When considering nursing activities within the context of Billett's (2001b) schema of work activities theory a different perspective can be identified. The categories of 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility' (Billett, 2001b) provide an opportunity to view each ICU nurses' work activity as having other potential factors associated with the work activity. Is the activity routine, and as such, easy to perform, or is it non routine requiring a different depth of knowledge to complete? Does the activity require a decision making process of an autonomous practitioner or is an RN faced with an activity that they do not have enough knowledge to be able to make an autonomous decision? Is the activity an advanced activity that has many facets? Utilising Billett's (2001b) schema of work activities theory there is the opportunity to provide a description that assists nursing administrators and managers in their understanding and subsequent staff planning activities. The schema can provide individual practicing nurses with guidance when they are supervising, delegating and overseeing other RNs, ENs or unregulated level of health workers. A format like the schema of work activities can provide a template to assess and understand how different activities may impact on junior ICU staff compared to experienced ICU staff

The schema of work activity theory can indicate work activities that are easy and/or complicated depending on the knowledge and capability of the person faced with the activity. The intensive care environment can have many different types of patients, and be staffed by RNs with different levels of competency and capability. While previous studies have defined nursing activities, no studies to date have described the multiple factors that may impact on the RN as they do an activity. Incorporating Billett's (2001a, 2001b) schema of work activities theory makes it possible to view nursing activities from a richer perspective. Each work activity can be described/classified into six perspectives.

2.5 Summary

This literature review has considered the factors such as legislation and professional guidelines that direct nursing practice in the work environment. As discussed, professional nursing organisations and legislation provide scope of practice guidelines for the RNs. Yet it is not only legislation that will impact on an RN working in a health facility. Work theories provide an insight into what might motivate a RN in their work environment. While these work theories provide a conceptual insight, work research into what ICU nurses do is the next logical step. The research described by the authors (Capuano et al., 2004; Goossen et al., 2001; Harrison & Nixon, 2002; Miranda et al., 2003; Yamase, 2003) has identified different nursing activities. Yet, only Yamase (2003) has described what is required to perform the activities. Billett's (2001b) schema of work activities theory adds a new perspective to the activities performed by ICU nurses. It is proposed that by combining the schema of work activities theory by Billett (2001b) with the research method of time and motion a different perspective can be presented of what ICU nurses in the Australian context do when they are working.

Chapter 3

Methods

3.1 Introduction

The challenge of identifying nursing activities in a fast paced hospital environment is addressed by different research techniques. Some of these techniques include self report (Burke et al., 2000; Gran-Moravec & Hughes, 2005; Harrison & Nixon, 2002), work sampling (Capuano et al., 2004; Finkler, Knickman, Hendrickson, Lipkin & Thompson, 1993; Korst, Eusebio-Angeja, Chamorro, Aydin & Gregory, 2003; Pelletier & Duffield, 2003; Stevenson et al., 1999; Urden & Roode, 1997) and time and motion studies (Burke et al., 2000; Davis et al., 2004; Finkler et al.1993; Langlois, Vytialingam & Aziz, 1999; Penner, Cone & MacMillan, 2003; Roberts, 2002). This study sought to describe and analyse the activities ICU nurses undertook. In this chapter a description of the research design chosen to address the research question is provided. Further sections of the chapter include the setting, sample, the researcher as an observer, data collection preparation, data collection, data analysis and ethical considerations and limitations.

To capture ICU nurses' work activities a time and motion method was utilised. The activities observed were classified in relation to the type of nursing work they represented; direct, indirect, unit-related and personal. This current study adopted the classification system developed by Urden and Roode (1997) and adapted by Pelletier and Duffield (2003). This study also utilised the schema of work activities theory by Billett (2001b) as part of the observation and analysis process of ICU nurses activities. The schema of work activities theory can be conceptualised in relation to ICU nurses and the 'routineness', 'discretion', 'complexity', 'intensity', 'multiplicity' and 'accessibility' (Billett, 2001b) of their work activities.

Combining the time and motion observation method, categorising the work activities observed and describing each work activity using the schema of work activities theory (Billett, 2001) introduces a new process to describe ICU nurses' work activities. Workload tools described in the literature (GIRTI, 1991; Padilha, Sousa, Kimura, Miyadahira, de Cruz et al., 2007; Spence, Tarnow-Mordi, Duncan, Jayasuriya, Elliot et

al., 2006; Yamase, 2003) have not described this approach to observing ICU nurses' actions. Using this combination of observation and categorisation of ICU nurses' work will contribute to nursing knowledge. It provides a novel approach to understanding factors that can impact on the ICU nurses' work that have not been described in the literature previously. Thus, this time and motion study captured the frequency of activities and the time it took to complete activities as the ICU nurse worked a day shift. The activities were grouped and classified into categories and then the schema of work activities theory was applied to each activity.

3.2 Research Question

The overall aim of this research was to describe the work undertaken by ICU nurses during a day shift. The aim led to the following research question:

What are the activities undertaken by bedside ICU nurses providing patient care?

Subsequently in the observation and analytic phases the following questions were answered.

1. What is the frequency of activities performed by bedside nurses in ICU?
2. What is the proportion of time bedside ICU nurses spend on direct care, indirect care and other activities?
3. To what extent can the activities of the bedside ICU nurses be described as routineness, discretion, complexity, multiplicity, intensity and accessibility?

3.3 Research Design

A descriptive quantitative structured observational research design using time and motion was used for this study. "The purpose of descriptive studies is to observe, describe and document aspects of a situation as it naturally occurs ..." (Polit & Beck, 2004, p.192). Descriptive research is classed as a non experimental research method (Houser, 2008; Polit & Beck, 2004). Non experimental research is utilised generally when researching human subjects. Human subjects have a number of variables that are not easily categorised or manipulated in an experimental way. The descriptive research method in particular is aimed at documenting what is taking place, whether it is the

characteristics of the subjects, the prevalence of a situation, the intensity or the sum total of a phenomenon (Polit & Beck, 2004). The strength of descriptive research is that it can provide information that has not been observed previously. It can be done in a natural setting with human subjects and it can provide baseline data for future research. The limitations of descriptive research method reflect principally the difference between experimental and non experimental methods and the ability to identify causal relationships (Polit & Beck, 2004).

Another method of observing human subjects in a natural setting is ethnography (Houser, 2008; Parahoo, 2006). Ethnography involves the exploration of culture in a participant observer process where the researcher becomes an active participant (Houser, 2008). One of the goals of ethnography is to describe aspects of culture that are not always obvious. The strengths of ethnography relate to the in-depth knowledge that can be identified in the natural setting (Houser, 2008). The participant is being observed as they act in their cultural setting (Houser, 2008). The limitations of ethnography include, the time required to achieve the level of knowledge can be extensive, the members of the culture/community being observed may react to the observation process and the observer may inadvertently alter the culture that she/he is observing (Houser, 2008). In this study the aim was to describe the activities of the ICU nurses from a non participant perspective. While the culture of ICU nurses is important to explore a participant observer method was not considered appropriate for the aim of the study. Therefore the descriptive research design was utilised.

A descriptive research design was appropriate to use in this study because the aim was to observe bedside ICU nurses in their environment and document activities performed during a day shift. This method will attempt to capture what took place naturally for this group of ICU nurses. Other studies have observed ICU nurses as they worked for periods of time (Aitken, 2003; Currey & Worrall-Carter, 2001) but none to date have been identified that document the ICU nurse's day shift. There have been several studies that have used time and motion method to understand activities in the health sector (Burke et al., 2000; Davis et al., 2004; Knickman, Lipkin, Finkler, Thompson & Kiel, 1992; Korst et al., 2003).

Where this study provides a different point of view is the application of the schema of work activities theory (Billett, 2001a, 2001b) and the grouping of the ICU nurses' work

activities (Pelletier & Duffield, 2003) for the whole day shift. Observing the whole shift allows for a macro and micro view of the ICU nurses day. The macro description provides an overview of what they ICU nurses experience for the full shift. The micro view then provides a description of the individual activities that the ICU nurses performed during the day. Applying Billett's (2001b) schema of work activities theory provides the opportunity to describe each activity performed by the bedside ICU nurse from six perspectives/categories, 'routineness', 'discretion', 'complexity', 'intensity', 'multiplicity' and 'accessibility' (Billett, 2001b). This offers a novel description and analysis of the ICU nurses' time and motion activities data. Their work is documented and timed using the time and motion observation process, grouped into work categories (Pelletier & Duffield, 2003) and described from the view that each work activity can have six factors that may impact on the ICU nurses. The description of the bedside ICU nurses' activities can inform future workload tools that are based on the Australian ICU nurse.

3.4 Setting

This study took place at a private hospital on the Gold Coast in Queensland. The hospital had 268 beds with services such as; cardiac surgery, cardiology and cardiac rehabilitation, general surgery, oncology, renal, obstetrics, emergency centre, urology, gynaecology and day procedures. The ICU was an 'open' unit where the treating physician or surgeon had direct input into the care of their patients and the ICU intensivist managed specific health care needs of the patients. The ICU was a 12 bed unit. Admissions include regular cardiac surgery and general surgery as well as admissions from the emergency department and the wards. This meant that the ICU was able to deal with 12 ventilated and critically ill patients across the spectrum of illnesses that required intensive medical and nursing care.

The JFICM (2003) standards outline three levels of ICUs. A Level III ICU is able to care for complex ICU patients with multi-system failures for an indefinite time. Level II ICUs are able to care for complex patients with multi-system failure for at least seven days and Level I ICUs are able to provide emergency care to stabilise a potential ICU patient for up to several hours (JFICM, 2003). The site where the research took place was a Level III ICU. The ICU had the staff and equipment to deal with patients who

required advanced intensive care, such as intra aortic counter pulsation support, continuous and intermittent dialysis, and long term ventilation. There was potential for emergency admissions that required Level III ICU care.

ICUs that have a surgical focus, as in the study site, will generally have a cyclical throughput of patients having elective surgery. The elective cardiac surgical patients were part of the core business for this ICU, which was elective surgery. In this study 80% of the patients the ICU nurses cared for were elective surgical cases, primarily cardiac surgical cases. This meant that the time and motion observations were principally of ICU nurses caring for cardiac post operative surgical patients. The sample reflects more of the routine and regular practices that can be seen for planned elective surgical cases.

The elective surgical patient will return from the operating theatre post surgery and generally progress through an expected recovery process. The patients when appropriate will then be transferred out of the ICU to make way for the next group of elective surgery patients. The discharge process can generally occur in the day shift, this allows for ICU beds to be prepared for the next group of elective surgical patients. This can mean that the ICU nurses are faced with timelines to transfer patients out of the ICU in order to be ready to receive new patients. In addition there may be off unit tests that need to be organised and coordination with the medical team and ward staff. The early shift timeframe presented an opportunity to explore what ICU nurses do in this shift. A consistent observation process of early shifts can provide a focussed view of the nursing actions during this shift. The decision to focus on the early shift provided the opportunity to study, describe and analyse what took place for this group of ICU nurses.

This project followed ICU nurses in a private hospital ICU. While there are both differences and similarities in how private and public ICUs are funded and managed, the staffing ratio for the ICU patient is one area of similarity. As with other Australian ICUs, the staffing at this site followed recommended guidelines (ACCCN, 2002; JFICM, 2003). That is, all patients in this study were considered intensive care patients and allocated one nurse for each patient. All participants cared for one patient except when meal breaks were occurring, when one ICU nurse was responsible for two ICU patients. While the findings in this study can not be generalisable to other ICUs the sample does reflect the general trend for staffing in Australian ICUs.

3.4.1 Participant Description

This study aimed to recruit ten ICU nurses who were classified as Nursing Officers level one (NO1) and observe them during the day shift (0700 – 1500 hours). The NO1 is described as a RN who cares for adults or children. Their nursing actions are clinically based and focus on patient care (Queensland Government, 2007). The NO1 has levels ranging from 1-7 which reflects their years of experience (Queensland Government, 2007). In this study all of the bedside ICU nurses were NO1 level.

Ten bedside ICU nurses were selected because there was the potential to generate approximately 80 hours of data if these nurses were followed for their eight hour shift. Ten ICU nurses could provide a variety of individuals work would be recorded with potential diversity in the data. Eighty hours meant that a comprehensive understanding of the day shift would be achieved. A convenience sample of ten different bedside ICU nurses agreed to participate in the study on consecutive days over two weeks, Monday to Friday of each week.

There were a number of reasons for the sample size of ten participants in a consecutive timeframe. These included, reducing the risk of observer fatigue during the study period. To attempt to capture a workplace time period (two weeks) that may reflect limited changes in practice or patient management. As a pragmatic issue for the researcher, there was a limited timeframe to collect data. The researcher had taken leave so that he could be the observer in the study. This meant that the researcher was unable to randomly sample time periods.

The time and motion study method can provide rich in depth data from the small sample (Finkler et al., 1993). However, it is an intense method of observation and requires concentration and focus for potentially long periods of time. There was the potential risk of burnout for the single observer if more participants were observed. The benefit of a single observer is the potential consistency of the observations (McCrea, 1998). Yet it was important to consider the timeframe for the observations.

In the literature different timeframes for observation have been described. Authors have described the observation periods ranging from, two hours (Wellard, Lillibridge, Beanland & Lewis, 2003), a minimum of three hours (Davies, Ellis & Laker, 2000),

four hours (Booth, Winstanley & Waters, 2001; Darmody, 2005; Zeitz, 2005), four to nine hours (McCrea, Wright & Murphy-Black, 1998) or for the full shift (Burke et al., 2000). The challenge with the observation periods is deciding the appropriate length of time to watch research subjects for the observer. McCrea (1998) described 'comfort breaks' where observers stepped away from the clinical observation setting a half hour after a specific observed event. This was done to reduce potential problems with concentration or fatigue for the observer.

In this study the planned observation time, the day shift, for the non participant observer incorporated the meal breaks that the ICU nurses were allocated. The observer documented the start and finish time of the break but was not documenting any observations during the meal break time. The meal breaks in the ICU were 0915 and 0930 hours and 1330 hours. This provided rest periods for the non participant observer that occurred either two hours 15 minutes or two hours 30 minutes into the shift and then approximately four hours later another break occurred. As discussed, the time and motion method can be intensive to perform, and there is potential for fatigue of the observer that can lead to lapses of concentration. Yet, the observer was able to take rest breaks when the ICU nurses did, which allowed for down time from the observation process. The meal breaks occurred as expected during the observation time at the research site.

To assist with the observation process the observer had taken leave from his normal work which removed other work commitments for the planned two week observation period. This reduced external stressors such as work related fatigue that may have impacted on the data collection. The observer was an experienced senior critical care nurse who worked in a public hospital ICU in Queensland. He was familiar with the work timeframes in the clinical environment of an ICU. The experiential familiarity of the observer related to the work in an ICU prepared him for the potential challenges he would face documenting the actions of the ICU nurses at the research site.

The tool to document the observations of the ICU nurses' activities was a simple design attached to a clipboard. The observer was able to document the start of each continuous hour once, then only document the minutes and seconds till the next hour. The landscape view of the tool also aided in the documentation as it was ergonomically comfortable for the observer. The stopwatch was running continuously above the tool in

a visible section of the clipboard. This allowed the observer to manage the scribing of the data in a comfortable manner.

The day shift was selected to increase the richness of data collected. Anecdotally in Australia, the day shift is regarded as the busier shift in an ICU based on the activities that occur. There are a variety of medical and allied health rounds on the day shift to assess a patient's progress. A number of activities occur during the shift such as x-rays, blood tests, patient transfers and dressing changes. Thus, a focus of this research was on the daytime activities undertaken by RNs.

Ethics approval was granted by the Griffith University (Appendix A), and the private hospital (Appendix B) prior to commencement of the study. RNs were approached by the researcher at handover and at education sessions, and a description of the study was presented. Questions were answered and an information sheet that outlined the study was supplied to interested RNs. The consent form had the information sheet attached for potential participants to read prior to consenting to be part of the study (Appendix C). Once RNs indicated their interest in participating in the study they voluntarily signed the informed consent form (Appendix D). All participating RNs were informed that they could withdraw from the study at any time. The potential RN participants were told that they would be observed for the entire day shift which was considered to be 0700 hours – 1530 hours or, what constituted a day shift for the RN. The RNs were informed that all of their activities that occurred during the day would be timed and documented. Explanations were provided to the potential participants that the timing of the activities was not related to their efficiency but identifying what activities took place and the time required for the activity.

3.5 Observation and Experience

The researcher, as a participant observer in research is described from two main perspectives. The active observer is someone who participates in the environment with the participants (Gold, 1958; Houser, 2008). The passive observer of participants observes but does not interact with the participants (Gold, 1958; Houser, 2008; Polit & Beck, 2004). There are benefits and limitations for both methods. An active participant may gain an insight into the environment and the factors that are affecting the participants who are being observed. Polit and Beck (2004) suggest that this research

method has the benefit of being able to investigate the intangible that may occur in an environment because the observer is immersed in it. Yet being active in the environment may not necessarily mean that the observer is trusted by the participants or is able to detach themselves from the phenomenon that they are observing (Houser, 2008; Polit & Beck, 2004). This has the potential for data to be missed due to reticence by the participants, or introduce a bias to the observations because of inaccurate observations being documented. The passive method of observation is where the researcher aims to be unobtrusive to the observed participants to the study. Not concealed but less obvious to the participants. This may reduce the chance of participant reactivity; where there is an alteration of the observed participant's reactions because the participant is conscious of being observed (Polit & Beck, 2004). However reactivity is not completely reduced as the passive observer may not be concealed. So the participants can still be aware of the observer. In this study the observer was a passive observer. It would not have been possible to time and record every activity undertaken by a RN if the researcher had undertaken participant observation. RNs participating consented to being observed in this manner.

The passive observer can be overt or covert in their actions (Öhman, 2005; Polit & Beck, 2004). The covert observer method aims to reduce the risk that the observed will alter their behaviours, described as 'reactive measurement effect' (Polit & Beck, 2004). The covert observer may be located behind a one way mirror or utilise a video camera to capture what takes place (Morse, 2003). The overt observer is obvious to those who are being observed; but does not join into the environment of the participants. In this study the researcher was an overt observer of ICU nurses. Being an overt observer allowed the researcher to clarify observations to limit misinterpretation of the activity observed.

Streubert and Carpenter (1999) describe the researcher as instrument as a person who has an intimate knowledge of the culture they are studying. The culture in this case was the ICU work environment. A description of the researcher is provided next. The researcher in this study was an experienced RN who had worked in ICUs in two states of Australia in the past eight years. He had obtained post-graduate qualifications in critical care and was currently working as a Clinical Nurse Consultant (CNC) in a tertiary level three ICU in Brisbane. During his ICU experience he has worked as a

direct patient care provider, developing an advanced level of knowledge about the care of critically ill patients. He has managed ICUs and has worked in the capacity of a nurse educator and nurse leader in the ICU environment. These experiences were invaluable in understanding the workings of an ICU. While all ICUs will have their own unique cultures there are commonalities amongst them. This ICU experience assisted the CNC in his understanding of the ICU work environment and the multiple activities and procedures that take place. He had the ability to classify activities readily and accurately. As an observer he was conversant in the workings of an ICU and this meant that he was a capable observer for this study. There is recognition that this knowledge can also bias an observer (Polit & Beck, 2004). The researcher had not worked at ICU research site and did not know any staff in the unit. Observation training and regular meetings with supervisors to review data collection and analysis were undertaken to limit this potential bias.

3.6 Data Collection Preparation

This section discusses self report, work sampling and time and motion as three types of observational data collection methods, including strengths and limitations of each and the reason for selecting time and motion as appropriate for this study. An explanation is given about how the researcher developed an understanding of time and motion method. The development of the data collection sheet and the preparation of the researcher are detailed. The use of discussion groups and a pilot study were used to improve the accuracy of recording and analysing the data. These are also described in detail.

3.6.1 Observations

Three different types of data collection methods were considered for this study; self report, work sampling and time and motion. Self report has been described as a method that can capture data that is not readily captured by observation (Polit & Beck, 2004). It adopts a format where respondents are able to document what they 'think, feel, or believe' (Polit & Beck, 2004), and it is based on a premise that a respondent who is not observed will be able to be more honest with their comments. The self report method is not as labour intensive as work sampling or time and motion techniques. The challenge and the main critique of self report is the ability to gain true data from the participants (Burke, McKee, Wilson, Donahue, Batenhorst et al., 2000; Polit & Beck, 2004). One

reason that may impact on self report can be the memory of the respondent. If the study design allows for respondents to enter data retrospectively there is the risk that the person may forget to document all the necessary data required (Burke et al., 2000).

Work sampling is an observation method that captures data in different time intervals. The work sampling method aims to capture data that occurs in segments of random (Brisley, 1971) or allocated time periods (Finkler et al., 1993). Work sampling is based on the premise that a calculated number of random samples in a given situation will follow the laws of probability and indicate an average representation of a larger scenario. The data collected does not measure the time it takes for an activity just the activity observed at the time (Urden & Roode, 1997). This method has been used in nursing to identify what nurses do in their workplace (Capuano et al., 2004; Korst et al., 2003; Pelletier & Duffield, 2003). The challenge and a critique of this method as in all observation methods is that participants can potentially alter their behaviour because they are being observed. This is referred to as the Hawthorne Effect (Houser, 2008; Parahoo, 2006).

Another difficulty in work sampling is the captured activity is purported to be the primary activity at the time of observance (Finkler et al., 1993). It may be difficult to determine the primary activity if there are a number of activities taking place at the same time. If a RN is captured tidying a sheet on a patient's bed this will be documented as observed. It is possible that the tidying of the sheet is the end of a sheet change for a bed bound patient or a bed bath or some other action that will not be captured. While categorising what a worker is doing at the time provides valuable data, it is important to be able to understand what an activity is and how long it takes to do an activity, because this can provide a deeper understanding of what has taken place. In order to provide a fuller explanation of an activity, time and motion method was chosen to best capture ICU nurses' work.

The time and motion data collection method has been used in the profession of industrial engineering for many years. It was initially developed to understand and identify inefficiencies of a work environment (Gilbreth, 1911; Lowry, Maynard & Stegemerten, 1927). The initial focus was on employees such as factory workers and brick layers. The workers are observed in their environment; the actions that they performed noted and recorded by time. Time and motion method has been used in a

number of health studies (see Appendix E). In one study nursing activities were observed and described, ranging from 3.5 to 33 minutes (Linden & English, 1994). Eight RNs were observed using the time and motion method for five shifts which equated to 292 hours (Burke et al., 2000). Of the 292 hours, the RNs were involved in 25.4% patient care activities. A study observing the nursing activities for neonatal infants identified RNs spent 76% of time in direct care of infants compared to other health professionals. Time and motion studies have also provided information related to medical officers. In one study 53 house officers actions were observed the authors indicated that 87-175 minutes of on call time was spent on direct patient evaluation, (Lurie, Rank, Parenti, Woolley & Snoke, 1989). Knickman et al. (1992) studied eight interns for 13,383 minutes, indicating that the average for activities was 7.75 minutes. .

In a time and motion study the observer is continuously monitoring a participant during a specific work period (Finkler et al., 1993). The observer documents the activities and codes them so that there is a breakdown of what has been observed (Finkler et al., 1993). As with work sampling there needs to be an understanding of what will be observed and how to document the activities (Finkler et al., 1993). The sample size for time and motion studies is usually small due to the generation of large volumes of data for analysis and because it is labour intensive (Burke et al., 2000; Finkler et al., 1993).

A benefit of the time and motion method when compared to work sampling relates to the allocation of observation time. The observer for the time and motion study observes the participant for the total time selected, where as the observer for work sampling requires a segment of planned or random times to capture what a person is doing (Finkler et al., 1993). Finkler et al. (1993) compared time and motion to work sampling in a study of eight medical residents. Finkler et al. (1993) then undertook a secondary analysis of time and motion data identifying activities randomly by applying the work sampling method. Their findings suggested that for work sampling to provide a good representation of time and motion observations the sample of observations needs to be large. Finkler et al. (1993) also believed that the calculations to define the number of activities to be observed could be affected by a researcher making incorrect assumptions about the frequency of specific activities. The implication being that the calculations for the work sampling activities may not yield similar findings to time and motion data meaning and that there is the potential for the results to be an inaccurate representation

of the activities observed. Thus time and motion was considered the best method for this study because it was the most likely to yield accurate data.

3.6.2 Limitations of the Observation Method

Potential limitations of time and motion observation method include the Hawthorne effect (Houser, 2008; Parahoo, 2006), observer fatigue (Casey, 2006), small sample size (Finkler et al., 1993), participants altering their behaviour as they are observed and the intensity of the continuous observations process (Finkler et al., 1993; Pelletier & Duffield, 2003; Roethlisberger & Dickson, 1939).

The Hawthorne effect refers to the effect on research participants when they are aware of being observed, the research participants may alter their behaviour (Parahoo, 2006). The Hawthorne effect was described by Roethlisberger and Dickson (1939). The researchers were assessing the effect of different settings of illumination in the work environment, and how this could impact on the efficiency of workers in the “Hawthorne Works of the Western Electric Company” (Roethlisberger & Dickson, 1939, p.3). It was identified that increasing or decreasing the brightness of the lights in the work environment did not have the expected effect on productivity, it continued to increase. The effect on efficiency related to the workers being observed.

Strategies to minimise the impact of the Hawthorne effect on participants have been described in the literature by a number of authors. Zeitz (2005) described the challenge of observing nursing observations of post operative patients. Zeitz (2005) indicated strategies that she employed to reduce the Hawthorne effect. Zeitz (2005) described a ‘fly on the wall’ approach, to be less obvious to the RNs she was observing. She also believed that having knowledge of the area but being unknown to the RNs was a benefit as the RNs were ‘comfortable’ with a fellow RN observing them. In a study of critical care nurses decision-making Bucknall (2000) also indicated that having knowledge of the environment, and developing a rapport with participants assisted in reducing the Hawthorne effect. In a study of nurses’ decision-making related to the hemodynamic status of cardiac patients Currey and Botti (2006) indicated that the complete observer does not disrupt the clinical environment of the nurse and as such reduces the Hawthorne effect. Casey (2006) also suggests that knowing the environment and allowing ward staff to become familiar with the observer assists in reducing the

Hawthorne effect. Mulhall (2003) suggests that the Hawthorne effect in participant observation is 'overemphasised'. She believes that there is an 'initial phase' as the researcher enters the field and then the participants who are being observed will be too busy to maintain any altered behaviours.

While the different authors have described strategies to reduce the Hawthorne effect, the main challenge is the difficulty identifying or measuring the altered behaviours. The suggestion by Mulhall (2003) that the observed participants will be too busy and will revert to their normal work behaviours holds merit. However, it is quite possible that the research participants remain in their altered behaviour and the observer is unaware. This may be prevented by the experience of the observer in the research area (Bucknall, 2000; Casey, 2006). The researcher familiar with work patterns and requirements may be able to identify when the actions appear at odds with normal practice. This supports the belief that the experience of the observer in the research site can be considered important in reducing the Hawthorne effect (Bucknall, 2000; Casey, 2006).

In this study the strategies employed to address the Hawthorne effect included, an unobtrusive approach to observations and the non participant observations. After introduction to the ICU nurse and patient the observer positioned himself near the ICU nurses participant. The open design of the ICU site allowed for observer to position himself within earshot of the ICU nurse and patient but still a reasonable distance from them both. This mirrors the 'fly on the wall' approach described by Zeitz (2005). The non participant observation process allowed the ICU nurses being observed to go about their work activities without interruption by the observer.

As suggested by different authors, knowledge of the area of observation can aide in reducing the Hawthorne effect (Bucknall, 2000; Casey, 2006; Currey & Botti, 2006; Zeitz, 2005). In this study the researcher was an experienced senior ICU nurse. His working role required him to constantly assess and educate ICU staff performance in the clinical setting, in an informal and formal manner. This provided a background knowledge of the practices and routines that can occur in an ICU. The experience of the researcher also meant that he had developed an advanced ability to observe ICU nurses' clinical ability. Therefore, he could be aware of actions that may not have fitted with the ICU nurse's observed actions. The non participant observer process of the ICU nurses

work activities meant that there was a greater potential for the ICU nurses to be focussed on their goals rather than being aware of the observer.

Observer bias is also considered a limitation of observational research (Polit & Beck, 2004). Polit and Beck (2004) have described potential observer biases that can occur during observational research. The author's list common observer biases of this research method, these are: "enhancement of contrast effect, central tendency bias, the halo effect, assimilatory biases, errors of leniency, and errors of severity" (Polit & Beck, 2004, p.391-2}. The enhancement of contrast effect is where observers will mould data so that there is clear delineation of data (Polit & Beck, 2004). The bias labelled central tendency refers to the observer altering the observations of extreme data so that they fall within the central theme of observations (Polit & Beck, 2004). The halo effect refers to the loss of objectivity when observing participants. The observer can form an opinion of the participant, this opinion can taint the observations of the participant. The observer can document positive observations of the participant when this may not be accurate (Polit & Beck, 2004). Assimilatory bias occurs when the observed data is recorded in accordance with the observer's beliefs. The data is categorised in a manner that demonstrates an untrue 'orderliness' (Polit & Beck, 2004). The bias of errors or leniency or severity occurs when the observer documents/rates all data in a positive (leniency) or negative (severity) manner (Polit & Beck, 2004).

The potential limitation of observer fatigue discussed in 3.4.1 highlights the importance of being aware that it may impact on observer vigilance (Casey, 2006). In this study the breaks in observation mirrored the allocated meal breaks of the ICU nurses. This allowed the observer to stop all observation other than logging the start and stop times for the meal breaks. The observer was able to replenish and rest during the meal breaks and return to the observation process refreshed.

The size of the sample for time and motion observations is generally small due to the time involved with observing the participants (Burke et al., 2000; Finkler et al., 1993). The benefit of the time and motion data is the volume of information that can be obtained observing participants (Finkler et al., 1993). In this study the observer was able to observe the ten ICU nurses. Partly through the pragmatics of what time was available to the researcher to observe the participants. However, it was decided that observing ten ICU nurses for their day shift would obtain a projected 80 hours of observations, which

could provide an insight into the ICU nurses work day. The decision to observe one shift time, the day shift, was made to provide a focussed view of the sample.

Time and motion observations capture the activities and the time it takes to perform the observed activities. It can provide a clear understanding of what is taking place during a selected work period. Thus it was decided that the time and motion method was the most appropriate data collection method for this study. As a researcher it is important to be aware of the limitations of the time and motion method and adopt strategies to address these limitations.

3.6.3 Data Sheet Development and Research Training

To utilise the time and motion method effectively it is necessary to prepare for the observations and practice the process (Lowry et al., 1927). To prepare for the study the researcher developed a data collection form, and revised it three times during training to improve the data collection/observations. Training was undertaken in a different ICU. An ICU Clinical Nurse (CN) researcher on the unit was enlisted to be a practice observer for this test phase. Two stopwatches were used for the observations that were running continuously in 24 hour time in second increments.

The plan was for the researcher and the CN researcher to trial the data collection sheet (see Appendix F) on two different ICU nurses as they cared for patients. The initial form had a start time, stop time, a section for an activity to be described and a section for coding of the activity as either Direct Care (DC) or Indirect Nursing Care (IC). The first trial was done to understand how the observation process would work and how the timing of events would be captured.

Staff in the ICU were approached and asked if they could be observed for a 15 minute block. Six ICU nurses agreed. The ICU nurses who agreed to be observed were given an explanation that the researcher was learning about time and motion observations. The researcher observed the nurse caring for a post operative cardiac surgical patient. The CN researcher observed an ICU nurse caring for a patient who was admitted from the emergency department. After the 15 minutes the two observers met and discussed the data collection process. This discussion focussed on identifying when an activity began and finished; the challenges of quickly documenting what was taking place and the

logistics of holding the paperwork documenting and accurately timing the activity. Both observers had captured 17 activities in the 15 minute block. The researcher considered the discussion regarding the data sheet and it was revised (see Appendix G).

The data sheet for the second set of practice observations was different from the previous data sheet. The new data sheet included the six categories of the schema of work activities theory (Billett, 2001b). Two different ICU nurses were observed, one each by the researcher and the CN researcher and the time and motion data was collected, then the observers filled in the six categories of Billett's (2001b) schema of work activities away from the bedside.

The schema of work activities theory by Billett (2001b) is a description of factors within work activities that workers experience. The six categories described by Billett (2001a) are 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility' (Billett, 2001b). To develop an observation tool of ICU nurses that would provide a description of the categories it was decided to create a coding system for the categories. Billett's (2001b) description of the categories indicated that there could be two facets to each category. One facet indicated a simple or less complicated aspect of the activity, for example Billett (2001b) described 'routineness' as a category that could have either a 'routine' or 'non-routine' component for the worker (p.23). Each of Billett's (2001b) categories were considered as, 'routine' or 'not routine', 'discretion' or 'no discretion', 'intense' or 'not intense', 'multiple' or 'not multiple', 'complex' or 'not complex', 'accessible' or 'not accessible'. The discretion category was renamed autonomous or not autonomous as it was defined by Billett (2001b).

The reason for the coding process was two fold. It allowed for the observations of the schema categories to be quantified and for the development of a scoring process in the clinical environment. An extra category 'not applicable', was also incorporated in the scoring tool. It was felt that there would be activities that did not fit into schema of work activities theory, such as meal breaks. By having the 'not applicable' category this would allow the observer to indicate activities that did not fit into the schema of work activities theory (Billett, 2001b).

The schema of work activities theory categories were marked 'yes', 'no' and 'not applicable'. An activity such as putting an antibiotic into a burette could be observed

and scored 'yes' or 'no' for 'routine', the 'yes' score would indicate that the activity was routine. This process was applied to the 'routineness', 'autonomous', 'accessible' categories. The categories of 'intensity', 'complexity', 'multiplicity' were scored where 'no' indicated that the activity was not intense, complex or multiple (see Appendix G). The observers would watch the activities the ICU nurse were performing, and document the time and motion data. Then, the observers considered the activity from the perspective of Billett's (2001b) schema of work activities theory. This process involved assessing the actions of the ICU nurse as they performed the activity and indicating a 'yes, no or n/a' to each of the Billett (2001b) categories.

The scoring of the categories of 'routineness', 'autonomous', 'intensity', 'complexity' 'multiplicity' and 'accessibility' were based on the knowledge and experience in ICU of both observers. The cues that guided the decision to score activities included the actions of the ICU nurse as they performed an activity. The observers made an assessment of the ICU nurses' action as they performed a clinical action, such as, administering an intravenous (IV) antibiotic. The decisions were based on the physical nursing actions and non physical cues (facial expressions, communication) of the ICU nurse. The cues provided the information for the observer to document the ICU nurse's actions against Billett's (2001b) schema of work activities categories.

The category of accessibility was described by Billett (2001b) as the "degree by which knowledge required for the work practice is either accessible or hidden" (p.23). To score the 'accessibility' category it was extrapolated to the ICU nurses' completion of an activity and their observed behaviour. The observer would consider if the ICU nurse sought knowledge from written sources, their demeanour as they completed the task and consider any hesitation or efficiency related to the task. At this stage of the development of the data sheet this category was still being refined. In activity 4 of Appendix G 'administer IV drugs via burette' the category of accessibility was scored as not applicable (N/A). In the case of the ICU nurse charting observations (Appendix G, activity 7), the observer documented 'yes', the ICU nurse had completed the task, with what was considered knowledge of the process. There was an inconsistency in the scoring of this category during the development phase. The documentation of the category accessible for the ICU nurses' actions was resolved by the final data sheet that

was used for data collection. The observer made a judgement based on what he observed of the ICU nurse's actions.

When the data sheet was used in the clinical setting activities such as adding a drug to a burette would be classified as 'yes'. The ICU nurse was demonstrating knowledge of their work activity based on their observed behaviour, demeanour and communication with other work colleagues. The documentation of accessibility could be regarded as a simplistic view of what knowledge the ICU nurses' demonstrated in their care. However, the goal of applying the schema of work activities theory by Billett (2001b) was to observe the ICU nurses and make a judgement of what factors were impacting on them as they performed an activity. Similar to how assessments of competence are made in the clinical environment.

The observer in this study was in essence assessing what was taking place for an ICU nurse and making a judgement of what was observed in relation to their knowledge. The process of assessment for a nurses' competence in the work environment is well documented (Bench, Crowe, Day, Jones & Wilebore, 2003; Cox, 2000; Fisher et al., 2005; O'Hearne Rebhotz, 2006; Poikela, 2004; Riitta-Liisa, Suominen & Leino-Kilpi, 2008). The assessment of competence involves in part direct observation and judgement of "...what is done well, and what was not" (Cox, 2000). The clinical assessment can be based on guidelines that outline different levels of clinical competence (Fisher et al., 2005). The assessment of clinical competence and the observations that took place in this study followed a similar theme. What was observed was judged to reflect accessible knowledge based on Billett's (2001b) definition. The ICU nurse was completing activities in a way that can reflect knowledge of the activity. Eisenhauer, Hurley and Dolan (2007) in a study of nurse thinking as they administered medications, indicated that as RNs are administering drugs they have employed a "...real-time application of professional knowledge" (p.86). The action of competence or ability to achieve an activity can reflect the knowledge that is accessible for the ICU nurse.

The two observers met once the observations and activity categories had been completed. The CN researcher observed 21 activities related to care of a post operative cardiac patient. The researcher observed 19 activities related to care of a different post operative cardiac patient. In discussion, both agreed that the timing of activities was easier than the first set of observations, because both observers understood how to

classify the beginning and end of an activity. Changing the data sheet to a landscape view provided an ergonomic benefit to the observers which aided in the speed of data capture. The stopwatch was attached to the board so that it was easily seen during the observation. Completing the Billett (2001b) coding after the fact and away from the RN being observed was found to be difficult as it was based on memory of every activity that took place. This was considered for the next observation block.

To speed the process of coding for the schema of work activities (Billett, 2001b) on the third revision of the data collection sheet (Appendix H) used a numbering system 0 = N/A, 1 = No and 2 = Yes for each of the categories; 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility' was used. The aim was to include the schema of work activities coding (Billett, 2001b) activities as the observations were taking place at the bedside.

The third practice of data collection used the new revised data sheet (Appendix H) in the landscape view, with the schema of work activities categories (Billett, 2001b) to be recorded using 0, 1, and 2. Both observers observed different RNs who were receiving post operative patients. This time the researcher observed 34 activities in the 15 minute block and documented the schema of work activities categories (Billett, 2001b) at the same time. The CN nurse researcher observed 31 activities as well as filling in the schema of work activities categories (Billett, 2001b). The discussion between both observers confirmed that timing and writing down of activities was much improved from previous two practices however a different number of activities were noted. The coding for the schema of work activities categories (Billett, 2001b) was easier to document using the numbering system. Additional training with the data sheet occurred at the hospital where the study would be conducted. This took place in a different ward with another observer and is described in pilot study section, 3.6.5.

A final section in the data sheet was the observation coding by Pelletier and Duffield (2003). This observation coding provided grouping of activities under four main categories of; direct nursing care, indirect nursing, unit-related and personal. There was also a section for miscellaneous activities that did not fit into the other categories. In each category there were defined sub groups of activities. The inclusion of the observation coding provided useful groupings of nurses' activities. The data sheet was

then finalised into a working tool (Appendix I) for the planned observations at the study site.

The classification of a stable or unstable ICU patient was defined by a number of criteria by the researcher. The definition was developed based on the observers experience in ICU (greater than ten years in tertiary ICUs). The reason for the patient's admission, planned or unplanned, the amount of medical interventions that were required to maintain hemodynamic stability. Surgical patients were observed and the plan was to consider whether they were following the expected recovery process. This could be identified by listening to the nursing and medical staff as they handed over or discussed the patient. The amount of specialist care that was provided and what was occurring for the ICU patient's hemodynamic status also provided cues. The stability or lack of stability of the patient during the shift was a sum total of observations and descriptions by medical/nursing staff. If the majority of the shift the patient was stable then they were classified as stable. Any variance in hemodynamic stability was documented using the Billett's (2001b) schema of work activities theory. Whereas, an unstable patient presented with numerous intensive therapies, such as multiple inotropes, regular arterial blood gases for ventilation management and hemodynamic instability for the majority of the shift.

3.6.4 Group Discussions

Group discussions were informally conducted in the researcher's ICU to assess the accuracy of the researcher's application of the schema of work activities (Billett, 2001b). The group discussions were conducted prior to the tool being used in a formal clinical setting. ICU nurses who were currently working in the ICU were considered as experts in understanding the nature of ICU nursing work. Thus the researcher's analysis of activities was compared to other ICU nurses conceptualisation of the activity. This would indicate if there were differences between the two perspectives suggesting a problem in interpretation or application. The researcher approached staff on the unit he worked in to see if they would be interested taking part in informal group discussions. The researcher explained that he wanted to compare how he scored the schema of work activities (Billett, 2001b) for ICU nurses with their scoring of ICU work activities.

Four groups of six ICU nurses agreed to discuss the schema of work activities theory (Billett, 2001b). A power point presentation of the definitions was shown to the informal group discussions. The researcher then supplied handouts of six scenarios that could occur in the ICU environment (Appendix J). The six scenarios related to management of an IV antibiotic (question 1 group), titrating an inotrope (question 2 group), charting patient observations (question 3 group), Continuous Veno-Venous Hemodiafiltration (CVVHDF) dialysis (question 4 group), patient hygiene (question 5 group) and Bi-level positive airway pressure (BIPAP) ventilation (question 6 group). Three of the scenarios were for simple activities (question groups 1, 3, 5) and three for more complicated activities (question groups 2, 4, 6). A dialogue ensued as to how the RNs would consider the definitions of the activities with the scenarios. The ICU nurses were asked to record their judgments as yes, no, sometimes or no comment for each of the schema of work activities questions (Appendix J). In total there were 24 participants' responses to six scenarios with six questions for each scenario regarding the schema of work activities (Billett, 2001b). In total there were 864 responses, see Appendix K for table of responses. In Figure 3.1 the 'yes' responses for the question groups are displayed.

Figure 3.1. Informal group discussion, 'yes' responses by ICU nurses to questions related to whether activities were routine or not routine

Figure 3.1 demonstrates 'yes' responses by the ICU nurses at the informal group discussions. The question groups relate to whether the ICU nurses regarded the

activities as routine or not routine. The average 'yes' response for all of the routine/not routine questions was 75.7% (see Appendix K). As an example, in question one the ICU nurses was asked if the management of an IV antibiotic was 'routine' or 'not routine'. Greater than 80% of the responses indicated 'yes', the activity was routine. In question four the ICU nurses were asked if setting up for CVVHDF was considered 'routine' or 'not routine'. Less than 40% of the responses indicated that 'yes', it was 'routine'. Suggesting that greater than 60% of the ICU nurses found this activity 'not routine'. In Figure 3.2 the 'yes' responses of the ICU nurses' in relation to their discretion with activities is displayed.

Figure 3.2. Informal group discussion 'yes' responses by the ICU nurses to questions related to their discretion when completing an activity

In Figure 3.2 the responses by the ICU nurses in the informal group discussion indicates that for greater than 60% of the time they felt that their actions involved 'discretion (autonomy)' in relation to the questions. The average for all of the responses for 'discretion' was 73.8% (see Appendix K). Question four related to the management of CVVHDF. In this question there was less than 20% of the ICU nurses in the informal group discussion who felt they would be autonomous in this scenario. In Figure 3.3 the responses of the informal group discussion is displayed in relation to the 'intensity' of an activity.

Figure 3.3. Informal group discussion, 'yes' responses by the ICU nurses to questions related to the intensity of an activity

In Figure 3.3 the informal group discussions of ICU nurses indicated whether the scenarios would be 'intense' or 'not intense' for them. The 'yes' responses for questions two, four and six which were considered the complicated activities, indicated that for greater than 70% of the responses the activity could be 'intense' for this group of ICU nurses. The average response for the entire intensity category was 65.3% (see Appendix K). In Figure 3.4 the responses to the 'multiplicity' questions are displayed.

Figure 3.4. Informal group discussion, 'yes' responses by the ICU nurses to questions related to multiple activities

In Figure 3.4 the ICU nurses in the informal group discussions were responding to the scenarios (Appendix J) and whether the activities could lead to 'multiple' actions occurring. In this Figure the average responses for this entire group was 81.8% (see Appendix K). The ICU nurses indicated that the work activity scenarios could become part of multiple scenarios. The question related to CVVHDF had a 100% response suggesting that there was the potential for a number of activities to occur when setting up the CVVHDF for a patient. In question five for this group the management of patient hygiene was just less than 60%. This can suggest that patient hygiene activities could also involve multiple actions. In Figure 3.5 the ICU nurses in the informal group discussions responses to the 'complexity' of activities is displayed.

Figure 3.5. Informal group discussion, 'yes' responses by the ICU nurses to questions related to complexity

In Figure 3.5 the informal group discussions of ICU nurses responses indicated that greater than 70% 'yes' responses to the question scenarios for five of the questions. This suggests that five of the question scenarios could be 'complex' for this group of ICU nurses. The question related to patient hygiene had 17% of the responses indicating that patient hygiene for these scenarios would not have led to complex scenario for the informal discussion group. In Figure 3.6 the 'yes' responses for the 'accessibility' scenarios are displayed.

Figure 3.6. Informal group discussion, 'yes' responses by the ICU nurses to questions related to accessibility

In Figure 3.6 the informal group discussions 'yes' responses to the scenarios indicated that for questions two to six greater than 80% of the ICU nurses believed that they had an understanding/knowledge (accessibility) related to the questions. Question 1 related to the IV antibiotic, 33% of the ICU nurses indicated that they have knowledge of the antibiotic actions. The information or knowledge related to the actions of antibiotics in the clinical scenario can be sourced using different pharmacological texts prior to administration. Due to the number of antibiotics on the market and the new ones coming on to the market it can be difficult to maintain knowledge of all antibiotics that will be administered. The question did not identify a specific IV antibiotic, so the responses were related to IV antibiotics generally.

The ICU nurses demonstrated good levels of agreement and their responses were similar to the researcher's. Of interest were the ICU nurses responses to the 'discretion' category for five of the questions. The informal group discussion participants' responses indicated that ICU nurses felt they had 'discretion' (autonomy) in their actions except for the question related to dialysis. The responses to the setting up dialysis question indicated that only a small number of ICU nurses in the discussion group believed that the activity was 'routine' and that they had 'discretion' (autonomy) in their actions. The other responses indicate that the activities were 'intense', 'complex' and 'multiple'

impacting on the ICU nurses who would be setting up dialysis for an ICU patient. So for this group of ICU nurses setting up dialysis was an involved activity. This was in line with the researcher's perceptions of a challenging ICU procedure.

In summary four groups of six ICU nurses were informally recruited to test the accuracy of the researcher's application of Billett's (2001b) schema of work activities theory in the ICU environment. The responses provided an insight into work activities of the ICU nurses in the workplace. This perception was similar to the researcher's perception of what is taking place as an ICU nurse is conducting these activities. Another phase of the project for the researcher was to conduct a pilot study.

3.6.5 Pilot study

A small pilot study was conducted at the hospital where the study was to be done. It was conducted in a ward that agreed to be a pilot site for this study. The pilot study involved the researcher and another RN research assistant who would be collecting data in a general ward, using the same data collection form and doing short periods of observation together. The goals for the pilot study were to refine the data collection sheet and to provide data to be analysed for interrater reliability. The preparation leading up to the observations included a discussion of the different aspects of the data sheet. This included the method of timing the activity, understanding the work sampling coding (Pelletier & Duffield, 2003) (Appendix L) and the schema of work activities (Billett, 2001b). To assess timing of the nursing activities both observers followed the same RN around without talking and then compared their observations in a quiet area of the ward when finished. The equipment used was a clipboard with a number of data sheets attached and stopwatches attached that were running continually. The stopwatches had been synchronised to each other with the same time. This was important to make the comparison of timing accurate between the observers. An abbreviated definitions sheet for the work sampling codes was also part of the equipment.

After the observations, comparison of both sets of data showed that the data was classified the same and the documented timing between the observers was similar (see Table 3.1). The average difference between times for the observers was 00:06 seconds ranging from 00:02 to 00:09 seconds. This suggests that there was a satisfactory

agreement between the observers when considering the observation times. The number of activities observed (see Table 3.1) indicate that the difference between the average frequency of activities was two, ranging from one to three activities. Therefore the observers were able to identify and time an activity with a maximum difference of three seconds in the documented time.

Table 3.1. Pilot Study Data

Observers	Number of activities observed		Observed RN activity time blocks (mm:ss)		Decimal conversion of time blocks	
	1	2	1	2	1	2
Trial 1	10	12	14:43	14:42	14.61	14.67
Trial 2	5	5	15:07	15:16	15.12	15.27
Trial 3	8	5	14:11	14:09	14.18	14.18
Totals	23	22	43:52	44:07	43.91	44.09

Note. Average difference of the frequency of activities was 2 (range 1-3), average difference of time was 0:06 seconds (range 00:02-00:09).

After the third set of observations were completed there was another discussion regarding the process. The application of the types of activities was consistent between the observers. To compare the data statistically in relation to inter observer variation a Bland-Altman test was conducted on the three time blocks for each observer. The Bland-Altman test compares the differences of the results with the average (Bland & Altman, 1999). To do this it was necessary to convert the time values in to decimal time equivalents, for example 4:30 mm:ss would be converted to 4.5. Using the Bland-Altman comparison of the three observer time blocks, the mean difference was -0.060 (95% CI -0.284 to 0.164) with a Pitman's Test showing that there was no significant difference in the time measuring procedures between observers with $p = 0.608$.

The pilot study provided an insight into the observation method at the research site. It provided a chance to trial the final data sheet and to understand what would be involved. The discussions between the researcher and the research assistant led to agreement that

they both had developed an understanding of how to do the observations and the coding of nursing activities. Both were confident and ready to begin the data collection.

3.7 Data Collection

This section provides a description of the data collection in the ICU at the research site. The researcher had prepared himself for this data collection process as described previously in the data sheet preparation and pilot study sections. The observer carried a sheet of abbreviated definitions of the codes as he conducted the time and motion study. This allowed for a quick reference guide. Data collection occurred during the middle two weeks of August 2005. Data collection involved 1) recording activities and their timing and 2) Categorising the activities in terms of type (Pelletier & Duffield, 2003) and schema of work activities (Billett, 2001b). The second aspect was the beginning of the analytic process and is described in detail in the data analysis section.

The day of observation for each participant followed the same format. After ensuring informed consent the participant was observed from the bedside handover at the start of the shift until 1530 hours or the end of their shift. Each consenting participant was observed for the entirety of their shift. The researcher set himself up in a position close to the participant being observed so that any conversations could be heard. The normal process for the ICU was to do a general handover of all patients and then each RN would do a bedside RN to RN handover. Observations commenced with the bedside RN to RN handover. Where required, the participant was followed to their destination of activity. In the early part of the shift either the patient (if able) or family of the patient being cared by the participant would be approached to inform them of the research study and obtain assent. All families or capable patients assented to the research taking place. At all times the patient's privacy was respected.

The logistics of this process involved being able to capture all of the data efficiently. To do this the observer was equipped with a clipboard, a number of data sheets (Appendix I) and a stopwatch, attached to the clipboard. Part of the observation process was to prepare a number of sheets with standard information and sheet numbers. This allowed the observer to keep track of the data sheets that he was scribing on as well as having the minimum needed to be written separate to the observations. Once data collection was completed for the day, the researcher checked the sheets for any inconsistencies

while it was fresh in his mind. Information was written on the first data sheet of the day that described general events of the day. These notes described the ICU, the general acuity of the other patients and what was taking place as a whole and provided the context for the observations.

3.7.1 Data Entry and Cleaning

All data was collected over the two week period on consecutive weekdays. The data was then entered into a Microsoft excel spreadsheet. See Appendix I for an example of the headings. The data was checked for discrepancies or inconsistencies. This process involved printing the worksheets and manually checking timing of activities, coding of activities and looking for missing data. Any errors were corrected in the master excel worksheet. The data was then transferred into an electronic statistical package, Statistical Package for Social Sciences (SPSS) version 12.

3.8 Analysis of Data

This section describes the analysis of the data; this includes the elements of the observations that were documented during the time and motion process. The first section focuses on the type of activity coding (Pelletier & Duffield, 2003). The next section will describe the timing of the activities, following this there will be a breakdown of the data collected within the schema of work activities (Billett, 2001b). Identified simultaneous activities will be discussed in the following section. Descriptive statistics were used to summarise the time and motion data, activity coding (Pelletier & Duffield, 2003) and the schema of work activities data (Billett, 2001b).

3.8.1 Types of Activity Coding

The work activity coding that was utilised by Pelletier and Duffield (2003) is an adaptation of Urden and Roode's (1997) coding of activities. This section provides descriptions of the coding using this framework. The advantage of categorising the activities into broad headings meant that there was consistency for the observation sets. An abbreviated definition of codes was attached to the clipboard. This allowed the observer to write the observed activity down and then check the definition to put a work activity code to it. Any activity coding that the observer was unsure of was reviewed against the main definitions after the day's data collection.

The types of activity coding was organised into four main categories of direct care, indirect care, unit-related and personal (Pelletier & Duffield, 2003). The direct care activities incorporated the RN's care that was focussed directly on the patient and included ten activities. There were seven indirect care activities defined that were related to the patient care but were not directed at the patient, an example would be writing in the patient's notes (code 15). The three unit-related codes covered activities related to operational aspects of the ward or unit the RN worked on; for example ward inservice education (code 19). The heading of personal related to activities that were not connected to the ward or unit, or patient care; for example nurses going for a break (Pelletier & Duffield, 2003). Table 3.2 provides a list of all the codes utilised for this study. For a more in depth definition of the codes see Appendix L.

Table 3.2. Activity Coding and Descriptions

Activity type (group)	Codes	Description
<u>Direct care</u>	1	Admission/assessment
	2	Hygiene
	3	Patient mobility
	4	Medication/ IV administration
	5	Procedures
	6	Specimen collection/testing
	7	Nutrition/elimination
	8	Transporting patient
	9	Assisting with procedures
	10	Patient/family interaction
<u>Indirect care</u>	11	Verbal report/handover
	12	Communication/information
	13	Room/equipment setup/cleaning
	14	Medication/IV preparation
	15	Progress notes/discharge notes
	16	Computer - data entry & retrieval
	17	Co-ordination of care: rounds, team meetings
	18	Co-ordination of care: care, planning & critical pathways
<u>Unit-related</u>	19	Teaching & inservice:
	20	Supplies, check, re-stock
	21	Errands, off-unit
	22	Meetings & administration
	23	Clerical
	24	Environmental cleaning
<u>Personal</u>	25	Personal
	26	Miscellaneous

3.8.2 Schema of Work Activities

Billett's (2001b) schema of work activities was applied to the data. By scoring 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility' using '0, 1' or '2' (see Appendix I) it was possible to score the RNs activities. The schema of work activities (Billett, 2001b) definitions for the activities of 'routine', 'no discretion', 'accessibility', 'not intense', 'not multiple' and 'not complex' were interpreted as 'routine' nursing activities for ICU nurse and scored as '1'. The opposite activities for these categories; 'not routine', 'discretion', 'intensity', 'multiplicity', 'complexity', and 'no accessibility' suggested there was a need for an increased level of ability and were scored as 2 (see Appendix M). The scoring for the Billett (2001b) schema of work activities in this study is displayed in Table 3.3.

Table 3.3. Scoring for Schema of Work Activities

Activities scored as 1	Activities scored as 2	Activities that were not applicable scored as 0
^a Routine	Not routine	N/A
No discretion	^a Discretion	N/A
Not intense	^a Intensity	N/A
Not multiple	^a Multiplicity	N/A
Not complex	^a Complexity	N/A
^a Accessible	Not accessible	N/A

Note. Definitions from Billett (2001b). N/A = not applicable. ^aIndicates Billett's (2001b) primary categories.

Displayed in Table 3.3 is the spread of the Billett (2001b) schema of work activity coding for '1' and '2' scores. The activities of 'routine' and 'accessible' were scored as a '1' indicating that the ICU nurse was operating within a normal or regular capacity. The activities of 'discretion', 'intensity', 'multiplicity' and 'complexity' were scored as a '2' indicating that the ICU nurse was dealing with activities that involved higher level of knowledge or cognition.

To provide a visual display of the schema of work activities (Billett, 2001b), Figure 3.7 was developed. In Figure 3.7 the interconnectedness of the activity and the schema of work activities (Billett, 2001b) are displayed. The single activity presented in Figure 3.7 provides an indication of the potential factors that could impact on the ICU nurse. The figure provides a graphic representation of the factors to be considered as an ICU nurse

was observed involved in an action. As the activity occurred, the observer classified the schema of work activities. The activities were classified as regular, irregular or not applicable. Categories of routine = routineness and multiple = multiplicity.

Figure 3.7. A graphical representation of a single activity utilising the schema of work activities theory

In an example of Billett's (2001b) schema, nursing communication is described. In this scenario the ICU nurse is performing a simple assessment communication activity of an ICU nurse asking a patient a question such as: can you hear me? This activity would provide limited impact on an ICU nurse and could be regarded as routine. Couple this 'routine' assessment communication of the ICU nurse with a patient who has a significant neurological decline and the simple communication has a new meaning; assessment of the Glasgow Coma Scale. The ICU nurse is dealing with a 'routine' activity which is potentially an intense and complex situation that could be part of a number of activities to assess the neurological status of the patient. As the ICU nurse is speaking she/he may be shining a torch into the patient's eyes to assess reaction, communicating to surrounding colleagues and checking the patient's monitor. The ICU nurse will be using her/his knowledge to understand the clinical signs as she/he assesses

the patient. The ICU nurse is faced with different factors in this activity and must make decisions and prioritise the activities on an ongoing basis.

An example of the application of this schema is given next by providing a snapshot of this analysis. In Table 3.4 the ICU nurse was faced with a new dialysis procedure, Extended Daily Dialysis and filtration (EDD-f). The patient was seriously ill but stable. Eight ICU nurse activities are listed in Table 3.4 which demonstrates some of the activities the ICU nurse performed as they checked the dialysis machine that was attached to a seriously ill ICU patient. The different activities included regular nursing actions such as patient observations and checking the patient monitor. The ‘flush for dialysis’ procedure for the dialysis was a higher order activity for the ICU nurse. The schema demonstrates the impact that this procedure had on the ICU nurse as she cared for the patient.

Table 3.4. Snapshot of an ICU Nurse and the Schema of Work Activities Data

Activity Comments	Routine	Discretion	Intensity	Multiple	Complex	Accessibility
Drug administration	1	2	1	1	1	2
Check lines	1	2	1	2	2	1
Observations	1	2	1	2	2	1
Check monitor	1	2	1	2	2	1
Check dialysis settings for observations	2	2	2	2	2	2
Check monitor	1	2	1	2	2	1
Check monitor	1	2	1	2	2	1
Flush for dialysis	2	2	2	2	2	2

Note: ‘1’ indicates activities that are routine, ‘2’ indicates activities that are not routine. The snapshot is of an ICU nurse caring for a seriously ill patient requiring EDD-f to be set up.

The activities displayed in Table 3.4 suggest a group of activities that required higher cognition and coordination. Of interest is the category of ‘discretion’ which indicated that even though these activities were involved for the ICU, the ICU nurse was still operating as an autonomous worker. In the ‘multiple’ and ‘complex’ activities there is a combination of checking the patient monitor as the ICU nurse was dealing with the dialysis machine.

The schema of work activities (Billett, 2001b) data was reviewed during and after collection, compared to the activities timed and also to the field notes. This method of

data collection captured the changing patterns of patient patterns and acuity and how this impacted on the ICU nurses. This enabled the researcher to be confident that the data observed and documented provided useful real time information. By incorporating the schema of work activities (Billett, 2001b) in conjunction with time and motion, and the activity coding a new perspective is gained of the ICU nurses in this study as they cared for their patients.

3.8.3 Simultaneous Activities

To investigate the nursing activities from a different perspective the collected data was analysed for activities that occurred simultaneously. This was done by viewing all the data that had been entered into the excel spreadsheet program and highlighting activities where timeframes overlapped. An example of an activity documented, was communication with the family. The activity start time was noted when the RN commenced communication with the family member. The timing ceased when the communication stopped between the parties. When other activities occurred at the same time for example the RN was taking the patient's blood pressure as they communicated, this time was noted as a separate activity with its own start and stop time. This provided timed data that was within the other activities timeframe. These events were highlighted in the excel spreadsheet for the number of simultaneous activities. In the next section the ethical considerations for the research are discussed.

3.8.4 Ethical Considerations

Four principles direct researchers to protect humans who take part in research. The principles of ethical research are beneficence, respect for human dignity, justice and informed consent (National Health and Medical Research Council [NHMRC], 2007; Polit & Beck, 2004). The principle of beneficence underpins the idea that the researcher should do no harm (Polit & Beck, 2004), that researchers should identify any potential risks of participating in a study (NHMRC, 2007). Risks may occur in different ways, Polit and Beck (2004) suggest that these can include physical, psychological and financial risks. The researcher must consider carefully if the study will lead to any of these risks. Then there needs to be a strategy to reduce or address any potential risks for the participants (NHMRC, 2007). Sub categories of beneficence include freedom from exploitation, benefits from research and the risk/benefit ratio (Polit & Beck, 2004).

These subcategories outline further considerations for researchers when planning a study. Freedom from exploitation suggests that a participant should not be exposed or disadvantaged because they are taking part in a study. A benefit from research is where a participant understands that the benefit will most probably be for the greater good rather than the participant personally. The risk/benefit ratio is an important consideration. The participant must be presented with the risks and benefits of the study. A suggestion by Polit and Beck (2004) is for the researcher to consider if they would be comfortable with their family being exposed to the risks of a study.

In this study the risks identified in the information sheet and informed consent related to those being observed feeling stressed by the observation process or feeling that their work was being scrutinised. The option was for the participant to opt out if this was the case and if needed; the researcher would direct the participant to a hospital counsellor. Another potential risk that was presented to the participants was the expectation of the hospital that the researcher would stop any actions that were out of the RNs scope of practice. The researcher would then direct the observed participant to the in-charge nurse. One RN approached to take part in the study declined. This RN approached the researcher at a later stage of the study and indicated that she had observed the researcher and would consent if the opportunity presented. This RN was subsequently included in the sample.

The principle of human dignity consists of sub-categories of the right to self determination and the right to full disclosure (Polit & Beck, 2004). The right to self determination means that participants have the choice to take part in a study and that they are not coerced in any way (NHMRC, 2007). This can be of particular importance if the researcher is in a position of power; however the researcher in this study was not in a positive position of power. When researchers are using stipends they need to be careful that the stipend is not excessive and that it is applied ethically (NHMRC, 2007). There is the potential for financial coercion if there is a large stipend and a participant is not financially well off. No financial stipends were offered in study. Potential participants were informed that if they declined to participate there would be no repercussions.

The right to full disclosure respects the participant's right to be fully informed so that they may make an educated decision in regards to the research study. This disclosure

can take place at the beginning, during and at the end where a participant is supplied a summary of the study results (Polit & Beck, 2004). The challenge with self determination and full disclosure is the potential bias that may occur when disclosing information to participants. There is the potential that participants may alter their behaviour because they are being observed or they may not take part in the study. This is where the risk/benefit ratio becomes critical. How much a participant is informed about a study can be directed by the need to capture accurate research data. This in part refers to covert data collection. Data is collected without the knowledge of the participant or actually deceiving the participant as to what the research is about (Polit & Beck, 2004). These are significant points that must be addressed by the researcher and the ethical committee reviewing the research (NHMRC, 2007).

In this study all participants were fully informed about the study and the goals of the bigger study. No information was withheld. Participants may have altered their behaviour while being observed and this should be considered. The researcher asked each RN participant at the end of the day's observation what they thought about the observation process. All indicated that they did not think the observation process led them to altering their behaviour. The group indicated that they were focussed on the patient and family.

The principle of justice has the sub-categories of the right to fair treatment and the right to privacy (Polit & Beck, 2004). The right to fair treatment is related to the participant being able to obtain fair treatment before, during and after the study (NHMRC, 2007). The researcher must respect the individuality of the participant and the cultural mores and norms. Participants must not be penalised for not participating in a study. This principle is about treating the participant as a human being and as the researcher would want to be treated themselves. The right to privacy is about understanding that their research can be intrusive and conducting themselves in a way to be the least intrusive as possible (Polit & Beck, 2004).

Privacy also equates to anonymity in research (NHMRC, 2007). Ensuring that a participant is unable to be identified in a research project is the goal. There are times in research where this may not be achievable so there will be the consideration of providing the participants with the guarantee of confidentiality (Polit & Beck, 2004). This means that participants are de identified so that they are can not be identified.

When conducting studies that have small samples this is particularly important for researchers (NHMRC, 2007). In this study the participants were coded as numbers with no identifying information about them. This study had only a small sample of participants so the demographics for the participants were checked to ensure that participants could not be identified.

The final principle of informed consent is a sum of the other principles where a participant is provided with information regarding the project that allows for the other principles (NHMRC, 2007; Polit & Beck, 2004). The participant will then be able to make a decision that is based on the information that is supplied by the researcher. The information will outline the study, the sample, and the process of data collection and the goals of the study. This will be presented in an easy to understand and read format. This information can be presented in written or oral format (NHMRC, 2007). When a participant makes their decision to take part in a study they will have assessed the risk to themselves or the person who will be involved in the study (Polit & Beck, 2004). The end result for the researcher is a participant who agrees to take part in the study. The informed consent for a study will be scrutinised by the different bodies who are overseeing the research. These ethics committees ensure that what is presented to a potential participant meets an expected standard. This helps to ensure researchers are practising in a transparent and correct way and that participants in the study are afforded every opportunity to understand what they are taking part in.

In this study the participants were provided an information sheet (Appendix C) that explained the project and the potential risks. They were given time to understand what was involved. The participants were provided with the informed consent sheet (Appendix D) that also outlined the study. The participants had time to ask any questions prior to signing the consent. At times the participants asked questions related to the study while they were being observed the researcher answered any questions and clarified if the participant was still happy to participate.

To address any concerns from patients and their visitors, the observer introduced himself and explained that he was observing the nurse and the activities that they performed for research. The researcher was seeking assent from the patients or visitors. As part of the discussion the observer identified that he was a RN himself at another ICU not related to the site. It was important to clarify for the patient and visitors that the

study focussed on the nurse and their activities. While the observer would be watching the activities that took place at all times the patient's dignity was paramount and respected.

3.9 Summary

This chapter has outlined the processes for exploring the daily activities of the ICU nurses in the clinical setting. The chapter included the research question and the justification for selecting a descriptive quantitative research design for the study. The goal to have a convenience sample of ten ICU nurses was described. The methods used to observe ICU nurses in the clinical setting was provided including; time and motion method (Finkler et al., 1993; Lowry et al., 1927), the schema of work activities (Billett, 2001b) and the coding of activities (Pelletier & Duffield, 2003). A description of the researcher's experience in the ICU environment provided support for his expertise as an observer of ICU nurses.

The next section of the chapter provided an insight into how the researcher developed an understanding of what was involved in this type of research study. This included the development of the data sheet for observations, the trialling of the datasheets in an ICU, the informal discussion groups and the pilot study. An outline of the data collection for the study and the initial definitions provide information in relation to how the data was analysed. The final section outlined the ethical considerations and how they related to this study. The next chapter provides the research results.

Chapter 4

Results

4.1 Introduction

This chapter presents the findings of the study of ICU nurses work during the day shift. The research took place in a private hospital ICU in South East Queensland over a two week period in August 2005. The aim of the study was to describe the activities undertaken by bedside ICU nurses who provide patient care during the day shift. There are a variety of factors that can impact on the nursing profession, such as changing roles (Solveig & Segesten, 2002); financial pressures (Buchan, 2004; Senate Inquiry into Nursing, 2002), and ageing of the nursing workforce (AIHW, 2004) and these issues provided the impetus to better understand contemporary ICU nurses' work. By documenting activities undertaken by ICU nurses new information can emerge that may guide the management of the valuable health resource, the ICU nurse, in the acute care setting.

Ten ICU nurses were observed as they worked one day shift each. The observations took place Monday to Friday. The descriptive data represents the nursing activities that occurred as the RNs cared for their ICU patients. Time and motion method was used to capture just over 76 hours of observations and a total of 3,081 activities. This study utilised a schema of work activities (Billett, 2001b) and work activity codes (Pelletier & Duffield, 2003) to analyse the activities captured by the time and motion method and describe what occurred for the ICU nurses. The data was also analysed for simultaneous activities that the ICU nurses performed as they cared for their patients.

The findings from this observational data are presented in the following sections. The first section provides a description of the ICU nurses and the patients they cared for during the observational period. The second section describes simultaneous activities that the ICU nurses were involved in as they cared for their patients. The third section describes the 25 different types of activities grouped into four main categories; direct, indirect, unit related, and personal (Pelletier & Duffield, 2003) undertaken by the ICU nurses. The last section focuses on data analysed using the schema of work activities;

‘routineness’, ‘discretion’, ‘intensity’, ‘multiplicity’, ‘complexity’ and ‘accessibility’ (Billett, 2001b), providing a new perspective of ICU nurse work activities.

4.2 Description of the Sample

The ten participants were all Nursing Officers (NO) 1 RNs. In Queensland the NO 1 were RNs on the first tier of the nurses’ pay scale and provide direct care to patients. To provide an understanding of the participants experience in the ICU setting a summary of each RN’s years of registration and work experience in the ICU research site is provided in Table 4.1. This data is in summary form to maintain anonymity of the participants.

Table 4.1. Years as a RN and Experience in ICU Study Setting

Number of participants	Experience as a RN (years)	Experience in ICU site (years)
2	5 or less	2.5 or less
1	6 – 10	4.0 or less
0	11 – 15	0
2	16 – 20	4.0 or less
5	21 or more	6.5 or less
	18.5 (<i>SD</i> = 10.5)	3.4 (<i>SD</i> = 1.7)

In Table 4.1 the range of years the ICU nurses were registered was from less than five years to greater than 21 years. The range of years working in the site ICU for the RNs was from less than 2.5 to 6.5 years. The participant age was grouped to avoid identifying them. There was one ICU nurse in the 20 – 29 year age bracket. Three ICU nurses were in the 30 – 39 years age bracket, four ICU nurses in the 40 – 49 years age bracket and two ICU nurses in the 49 years and greater age bracket. While this is a small sample it is interesting to note that the average age of RNs in Queensland was 44.1 years (AIHW, 2005) and the study ICU nurses was slightly less at 39.2 years. There was one male ICU nurse in the participant group.

Descriptions of the patients being cared for by the ICU nurses in the study are listed in Table 4.2. Patients’ operation or diagnosis and their condition on the day of observation

are also provided in Table 4.2. Either the patient was stable indicating that there was no out of the ordinary or emergent treatments involved with the patient, or, the patient was classified as unstable, where intensive or extraordinary therapies were instituted to maintain the patient's homeostasis.

Most of the patients were post operative and had some form of elective cardiac surgery. Three patients were considered unstable (patients 5, 6 and 9). Participant 5 cared for a stable post operative Coronary Artery Bypass Graft (CABG) patient who was transferred to the ward at 11:00 hours and then received an unplanned emergency admission at 12:40 hours. This second patient was in a day procedure section of the hospital when they had an unexpected collapse requiring ICU admission. Patient 7 experienced an acute exacerbation of his respiratory disease process and deteriorated progressively during the observed shift. Patient 10 was a patient with sepsis and required numerous intensive therapies to maintain hemodynamic stability.

Table 4.2. Description of Patients Cared for by the ICU Nurses

Patient	Operation or diagnosis	Patient condition
1	Formation of ileostomy	Stable
2	Triple heart valve replacement	Stable
3	CABG	Stable
4	CABG	Stable
^a 5	CABG	Stable
^a 6	Unexplained collapse	Unstable
7	Chronic airways disease	Unstable
8	Triple heart valve replacement	Stable
9	CABG	Stable
10	Sepsis	Unstable
11	CABG	Stable

Note. CABG = Coronary Artery Bypass Graft Surgery. ^aThe same ICU nurse cared for patients 5 and 6.

The acuity of the unstable patients provides a contrast to the other patients who were classified as routine post operative patients. Elective post operative patients in ICUs generally follow an expected clinical pathway. The intensive therapies are weaned as appropriate for the patient. The routine post operative patients in this study had elective surgery and followed the expected recovery process post surgery. Some of the key

events and progress milestones included patients waking from their anaesthetic, patients being suitable for extubation and removal of mechanical ventilation and patients maintaining satisfactory oxygenation with adjunctive oxygen as necessary. The ICU nurses caring for the stable patients demonstrated a set of regular actions during the observed shift in relation to the patient recovery timeline.

The information in Table 4.3 displays the length of each observed shift and the number of activities undertaken by the ICU nurses during this time period. The data is listed from the highest to lowest frequency of activities. The average length of time to undertake an activity in minutes and seconds was 1:29 ($SD = 3.52$). Participant 6 had the highest frequency of activities.

Table 4.3. Observation Times and Numbers of Activities by ICU Nurses

Participant	Daily observed time (hh:mm:ss)	Frequency of activities	Patient condition
6	7:59:55	500	Unstable
4	8:00:00	350	Stable
7	7:51:50	313	Stable
10	7:41:59	305	Stable
8	7:32:24	294	Stable
3	7:26:29	287	Stable
9	7:39:55	284	Unstable
5	7:27:32	281	Stable and unstable
2	7:59:58	274	Stable
1	7:36:36	193	Stable
Total	76:26:38	3,081	

On average the nurses undertook 308 ($SD = 78$; range, 193 – 500) activities during a day shift. Three ICU nurses observed in this study had a greater frequency of overall activities than the study average of 308 activities. The variety of frequencies for the stable patients (range 193-350) suggests that the patient's condition was not the only factor that influenced the work activity requirements for the ICU nurses.

4.2.1 Simultaneous Activities

An analysis of the data identified activities that occurred simultaneously as the ICU nurses cared for their patients. Activities occurred as two or three simultaneous actions, but not more. This grouping of activities provided a perspective on the complexity of the work undertaken by the ICU nurses. The number of simultaneous activities

occurring within the observed timeframe and the time spent doing these multiple activities are displayed in Table 4.4. For 39 hours 46 minutes one activity occurred represented 54% of all the time of observations. Together the two and three simultaneous activities occurred for 36 hours 40 minutes of the ICU nurses activities. The frequency of simultaneous activities in column two of Table 4.4 indicates the number of times that the simultaneous activities occurred during the study. Two simultaneous activities occurred for greater than 40% of the total study time, suggesting that simultaneous activities occurred on average for about three hours of the day for the ICU nurse participants.

Table 4.4. Simultaneous Activities of an ICU Nurse

Simultaneous activity groups	Frequency of simultaneous groups	Total frequency of activities	Activities frequency and time (hh:mm)
1 activity	1,663	1,663 (54%)	2,386 (39:46)
2 activities	663	1,326 (43%)	1,897 (31:37)
3 activities	29	87 (3%)	303 (5:03)
Total		3,081 (100%)	4,586 (76:26)

The simultaneous activities documented included monitor observations as patient care was attended, such as hygiene cares or shaving a patient. Communication was another activity that occurred as the ICU nurse was attending to another activity. For example, participant six was caring for a patient who had been placed on Bi-level positive airway pressure (BIPAP) ventilation due to a worsening respiratory failure but the medical oxygen that the BIPAP machine was connected to failed. This failure was documented at 10:58:42 am (total activity time 10:58:22 to 11:02:24). While the ICU nurse was troubleshooting this situation, she briefly communicated with another ICU nurse (11:00:55 – 11:00:59) and the patient to assess him (11:01:30 to 11:01:32). In this instance the simultaneous activities reflect the communication that occurred during an equipment failure. The next section describes classification of the ICU nurses' activities.

4.2.2 Classification of Activities

In this section the 3,081 activities documented over the 76 hours and 26 minutes are considered in relation to the 25 categories of activities subsumed under the four groups; direct care, indirect care, unit related and 'personal (Pelletier & Duffield, 2003). The activities have been analysed for the percentage of time for each of the 25 activity codes and the absolute frequency of occurrence (see Table 4.5). The data in Table 4.5 has been organised by the highest percentage of time to the lowest. This percentage reflects the time spent by the ICU nurses undertaking the particular activities.

Table 4.5. Types of Activities and Time Involved for ICU Nurses

Activity	Total time (hh:mm)	Frequency	Percentage of time
Personal	16:45	140	21.9%
Admission & assessment	09:25	661	12.3%
Procedures	08:24	343	11.0%
Coordination of care: rounds, team meetings	07:23	440	9.7%
Room/equipment setup/cleaning	07:04	248	9.2%
Patient/family interaction	04:11	510	5.5%
Medication & IV preparation	03:55	155	5.1%
Verbal report/handover	03:55	52	5.1%
Teaching/in-service	02:20	25	3.1%
Assisting with procedures	02:13	43	2.9%
Hygiene	02:10	42	2.8%
Patient mobility	01:59	52	2.6%
Progress notes/discharge notes	01:31	36	2.0%
Medication & IV administration	01:26	128	1.9%
Clerical	01:08	70	1.5%
Nutrition/elimination	00:41	44	0.9%
Communication information	00:36	71	0.8%
Coordination of care: care planning/critical pathways	00:23	11	0.5%
Transporting patient	00:19	1	0.4%
Meetings & administration	00:17	3	0.4%
Specimen collection/testing	00:11	6	0.2%
Computer: data entry/retrieval	0	0	0
Supplies, check, re-stock	0	0	0
Errands off unit	0	0	0
Environmental cleaning	0	0	0
Total	76:26	3,081	^a99.8%

Note. Activity definitions from Pelletier and Duffield's (2003) study. ^aCalculation 0.02 error due to rounding of percentages for table.

‘Personal’ time was the most frequently occurring activity, accounting for just over 20% of the time. Together, the first five activities in Table 4.5 equate to 64.1% of the ICU nurses’ time. While the ‘personal’ category constituted the greatest amount of time, the frequency of activities presents a different perspective. The five categories with the highest frequency of activities (admission and assessment, patient/family interaction, coordination of care: rounds, team meetings, procedures, and room/equipment setup/cleaning) equate to 2,202 activities, or 71.5% of the total activities. The category of ‘admission and assessment’ had the highest frequency of observed activities (661). The activities were also grouped using Pelletier and Duffield’s (2003) broad categories of ‘direct care’, ‘indirect care’, ‘personal’ and ‘unit- related’ (see Table 4.6).

Table 4.6. Major Groups of Activity Codes

Major activity groups	Frequency of activity	Percentage of time
Direct care	1,857 (60.3%)	40.5%
Indirect care	986 (32.0%)	32.4%
Personal	140 (4.5%)	21.9%
Unit-related	98 (3.2%)	4.5%
Total	3,081 (100%)	99.8%

Note. Major headings of activity groups from Pelletier and Duffield (2003)

Of the categories; ‘direct care’, ‘indirect care’, ‘unit-related’ and ‘personal’ (Pelletier & Duffield, 2003) ‘direct care’ constituted the largest group of ICU nurses’ activities. The combined total of activities in the ‘direct’ and ‘indirect care’ groups was 2,843, or 92.3% of the total activities with the percentage of time for these groupings similarly high at 72.9%. When the ‘personal’ activities category is deducted from the total number of activities there remains 2,941 activities. When examining the time aspect, removing the ‘personal’ time, equates to a total of 3,581 minutes of clinically based observed time. By dividing the number of minutes (3,581) by the 2,941 activities it was identified that the ICU nurses were involved on average in 1.2 activities per minute.

4.2.3 Schema of Work Activities

This section presents results related to the schema of work activities (Billett, 2001b). The schema of work activities by Billett (2001b) represents six categories for each work activity of an individual in the workplace. Utilising the definitions by Billett (2001b) for activities, Figure 4.1 provides an example of an application of the schema to one activity (endotracheal tube suction of a stable cardiac patient).

Figure 4.1. A single observed direct care activity; endotracheal tube suction of a stable cardiac patient utilising the schema of work activities

Figure 4.1 provides a graphic representation of the factors that were considered when an ICU nurse was observed suctioning the endotracheal tube of a patient. As the activity occurred the observer described and timed the activity then classified the schema of work activities. The activities were classified as ‘regular’ = 1, ‘not regular’ = 2 or ‘not applicable’ = 0 which is demonstrated by the boxes under the individual schema (Figure 4.1). The arrow at the bottom of Figure 4.1 indicates the length of time for the activity.

In the next two tables (Table 4.7 and Table 4.8) two 30 minute snapshots of work activity codes (Pelletier & Duffield, 2003) and Billett’s (2001b) schema of work activities are presented. These snapshots demonstrate the application of the schema of work activities categories (Billett, 2001b) in relation to nursing activities of the ICU nurses. The data in Table 4.7 are observations of an ICU nurse with a stable elective cardiac post operative patient. In Table 4.8 the data are of observations where the ICU nurse was caring for an unstable patient.

In Table 4.7 the data displays the ‘routine’ activities of nursing as the RN cared for the patient. The RN is starting her shift and is performing a planned extubation of the stable

post operative cardiac patient. The patient was progressing through expected post operative recovery milestones. The suction and ventilation settings activities occurred in a measured manner and were not urgent actions.

Table 4.7. Thirty Minute Snapshot: ICU Nurse Observed Performing Nursing Activities for a Stable Elective Cardiac Post Operative Patient

Activity count	Activity	R	D	I	M	C	A
1	Verbal handover at bedside	1	2	1	1	1	1
2	Introduction to patient	1	2	1	1	1	1
3	Preparation for extubation of patient	1	2	1	1	1	1
4	Patient communication	1	2	1	1	1	1
5	Ventilator settings	1	2	1	1	1	1
6	Suction	1	2	1	1	1	1
7	Patient communication	1	2	1	1	1	1
8	Ventilator off tidy area up	1	2	1	1	1	1
9	Mouth suction	1	2	1	1	1	1
10	Mouth suction	1	2	1	1	1	1
11	Patient communication	1	2	1	1	1	1
12	Mouth suction	1	2	1	1	1	1
13	Patient communication	1	2	1	1	1	1
14	Staff communication	1	2	1	1	1	1
15	Medication preparation	1	2	1	1	1	1

Note. R = Routine, D = Discretion, I = Intense, M = Multiple, C = Complex and A = Accessible (Billett, 2001b) Score of '1' for regular nursing activities. Non regular activities scored a '2'.

The activity data presented in Table 4.7 provides a view of what the ICU nurse did as she went about extubating the patient after the morning handover. The data indicate activities that were routine and uncomplicated for this ICU nurse. Activity 1 that involved the verbal handover from the night shift to the day shift was identified as an uncomplicated handover. The main group of patients who came through the ICU were elective cardiac patients. The patient was day one post uneventful elective cardiac surgery. Day zero in this ICU was the day that the patient arrived from surgery. The communication in this handover indicated a stable patient with limited IV therapies or treatments to manage. The patient had followed the expected recovery timeline and was ready to be extubated. Activity 3 related to the preparation for extubation and was documented as regular activity for the ICU nurse. The majority of elective cardiac patients would be extubated day one after the surgery in this ICU. This activity was observed as a regular process for the ICU nurses as they collected and prepared the equipment. There are seven communication activities in this snapshot; five directed to

the patient. The schemas of work activities (Billett, 2001b) in Table 4.7 consistently indicate regular ICU work activities.

The schema of work activities (Billett, 2001b) observed in Table 4.8 present a different scenario. This RN's actions indicated activities that were not regular. Some nursing actions such as the manipulation of the intravenous infusions and checking of the patient monitor for the patient's hemodynamic response indicated an interrelationship among activities. Also in this snapshot a number of clinical conversations occurred between the ICU nurse and doctor. To provide a further explanation of how the scoring of '1 and 2' for the schema of work activities (Billett, 2001b) occurred, activity 4 'Monitor check' in Table 4.8 is described. The activity was scored as 'routine' as this was a regular action that took place for the ICU nurse. The ICU nurse was autonomous in making the decision to check the monitor so was using 'discretion'. The activity was 'intense' for the ICU nurse due to the acuity and the instability of the patient. The activity was part of a number of activities occurring in a cluster at the time and was therefore 'multiple'. The 'complex' nature of the action related to the information on the monitor, the importance of the multiple readings that were on the screen and the fact that the patient's intravenous infusions were administered to achieve a specific blood pressure range. The ICU nurse was able to access this information easily so this part of the activity was scored as a '1' regular. Activity 4 'monitor check' in Table 4.8 can suggest a simple ICU nursing action. Yet, when employing the schema of work activities a different perspective was identified. In Table 4.8 the activities for the ICU nurse were not regular. The patient was critically ill with septic shock. The patient had a number of medication infusions including inotropes, sedation, parenteral nutrition and a 96 hour infusion specifically for sepsis. Advanced mechanical ventilation provided the patient optimal oxygenation. The ICU nurse in this half hour snapshot was dealing with multiple factors that were impacting on her decisions which demonstrated higher levels of knowledge and skills compared with the care of a stable postoperative ICU patient.

Table 4.8. Thirty Minute Snapshot: ICU Nurse Performing Nursing Activities of a Critically Ill Patient

Activity count	Activity	R	D	I	M	C	A
1	Troubleshoot infusion	1	2	2	2	2	1
2	Troubleshoot infusion	1	2	1	1	1	1
3	Drug preparation	1	2	1	1	1	1
4	Monitor check	1	2	2	2	2	1
5	Drug administration	1	2	1	1	1	2
6	Ventilator check	1	2	2	2	2	1
7	Monitor check	1	2	2	2	2	1
8	Monitor check	1	2	2	2	2	1
9	Sort IV lines	1	2	2	2	2	1
10	Titrating infusions	1	2	2	2	2	1
11	Check IV lines	1	2	2	2	2	1
12	Get drugs	1	2	1	1	1	1
13	Drug administration	1	2	2	2	2	2
14	Check monitor	1	2	2	2	2	1
15	Check monitor	1	2	2	2	2	1
16	IV lines	1	2	2	2	2	1
17	Check monitor	1	2	2	2	2	1
18	Chart observations	1	2	2	2	2	1
19	Nurse to doctor communication	1	2	1	1	1	1
20	Observations	1	2	2	2	2	1
21	Check medication chart	1	2	2	2	2	1
22	Nurse to doctor communication	1	2	2	2	2	1
23	Get equipment	1	2	1	1	1	1
24	Medical review	1	2	1	1	1	1
25	Chart observations	1	2	1	1	1	1
26	Increase feeds	1	2	1	1	1	1
27	Infusions	1	2	2	2	2	1
28	Nurse to doctor communication	1	2	2	2	2	1
29	Monitor check	1	2	2	2	2	1
30	Chart observations	1	2	2	2	2	1
31	Monitor check	1	2	2	2	2	1
32	Check results	1	2	2	2	2	1
33	Nurse to doctor communication	1	2	2	2	2	1
34	Nurse to doctor communication	1	2	2	2	2	1
35	Nurse to doctor communication	1	2	2	2	2	1
36	Nurse to nurse communication	1	2	2	2	2	1
37	Titrating infusions	1	2	2	2	2	1

Note. R = Routine, D = Discretion, I = Intense, M = Multiple, C = Complex and A = Accessible (Billett, 2001b) Score of '1' for regular nursing activities. Non regular activities scored a '2'.

When this ICU nurse was caring for the critically ill patient the data (Table 4.8) presents a multifaceted view of what was occurring. The data indicates that the ICU nurse was managing a number of regular activities that take place in the ICU environment charting patient observations, troubleshooting an IV infusion and drug preparation. The ICU nurse was also using 'discretion' (autonomy) in her actions as she conducted the activities. However, the categories of 'intense', 'multiple' and 'complex' suggest an increased workload for a majority of these activities in this snapshot. In these three categories the activities were scored the same, 28 (76%) of the 37 activities were scored as '2'. These three categories appear similar yet there is a distinction between the three.

The 'intense' nature of an individual activity reflects what the ICU nurse is experiencing or doing related to the acuity of the patient. There are a number of activities where the ICU nurse is checking the patient monitor to observe the invasive pressure readings or communicating with a doctor about patient. These activities indicate that the activities were 'intense' related to the care of this critically ill ICU patient.

The 'multiple' category reflected the number of activities that the ICU nurse was dealing with at a given time. The acuity of the ICU patient in this snapshot meant that the number of activities that needed to be dealt with increased the workload for the ICU nurse. In the 'complex' category the ICU nurse was dealing with decision making pressures that involved each activity, the multiple factors in each activity and the surrounding activities. The categories and activities in the snapshot (Table 4.8) suggest that even though these activities presented as regular ICU activities, the acuity of the patient introduced new variables for the ICU nurse.

An example of how the scoring of the activities was applied can be demonstrated by activities 12 and 13 in Table 4.8. Activity 12 'Get drugs' was considered 'routine' (scored as 1). Drugs in hospital wards and ICUs are generally kept in a fixed location, this allows RNs to know where to get drugs. Therefore, the ICU nurse was going to a commonly recognised place in the ICU to obtain a drug for her ICU patient. The ICU nurse was observed for indications that this was not routine for them. These indications included, communication with other ICU nurses where the drug was, or how to obtain it, or hesitation or confusion regarding where the drug was stored. The ICU nurse was observed going directly to where the drug was stored, obtaining it and coming back to

the bedside. The action was without hesitation and completed in an efficient manner. These actions may have been different if the ICU nurse was new to the ICU environment.

The score (2) of 'discretion' (autonomy) was decided based on the ICU nurse's actions. The ICU nurse was working at the bedside, she finished one activity, and then indicated to the ICU nurse at the next bed she was leaving her patient to get a drug. She then proceeded to get the drug from the cupboard. This occurred without direction from other staff in the unit. It was considered that the ICU nurse used her 'discretion' (autonomy) to decide when to go and get the drug as there was no direction from other work colleagues that the ICU nurse should get the drug for the patient.

The process of obtaining the drug was considered as 'not intense' (scored as 1). There were no other activities occurring at the observed time that could potentially impact on the ICU nurse's decision. The ICU nurse proceeded to get the commonly used drug for the patient. As there were no other observed activities that the ICU nurse was engaged in, the action was scored as 'not multiple' (scored as 1). This was also the case for the category of 'not complex' (scored as 1). As the ICU nurse went through the process of obtaining the drug there were no other competing factors that may have complicated the action of getting the drug for the ICU nurse.

The process of obtaining the drug from the medication area was considered to indicate that the ICU nurses was demonstrating 'accessible' knowledge and was scored as a 1. The ICU nurse knew where the drug was stored, was able to confidently obtain the drug and return to the bedside without hesitation. She did not need to seek advice from other colleagues on where the drug was stored.

The next activity number 13 'drug administration' in Table 4.8 presents a different perspective. When it came to administering the drug the ICU nurse demonstrated activities that were considered different to the previous activity of obtaining the drug (activity 12). In activity 13 the action of preparing a drug was still considered as 'routine' for this ICU nurse and was scored as 1. This was based on the ICU nurse's actions which indicated that preparation of a drug was 'routine' practice for this ICU nurse. The ICU nurse was still considered to be demonstrating 'discretion' (autonomy) as she prepared the drug. There was no direction from other medical or nursing

colleagues related to when to preparation the drug. This suggested that the ICU nurse was using her 'discretion' (autonomy) to prepare the drug within her timeframe.

However, the activity was considered 'intense' for the ICU nurse (scored as 2) as it had become important to prepare and administer the drug quickly based on the ICU patient's condition. A number of other activities were occurring at the time (Table 4.8 activities 14-18) so the ICU nurse was now dealing with 'multiple' (2) activities. The number of factors was also considered 'complex' as the ICU nurse was prioritising the activities she was dealing with for the patient.

The last category 'accessible' was scored as a 2, as the ICU nurse needed to consult the administration paperwork with the drug to prepare it correctly. The action of preparing the drug was regarded as 'routine', however, the ICU nurse needed to seek information to prepare the drug correctly. This was considered to indicate that the knowledge required to perform the preparation of the drug was 'not accessible' (scored as 2) for the ICU nurse as she needed to read the information in the drug pack.

The data in Table 4.9 depicts the frequency of the schema of work activities (Billett, 2001b) for all 10 ICU nurses. The results highlight the categories of 'routine', 'not intense' and 'accessible' scored predominantly as regular nursing work activities for ICU nurses. The category of 'discretion' is of note considering that in this observation study the ICU nurses' demonstrated autonomy in all their actions whether the activity was 'regular' or 'not regular'. The time and motion data has captured the activities and the schema of work activities (Billett, 2001b) provides a broader perspective of these actions by the ICU nurses.

Table 4.9. Schema of Work Activities Data for All ICU Nurses

Regular nursing activities	Frequency (%)	Non regular nursing activities	Frequency (%)	Not applicable frequency (%)
Routine	2,901 (94.2%)	Not routine	52 (1.7%)	128 (4.2%)
No discretion	0	Discretion	2,953 (95.8%)	128 (4.2%)
Not intense	2,806 (91.1%)	Intense	136 (4.4%)	139 (4.5%)
Not multiple	1,685 (54.7%)	Multiple	1,268 (41.2%)	128 (4.1%)
Not complex	2,178 (70.7%)	Complex	776 (25.2%)	127 (4.1%)
Accessible	2,923 (94.9%)	Not accessible	30 (1%)	128 (4.2%)

Note. Activity descriptions from Billett's (2001b) schema of work activities.

This suggests that the majority of the nursing actions for these sections of the schema were regular activities. The categories of 'discretion', 'multiple' and 'complex' are the three major groups with significant amount of activities that were not regular nursing activities. The 'discretion' (autonomy) of the ICU nurses was observed for 95.8% of their time. 'Multiple' activities were observed for 41.2% of the ICU nurses' time. This is the greatest amount of activity sections that were scored as a 2. A score of not applicable (N/A) was used when an activity was not related to the nursing activities in the ICU. An example of this is when the ICU nurse went for a break.

In Table 4.10 the total time frequencies are presented. The time frequencies provide another perspective of the schema of work activities (Billett, 2001b). The times in the 'regular' nursing activities column range from 56 hours 32 minutes to 57 hours 38 minutes excluding 'no discretion'. The 'non regular' nursing activities times ranged from two minutes and three seconds to 59 hours 41 minutes. This table presents the amount of time that the ICU nurses were dealing with the different schema of work activities categories (Billett, 2001b).

Table 4.10. Schema of Work Activities Time Frequency

Regular nursing activities	Time frequency (hh:mm)	Non regular nursing activities	Time frequency (hh:mm)	Not applicable	Time frequency (hh:mm)	Total (hh:mm)
Routine	57:18	Not routine	2:23	N/A	16:45	76:26
No discretion	0	Discretion	59:41	N/A	16:45	76:26
Not intense	57:38	Intense	2:03	N/A	16:45	76:26
Not multiple	56:43	Multiple	3:06	N/A	16:45	76:26
Not complex	56:32	Complex	2:55	N/A	16:45	76:26
Accessible	57:12	Not accessible	2:25	N/A	16:45	76:26

Note. Activity descriptions from Billett's (2001b) schema of work activities. The N/A column reflects the break times and times that were not related to a clinical activity in the ICU, therefore the time frequency is the same for all in the time frequency column.

In Table 4.11 the total time documented and the schema of work activities (Billett, 2001b) frequency is combined. This table provides a calculation which reflects the average amount of time taken for the different activities that were observed. In the case of the category 'routine' 57 hours and 18 minutes were observed and in this time 2,901 'routine' activities occurred. Averaging out the amount of time per activity meant that if an ICU nurse was involved in a 'routine' activity it would on average take 1 minute 11 seconds. In the case of a 'not routine' activity they would on average take 2 minutes 45 seconds. The average amount of time taken for the 'regular' nursing activities ranged from 1 minute 10 seconds to 2 minutes 6 seconds. The 'non regular' activities ranged from 9 seconds to 4 minutes 50 seconds.

Table 4.11. Total Time and Frequency of Schema of Work Activities for the ICU Nurses

Regular nursing activities	Time frequency of activity (hh:mm)	Frequency of activity	Average of time taken for each activity (m:ss)	Non regular nursing activities	Time frequency of activity (hh:mm)	Frequency of activity	Average of time taken for each activity (m:ss)
Routine	57:18	2,901	1:11	Not routine	2:23	52	2:45
No discretion	0	0	0	Discretion	59:41	2,953	1:13
Not intense	57:38	2,806	1:14	Intense	2:03	136	0:54
Not multiple	56:43	1,685	2:06	Multiple	3:06	1,268	0:09
Not complex	56:32	2,178	1:33	Complex	2:55	776	0:14
Accessible	57:12	2,923	1:10	Not accessible	2:25	30	4:50

The information in Table 4.12 provides a breakdown of the schema of work activities and the individual ICU nurse results. The categories of 'multiple' and 'complex' in Table 4.12 have the highest frequency of activities that were scored as a 2 in the data collection. When considering the different patients and the reasons for admission to the ICU, Patient 10 who was critically ill has the highest frequency of activities in the 'multiple', 'complex' and 'not accessible' categories. However, when viewing the other data in Table 4.12 it can be seen that other patients who were documented as stable patients also presented the participants with 'multiple' and 'complex' activities. The work activity of 'intensity' had the greatest proportion of activities for the critically ill patients (Participant 6 and Participant 9).

Table 4.12. Individual Participant Schema of Work Activities Scores of '2'

ICU RN	Patient condition	Frequency of activities	Not routine	Discretion	Intense	Multiple	Complex	Not accessible
1	Stable	193	1 (0.5%)	187 (96.7%)	0	49 (25.4%)	16 (8.3%)	1 (0.5%)
2	Stable	274	8 (2.9%)	264 (96.3%)	1 (0.4%)	84 (30.7%)	56 (20.4%)	2 (0.7%)
3	Stable	287	0	269 (93.7%)	0	86 (30%)	46 (16%)	1 (0.3%)
4	Stable	350	5 (1.4%)	335 (95.7%)	7 (2%)	158 (45.1%)	100 (28.6%)	3 (0.9%)
5	Stable/unstable	281	7 (2.5%)	268 (95.4%)	0	126 (44.8%)	56 (19.9%)	0
6	Unstable	500	3 (0.6%)	484 (96.8%)	22 (4.4%)	189 (37.8%)	126 (25.2%)	5 (1%)
7	Stable	313	0	292 (93.3%)	0	116 (37.1%)	67 (21.4%)	0
8	Stable	294	3 (1%)	279 (94.9%)	3 (1%)	128 (43.5%)	64 (21.8%)	3 (1%)
9	Unstable	284	25 (8.8%)	274 (96.5%)	103 (36.3%)	195 (68.7%)	182 (64.1%)	15 (5.3%)
10	Stable	305	0	301 (98.7%)	0	137 (44.9%)	63 (20.7%)	0
Total		3,081	52	2,953	136	1,268	776	30

Note. Schema of work activities definitions (Billett, 2001b)

This section has outlined a different way of analysing the ICU nurses activities using the schema of work activities (Billett, 2001b). The 30 minute snapshots of two ICU nurses presented contrasting views of two nurses as they cared for their patients (Tables 4.7 & 4.8). In Tables 4.9 and 4.10 the broad totals of the schema of work activities (Billett, 2001b) and the total time for the schema activities was presented. A combined presentation of activities and time was displayed in Table 4.11 including an average for the time to do an observed work activity. The breakdown of the individual schema of work activities (Billett, 2001b) in Table 4.12 suggests that the categories of ‘multiple’ and ‘complex’ were significant for the ICU nurses as they cared for their ICU patient. This implies that the acuity of ICU patient in this study was not a deciding factor as to the workload an ICU nurse during a day shift.

4.3 Summary

This chapter has presented the findings from the time and motion study of ICU nurses working a day shift. The data in the chapter detailed the demographics of the ICU nurses and patients that they were caring for during a day shift. The ICU nurses in this study had been working in the ICU for 3.4 ($SD = 1.7$) years. The time and motion data indicated the number of activities the ICU nurses performed during their working day (mean 308, $SD = 78$, range 195-500) and time it took to do the activities. The data (76:26 hh:mm) indicated that the ICU nurse in this study spent greater than 31 hours involved in two activities simultaneously which equated to 43% of their time. The next section of the chapter provided the data that classified each nursing activity. To document and classify the activities of the ICU nurses consistently, the coding tool by Pelletier and Duffield (2003) was utilised. One facet of the tool was the classification of major categories of ‘direct’ nursing care, ‘indirect’ nursing care, ‘unit-related’ or ‘personal’ activities (Pelletier & Duffield, 2003). The observed frequency of ‘direct’ nursing care was 1,857 activities, followed by the frequency of ‘indirect’ nursing care (986 activities), ‘personal’ activities (140) and ‘unit-related’ activities (98) of the ICU nurses’ time.

The final section of the chapter described the schema of work activities data (Billett, 2001b). This analysis provided a more in depth perspective of each activity. When considering the activities and applying the schema of work activities (Billett, 2001b)

‘discretion’ (autonomy) was a common factor for the ICU nurses. The ICU nurses ‘discretion’ (autonomy) was 95.8% of their activities which equated to 2,953 activities in 59 hours 41 minutes as they worked day shifts in the ICU. The Billett (2001b) categories that indicated ‘regular’ activities were described. The categories of ‘routine’ occurred 94.2% of their time (2,901 activities, 57 hours 18 minutes); ‘not intense’, 91.1% of their time (2,806 activities, 57 hours 38 minutes); ‘not multiple’ 54.7% (1,685 activities, 56 hours 43 minutes); ‘not complex’ 70.7% (2,178 activities, 56 hours 32 minutes) and ‘accessible’ 94.9% (2,923 activities, 57 hours 12 minutes) of their time.

The categories that indicated ICU nurses’ activities that were ‘not regular’ were described. The category of ‘not routine’ was observed for 1.7% of the ICU nurses’ activity which equated to 52 activities in 2 hours 23 minutes; the category of ‘intense’ was observed for 4.4% of the activities which equated to 136 activities occurring in 2 hours and 3 minutes. In the category of ‘multiple’ there was a greater frequency of observed activities. The ICU nurses’ activities for ‘multiple’ was 41.2% which equated to 1,268 activities that occurred in 3 hours and 6 minutes and the category of ‘complex’ was observed for 25.2% of the activities which equated to 776 activities in 2 hours and 55 minutes. The final category ‘not accessible’ was observed for 1% which equates to 30 activities in 2 hours and 25 minutes.

It was possible to ascertain factors that presented the ICU nurses with a greater challenge as they went about their shift. This perspective of nursing work demonstrates a dynamic view of the working ICU nurse for a day shift. From the perspective of the schema of work activities (Billett, 2001b) the ICU nurses were acting autonomously when dealing with their work activities. The next chapter will discuss the findings outlined in this chapter and relate them to current literature.

Chapter 5

Discussion

5.1 Introduction

The aim of this study was to describe and analyse the activities bedside ICU nurses undertake as they cared for ICU patients; in essence their work. The method of time and motion was selected as an appropriate technique to meet these aims. ICU nurses' actions were observed and analysed according to 25 categories of activities (Pelletier & Duffield, 2003) and a schema of work activities (Billett, 2001b). This research provides a perspective of ICU nurses' work actions that has not been described in the literature previously. Analysing ICU nurses work activities provides a better understanding of what constitutes clinical work for these specialty nurses. The study observed ten bedside ICU nurses completing a day shift in the clinical setting, and reflected for the most part the work undertaken with stable elective cardiac surgery patients. ICU nurses undertook on average greater than 300 activities per day shift. During their shifts this group of ICU nurses were observed undertaking more than one activity at a time for almost half of their shift. Much of their work involved 'direct' or 'indirect' nursing care that was 'routine'. However, there were times when the ICU nurses' activities were 'complex, multiple' and 'intense' and these activities were not necessarily related to the acuity of the ICU patient.

This study was the first part of a large, two phase project exploring the activities of RNs in the work environment. The goal of the larger project was to develop guidelines for effective management of nursing resources in the private health system. The second phase of the project involved critical incident technique interviews of nurses who were involved in the first phase of the project. The findings of the first phase informed the second phase. This thesis is reporting on the first phase of the project.

The research findings are discussed in this chapter. The discussion considers the findings in relation to previous literature describing RNs' work in the acute hospital setting, and in particular ICU nurses' work. The three facets of the research project; time and motion observations, 25 categories of ICU nurses' activities (Pelletier &

Duffield, 2003) and the schema of work activities (Billett, 2001b) provide an analysis and discussion of the ICU nurses' activities as they worked a day shift. In the final section limitations of the research, nursing implications and recommendations for future research are discussed.

5.2 The Sample

This section discusses the sample of the ICU nurses and the patients who were in their care. The study took place in a private 12 bed ICU in South East Queensland. The participants in this study were ten Nursing Officer 1 (NO1) level RNs. This group of RNs normal duties involve providing bedside nursing care to the intensive care patients. Different studies that have explored nursing activities have described the ICU nurse sample as a mixture of nursing levels (Adomat & Hicks, 2003; Harrison & Nixon, 2002; Norrie, 1997) and different ICU experience groups (Saarinen & Aho, 2005). In this study the group of ICU nurses were all of the one nursing level compared to other studies (Adomat & Hicks, 2003; Harrison & Nixon, 2002; Norrie, 1997). This has the potential to provide a more focussed sample regarding their level of responsibility compared to the mixed groups. While different levels of ICU nurses in other studies may have provided a broader perspective, it also has the potential to mask true intragroup differences because of the heterogeneity of the sample. The sample of ICU nurses was homogenous in terms of classification. That is; all NO1 RNs involved in direct nursing care of ICU patients.

In this study the age of the ICU nurses ranged from 25 to 54 years. The ages of the participants were grouped into four age groups, 20 – 29, 30 – 39, 40 – 49 and greater than 49 years of age. These groupings of ages limit the ability in this study to average the participants' ages and compare them to data on ICU nurses in Queensland. However seven of the ICU nurses were in the 35 to 49 years age group. In 2003 critical care nurses in Queensland were 39.2 years of age on average (AIHW, 2005b), which is broadly comparable to the average age of the research participants. In this sample 40% of the participants worked full time and 60% worked part time. Employment data for Queensland indicates that 53% of critical care nurses work part time (AIHW, 2005), similar to the study sample. The average time that the ICU nurses had worked in the

ICU where the study was conducted was just greater than three years and their mean years of experience as RNs were almost 19 years.

In summary, the setting for the research project was a private hospital that followed recommended staffing guidelines of one ICU nurse to one ICU patient (ACCCN, 2002; JFICM, 2003). The ICU was able to operate to a Level III ICU, but the core business was elective surgery, principally cardiac surgery. The majority of the participants (six) were part time workers in the ICU. They had worked on average in the ICU site for just greater than three years. Seven of the participants were aged between 35 to 49 years. In the next section the time and motion findings will be discussed.

5.3 Frequency of Activities Undertaken by ICU Nurses

In this section the frequency of observed activities of the ICU nurse are discussed. In this study more than 3,000 activities were observed in just less than 77 hours over a two week period. On average, the nurses undertook 308 activities with the average length of time to undertake an activity just under one minute thirty seconds. The frequency of the 21 observed activity groups (see Chapter 4, Table 4.5) ranged from 1 activity (transporting patient) to 661 activities (admission & assessment). Interestingly a category that relates to communication, 'patient/family interaction' (see Chapter 4, Table 4.5), had the second highest frequency of observed activities (510 activities) which involved greater than four hours of the ICU nurses' time and equated to 5.5% of the ICU nurses' time.

Another category that describes communication with medical and allied health team 'coordination of care: rounds and team meetings' had less activities (440 activities) but greater percentage of time (9.7%) which equated to greater than seven hours (see Chapter 4, Table 4.5). This category had the third greatest frequency of activities. The combined percentage of these two communication activities (patient/family interaction, coordination of care: rounds and team meetings) equates to 15.2% (950 activities, 11 hours 34 minutes) of the ICU nurses' time. This suggests that communication activities by the ICU nurses were a significant percentage of their work in this study.

The interaction between ICU nurse and the patient/family was predominantly while the ICU nurse was caring for a stable cardiac surgical patient (see Chapter 4, Table 4.2).

The frequency of instances where this activity was observed (see Chapter 4, Table 4.5) may indicate interactions occurring between the stable patient and RN that are different, or less for unstable patients. The unstable ICU patient may be unable to communicate due to their illness or sedation (Magnus & Turkington, 2006). Therefore there is the potential that communication occurring between the unstable patient and the ICU nurse is one way and takes less time compared to communicating with an ICU patient who is able to communicate/interact in a conversation. The process of a two way communication can potentially be a longer more involved process compared to a one way communication. Bucknall (2003) suggests that an alert and stable patient can require communication that is focussed on their clinical progress. The amount of time involved in communicating with ICU patients and family can provide another potentially unpredictable element for the ICU nurse (Gurses & Carayon, 2007). The action of communication is important for the patient and family (Major & Holmes, 2007; Price, 2004) and was part of the ICU nurse's day that was observed.

The ICU nursing activity of communication with the patient or family has been considered in ICU workload tools (Miranda et al., 2003; Yamase, 2003) and identified in studies of ICU nurses (Adomat & Hicks, 2003; Wong et al., 2003). The percentage of time that ICU nurses were involved in communication ranged from 2.2% to 3% (Harrison & Nixon, 2002; Miranda et al., 2003; Wong et al., 2003). In this study communication 'patient/family interaction' equated to 5.5% of the ICU nurses' time. This may reflect the time and motion observation providing a better opportunity to capture these interactions and the time involved for the ICU nurse.

Communication between ICU nurses and patient/families is an important facet of patient care (Major & Holmes, 2007; Price, 2004). The challenge is considering communication within a workload tool. Miranda et al. (2003) provided different weighting scores for ICU nursing activities in the Nursing Activities Score (NAS). Communication with patient/relatives that required "full dedication for about 1 hr in any shift" (p.378) was weighted as 4.0, indicating that 4% of the ICU nurses' time in a 24 hour period could potentially involve this communication category. Miranda et al. (2003) also described a communication activity that required "full dedication for 3 hrs" (p.378) with the greatest weighting (32.0). This score implied that the ICU nurse's actions would equate to 32% of their time in a 24 hour time period. This suggests that in

the NAS (Miranda et al., 2003) when communication has a major time impact on nursing workload it is scored highly. This is an important inclusion to a workload tool, as it recognises the potential time impact on the ICU nurses' work that may occur which are not physical nursing activities. In this study the findings related to the percentage of communication support the need to recognise the inclusion of communication in a workload instrument.

Communication that occurred between the ICU nurse and other health professionals has been described in the literature ranging from 4.2% to 9.94% (Gonçalves, Padilha & Cardoso Sousa, 2007; Harrison & Nixon, 2002; Hendrickson et al., 1990; Miranda et al., 2003). In this study this category was observed occurring 9.7% of the ICU nurses' time. The definition for this communication category in this study is similar to published studies. Miranda et al. (2003) refers to this communication as "... professional exchange of information (e.g., ward rounds)" (p.378), Harrison and Nixon (2002) describe it as "providing information about the patient to other members of the team, e.g. handover, physio" (p.163) and Hendrickson et al. (1990) describe it as "professional interaction" (p.33). In this study the communication definition was 'rounds, communication with doctors and allied health or other nurse(s)...' (see Appendix M, Data dictionary) it does not include handover, which is different to Harrison and Nixon (2002). The category for all of the studies related to health professionals and not unlicensed staff. Communication between health professionals has been described as important for the safety and consistent care of an ICU patient (Curtis, 2008; Manojlovich & DeCicco, 2007; Pronovost, Wu, Dorman & Morlock, 2002). Pronovost et al., (2002) suggests that verbal and written communication has been recognised as a team factor that can influence a "preventable adverse event" (p.81) for an ICU patient.

In this study the ICU nurses were observed communicating with other members of the health team. The studies utilised work sampling (Gonçalves et al., 2007; Hendrickson et al., 1990; Miranda et al., 2003) and self report logs (Harrison & Nixon, 2002) to observe the ICU nurses. Therefore, only single activities were documented. Therefore there is the potential to miss relevant data that may be occurring at the same time (Harrison & Nixon, 2002; Miranda et al., 2003). Harrison and Nixon (2002) recognised that communication can occur while the ICU nurses were involved in another aspect of care

and that in their study this communication was possibly missed. In this study the time and motion observations was able to capture greater than seven hours of ICU nurse interaction with other health professionals which provides further insight into their work. While the observations do not describe the type of communication observed it is another factor that is important for understanding what ICU nurses are involved in as they care for their patient. Describing how much communication occurs with other health professionals identifies an important function that is relevant to patient care that should be included in a workload tool.

The activity of communication which was observed in this study highlights an important facet of ICU nurses' work. The time and motion method of observation has allowed the observer to document ICU nurses' communications as they occurred. The workload tool that considers communication work activities such as (Miranda et al., 2003) recognises an important factor that can impact on ICU nurses and by extension the ICU patient. This study's findings support the recognition of this type of communication in workload tools such as the NAS by Miranda et al. (2003). In the next section activities that occurred at the same time are discussed.

5.3.1 Simultaneous Activities of the ICU Nurse

A facet of nursing activity that was identified in the time and motion data was the number of activities that occurred for the ICU nurses simultaneously. The data was analysed for instances where the nursing activities were occurring at the same time for the ICU nurse. Two simultaneous activities were captured for 43% (see Chapter 4, Table 4.4) of the study time. There were occasions when three activities were occurring simultaneously for the ICU nurses. These observations equated to approximately 3% of the observed times (see Chapter 4, Table 4.4). Thus, almost half the time the ICU nurses were undertaking more than one activity at a time.

There is limited discussion in the nursing literature related to simultaneous activities. Studies have alluded to the ability of RNs to multitask (Gran-Moravec & Hughes, 2005; Linden & English, 1994; Wong et al., 2003) or multi skill (Duffield & Wise, 2003) but have not expanded on the subject. Hughes (1999) suggests that the challenge with capturing the simultaneous activities of RNs is the unplanned nature of the actions. The RN maybe assessing a patient's gait as they assist them to the toilet. In one study of ICU

nurses the simultaneous activities were ignored (Wong et al., 2003). If an observer noted a number of activities occurring at the same time only one activity was selected and timed, disregarding the other activity (Wong et al., 2003). Interestingly Miranda et al (Miranda et al., 2003) when developing the NAS considered “Routine communication allowing staff to continue with other nursing activities such as communication with patient during hygiene procedures...” (p.376). Implying that there could be simultaneous activities by the ICU nurses. However, because of the work sampling method it was not possible to capture this data so the category was incorporated into the ‘support and care’ category of the tool (Miranda et al., 2003).

It is suggested that the ICU nurse’s ability to coordinate simultaneous activities as they cared for their patients presents an unrecognised facet of their work within most workload tools. This may relate to the difficulty of capturing the simultaneous activities in the clinical environment, or the perception that nursing activities occur in a linear manner, each activity follows the previous. Linden and English (1994) recognised the benefit of using a time study method to capture the simultaneous activities of nurses. This highlights a potential weakness with utilising a work sampling method to quantify the nursing work that is occurring. The observed nursing activities are considered single units of activity, which misses the complexity that may be occurring for the RN as recognised by Miranda et al. (2003). In the case of the ICU nurse this may be a significant factor in their work day that is not recognised.

Considering that the workload models aim to provide predictions of the ICU nurse workload based on the ICU patient characteristics (Miranda et al., 1997; Miranda et al., 2003; Padilha et al., 2007; Pyykkö et al., 2004; Pyykkö, Laurila, Ala-Kokko & Hentinen, 2001; Volpatti, Leathley, Walley & Dodek, 2000; Walther et al., 2004) there is the challenge of finding the balance between safe quality care and fiscal accountability. Understanding that there is the potential for activities to occur simultaneously for the ICU nurse as they care for their patient is useful information because it demonstrates the complexity of ICU nursing. The ICU workload tools in the literature may generally underestimate what ICU nurses are dealing with when caring for ICU patients as they perform simultaneous activities. The simultaneous activities for ICU nurses was considered in the development of the NAS (Miranda et al., 2003), which suggests a recognition of the potential effect on ICU nurses. However

simultaneous activities have not been described in other ICU workload tools, this current research suggests they should. The simultaneous tasks performed by ICU nurses could be an important factor for patient safety, staff satisfaction and quality of care. The ICU nurse as with other RNs can experience the impact of shift work and fatigue (Dorrian, 2006; Montgomery, 2007). Combine this with simultaneous activities and there is the potential for error at the bedside that is not considered in ICU workload tools.

Duffield, Roche and Merrick (2006) have described the “invisible nature of nursing” (p.17) in relation to the difficulty of capturing all nursing interventions. The simultaneous activities observed in this study identify the “invisible nature of nursing” discussed by Duffield et al. (2006, p.17). Describing simultaneous activities recognises that ICU nursing activities do not occur in a linear manner. Other researchers have considered the multiple activities nurses undertake. For example, in their study of RNs in a telemetry ward, Gran-Moravec and Hughes (2005) described how RNs ‘multitask’ (simultaneous activities) their activities. It is possible to observe and describe simultaneous nursing activity (Gran-Moravec & Hughes, 2005; Linden & English, 1994) and integrate the possible simultaneous actions in a workload tool (Miranda et al., 2003). The findings in this study identify and quantify simultaneous nursing activities in an Australian ICU. This provides an understanding of the potential complexity of ICU nurses work as they care for their patients. These findings highlight an important consideration for future Australian workload tools. The ICU nurse’s work is not a linear progression of activities, there is the potential for a number of actions to occur in a simultaneous manner.

In summary, this study has identified that ICU nurses were involved in simultaneous activities as they cared for their patients for 43% of the observed activities (see Chapter 4, Table 4.4). To date, this has not been discussed widely in the research. Yet, it should be considered an important part of nursing work. It is suggested that workload tools should incorporate this important facet of ICU nurses’ work identified in this study. Recognition of the potential simultaneous activities that ICU nurses perform in the daily work provides the opportunity to describe the invisible work alluded to by Duffield et al. (2006). A workload tool that has provision for simultaneous activities can represent

an important addition to the ICU nurses' work. In the next section a breakdown of the nursing activities will be discussed.

5.4 Types Activities Undertaken by ICU Nurses

In this section the categorised activities undertaken by ICU nurses are discussed. The time and motion method data identified what activities occurred and over what duration. The next phase of the project was to categorise the actions into four major and 25 minor categories. The tool described by Pelletier and Duffield (2003) was utilised for this study as it provided a method to categorise the nursing actions into logical groups. There are four major categories 'direct care', 'indirect care', 'unit-related' and 'personal' (see Chapter 4, Table 4.6) and 25 minor categories (see Appendix L). However, only 21 categories were observed and documented for the ICU nurses as they worked their shifts. The findings are discussed related to the major and minor categories. The first section describes the 'direct care' activities of the ICU nurses.

5.4.1 Direct Care Activities

In this study the ICU nurses as a group were observed providing 'direct care' to their patients 40.5% of the time (see Chapter 4, Table 4.6). The concept of 'direct care' for this study focussed on all activities that occurred in the presence of the patient and family (see Appendix M, Data dictionary) (Pelletier & Duffield, 2003). There are varying perspectives of what is defined as direct nursing care for ICU nurses and how it is presented in the literature. Whether it is the percentage of time for ICU nurse direct care activities (Harrison & Nixon, 2002; Norrie, 1997; Wong et al., 2003), the frequency of direct care activities (Marasovic et al., 1997) or a mix of both time and frequency (Bosman et al., 2003). This presents a challenge when comparing findings. Comparing the different study findings direct nursing care can range from 31% to 85% (Bosman et al., 2003; Harrison & Nixon, 2002; Marasovic et al., 1997; Wong et al., 2003).

In two UK studies direct nursing care has been described as all activities related to the patient (Harrison & Nixon, 2002; Norrie, 1997). However, both authors had a separate category called 'patient assessment' which included assessment and documentation of the ICU patient's physiological status. The 'patient assessment' category activities that

included assessment and documentation findings of an ICU patient in this study would have been included in the 'admission and assessment' category of the direct nursing activities (Pelletier & Duffield, 2003). The comparison of the findings of these two studies needs to be considered in this context as it is not a complete comparison of the findings.

The ICU nurse percentage of time for direct nursing care was described ranging from 41% (Norrie, 1997) to 85% (Harrison & Nixon, 2002). Norrie (1997) excluded the 'patient assessment' category from direct nursing care calculation, whereas Harrison and Nixon (2002) included the category. Harrison and Nixon (2002) presented the percentage of time for direct nursing care (85%) as a combination of a number of categories in the abstract. However, in the discussion, direct nursing care is 24% and is compared to other studies based on this percentage.

The percentage of direct nursing care time observed in this study (40.5%) can be regarded as a reasonable representation of the ICU nurses' work compared to the other studies (Harrison & Nixon, 2002; Norrie, 1997). Both Norrie (1997) and Harrison and Nixon (2002) utilised a self report log. The ICU nurses filled in retrospective data into a log form that was divided up into five minute segments for each hour. The difference between self report and direct observation is reflected in the 'fly on the wall' approach described by Zeitz (2005), where the ICU nurse is unobtrusively observed performing all of the activities rather than remembering what activities they have performed. Considering the importance of documenting accurately the activities that ICU nurses perform for workload tools. The accuracy of the self report log method must be questioned and whether it truly reflects the work activities for the participants in the studies described. This perspective has also been expressed by Burke et al. (2000).

In The Netherlands (Bosman et al., 2003) and the US (Wong et al., 2003) studies have described ICU nurses' activities that can be considered direct nursing care. Bosman et al. (2003) observed direct patient care ranging from 54.9% to 61% (1442 to 1633 observed direct care activities) of the time for the ICU nurses. Wong et al. (2003) defined direct nursing care similar to this study's definition (Pelletier and Duffield, 2003). Their findings for direct nursing care in the ICU ranged from 31% to 40% (Wong et al., 2003). Both of these studies utilised time and motion as a method of observation for the ICU nurses' work activities. The findings in this study compare to

Wong et al. (2003) study however the authors did not record simultaneous activities, the observers selected "...the predominant task was identified and logged" (p.2489). The varied frequency of direct activities may reflect the activity that was occurring in the ICU at the time.

Harrison and Nixon (2002) suggested that the different type of ICU could lead to a different number of activities being observed. They suggested that a cardiothoracic surgical ICU may have more activities related to the preparation for discharging a patient, in the general ICU Harrison and Nixon (2002) suggest that the activities may be spread over a greater time. Wong et al. (2003) and Bosman et al. (2003) conducted their studies in surgical ICUs. The findings in this study related to direct nursing care provide an indication of the variability of ICU nurses' work. Rather than it being the different type of ICU that affects the amount of direct nursing care activities it is suggested that it is the clinical needs of the ICU patient and the nurse staffing model that will dictate the amount of work to be performed.

An important element to consider is the different nurse to patient ratios in different countries when comparing findings with an Australian study. In the US the ratio can be one ICU nurse to two or more patients (Dang, Johantgen, Pronvost, Jenckes & Bass, 2002). In The Netherlands the ratio is one nurse to two patients (Top, Schultz, Jurrjens, Rommes & Spronk, 2006). In the UK generally the ratio is the same as Australia, one nurse to one patient (Adomat & Hicks, 2003; ACCCN, 2002). It is possible that this alters the observation data of the 'direct care' activities for the studies where the ratio is one ICU nurse to two patients. The 'direct care' activities could also be attended by other health professionals or nurses of a different clinical level from the ICU nurse. This could potentially dilute the number of activities observed and it makes comparisons with this study difficult.

The concept of 'direct care' is a core aspect of the ICU nurses' work life and includes what the ICU nurse does directly with the patient or family. The exponential growth of technology in the ICU environment has been described as one of the major changes to occur in ICU nursing over the last 40 years (Wiles & Daffurn, 2002). Yet the direct patient focus remains the cornerstone of ICU nursing. Today, monitoring of patient status is assisted by technology but the ICU nurse is crucial to understanding and acting upon the clinical information displayed. The actions of ICU nurses as they deliver

‘direct care’ are important to document. The observed ‘direct care’ of this group of ICU nurses demonstrates that more than 50% of the time working a day shift was focussed on the ICU patient.

The sub-category of ‘admission and assessment’ (see Chapter 4, Table 4.5) in the ‘direct care’ major category was observed occurring most often, comprising 12% of the observed study time. This minor category involves activities such as patient observations, monitoring alarms and documenting objective and subjective patient information (Pelletier & Duffield, 2003). In the Australian ICU environment this is a logical expectation considering that there is generally one ICU nurse to one ICU patient and the ICU nurse will be in close vicinity to the patient. The ‘admission and assessment’ category is an active and passive process for the ICU nurse involving both physical and the non physical evaluations of the ICU patient. The active/physical behaviours involved doing actions such as taking a blood pressure, whereas the passive/non physical actions were the observations of the patient and monitor. An example can be the assessment of the ICU patient’s air entry and with their oxygen saturations displayed on the monitor. The evaluation and assessment of patients has been discussed as a scanning process for decision making by ICU nurses (Aitken, 2003). The ICU nurses are observing a number of factors and processing the information into a clinical assessment of their patient. This processing of patient care decisions is suggested to occur every 30 seconds for the ICU nurse (Bucknall, 2000). While the observed activities in this study were not separating out this detail, it can be suggested that dividing the total direct care activities (1,857) by the amount of time to do these activities (30 hours 59 minutes) may indicate that the ICU nurses could be making approximately one decision every minute. That is, if each activity required a decision. The ‘direct nursing care’ activities imply that there could be a significant intellectual activity component to this observed action. The assessment of monitor displays and patient presentation presents the ICU nurse with a number of different inputs that they need to process and potentially act upon. The next major category ‘indirect care’ was observed for 32% of the ICU nurses time, this will now be discussed.

5.4.2 Indirect Care Activities

Indirect care involved nursing actions that were directly related to the patient but performed away from the bedside, for example coordinating a patient’s discharge with a

ward. This major group had eight minor categories of activities (Pelletier & Duffield, 2003). The category of 'indirect care' for the ICU nurses involved 32.4% of the ICU nurses' time (see Chapter 4 Table 4.6). The indirect activity findings in this study are greater than what was described by Wong et al. (2003). In their study indirect nursing care was 15.3% to 15.4% of the ICU nurses' activities. The difference in findings between Wong et al. (2003) and this study may be because of two reasons. The first reason is related to the definition of indirect nursing care category. In this study documentation was considered as either part of 'admission and assessment' (direct nursing care) or indirect nursing care (progress notes/discharge notes, coordination of care: care planning and clinical pathways). Wong et al. (2003) considered any documentation by the ICU nurses as documentation in their study. The authors had separated this indirect activity to better observe any differences that ICU nurses would demonstrate related to the clinical information system introduction.

The second reason may reflect the different indirect nursing care provided by the two different studies. In the case of Wong et al. (2003) the observed action of setting up a room performed by ICU nurses was observed occurring 0.4% to 1.4%. In contrast, in this study the ICU nurses were observed involved in room setup activities for 9.2% of their time. This may reflect the different support staff who were available to assist the ICU nurses at the two study sites. In this study the activity was performed by the ICU nurse on the shift.

The minor category of 'coordination of care: rounds, team meetings' had the greatest percentage of activities (9.7%) under the 'indirect care' major category (see Chapter 4 Table 4.5). This minor category involved communication with other health professionals regarding the care of the patient. This is an essential element of ICU nursing as effective coordination of care will likely lead to better outcomes for the ICU patients (Narasimhan, Eisen, Mahoney, Acerra & Rosen, 2006). Communication is an obvious important factor for effective coordination of care. If there is a lack of clear communication then there is greater chance of negative outcomes for patients (Sanghera, Franklin & Dhillon, 2007) including clinical errors (Kopp, Erstad, Allen, Theodorou & Priestley, 2006; Needham et al., 2004; Rothschild et al., 2005). The amount of time for 'coordination of care: rounds, team meetings' that the ICU nurses were observed in this study equated to seven hours. While it is difficult to surmise

whether this is an adequate amount of time to spend on ‘coordination of care’ it is still important to capture, because effective communication in relation to a critically ill patient is crucial for continuity of care and patient safety.

In this study the finding that the ICU nurses were involved in ‘room/equipment setup/cleaning’ activities for greater than 9% (see Chapter 4, Table 4.5) of the observed time is a concern. In the literature this category has been referred to as “non-nursing duties” (Harrison & Nixon, 2002, p.161; Norrie, 1997, p.122) and has been described ranging from 4% to 7% (Harrison & Nixon, 2002; Norrie, 1997). In this study the finding may reflect the different ICU environment and their work practices. It may also reflect the limitations of the self report method for these two studies of ICU nurses. The ICU nurses activities were observed across the different shifts (Harrison & Nixon, 2002; Norrie, 1997). In this study the time and motion observations were conducted during day shifts Monday to Friday when cleaning or ancillary staff are generally available in the unit. This finding highlights an area for potential change. Using ICU nurses to perform non-nursing duties rather than ancillary staff has been described as financially inefficient and leads to nurse turnover (Duffield et al., 2005). It appears from these finding that there were limited staff available to assist with the cleaning in the unit. In this study ICU nurses were observed spending greater than 9% of their time performing activities that could have been done by other staff. This has the potential to increase ICU nurses workload unnecessarily and as Duffield et al. (2005) suggests increase staff turnover.

Intrinsic to the efficient management and care of an ICU patient is to consider all nursing actions related to the patient. Some of the minor categories in the ‘indirect care’ group include; the verbal report and handover, preparation of drugs, medical rounds and progress notes, which are important activities of the ICU nurse. These ICU indirect nursing activities should be considered as important as the direct care activities for a number of reasons. The activities may have a significant impact on a patient’s progress in the ICU. Understanding how much time is involved with activities such as, handover, preparing medications, medical rounds or progress notes could provide an indication of unrecognised activities in workload tools. Any inefficiency in these areas of nursing care could have a cascading impact on the ICU patient. Ineffective team communication could lead to delayed or inappropriate actions related to the ICU patient. Incorrect

preparation or administration of medications could have a catastrophic effect on an ICU patient. So while this major category has not previously been given a significant consideration in the nursing literature, it is argued that capturing and considering the ‘indirect care’ activities of an ICU nurse is crucial to understanding workload factors. These ‘indirect care’ activities can have an effect on the nurses’ workload and time when caring for an ICU patient and could have important implications for quality patient care.

The indirect nursing care findings in the current study are higher than the study of ICU activities by Wong et al. (2003). This study and Wong et al. (2003) have used time and motion to observe the ICU nurses’ work activities. The discrepancy in findings may relate to the different staffing systems between Australia (this study) and the US (Wong et al., 2003). The time and motion observations and categorisation of the indirect nursing care activities of the ICU nurses provides a clear description of this type of activity. Identifying indirect activities that can be allocated to other non nursing personnel is important. Norrie (1997, p.122) suggests that some activities involve “... duties which do not require the levels of knowledge and skills of a qualified nurse”. This poses the question as to who is the most appropriate person to do these activities.

Finally, it is important to recognise the value of indirect nursing activities and how they may potentially impact on an ICU nurses workload. Indirect care activities that can only be performed by ICU nurses such as, medication preparation and handover have the potential to significantly impact on an ICU patient if done poorly, or, may involve a major percentage of time for an ICU nurse particularly if the activity is complicated. It is suggested that workload tools must consider indirect nursing activities in the ICU. Ignoring these activities ignores an important facet of an ICU nurses’ work.

5.4.3 Unit-related Activities

The next major category in this study was ‘unit-related’, (Pelletier & Duffield, 2003) defined as activities that were related to the running of the ICU and not related to the patient. In this study ‘unit-related’ (Pelletier & Duffield, 2003) activities for the ICU nurses involved 4.5% of their time. This finding is similar to Bosman et al. (2003) in their study of uncomplicated cardiothoracic surgery ICU patients in The Netherlands. The authors described ‘unit-related’ activities ranging from 3% to 4%. Other ICU

studies were not as clear on their descriptions of ‘unit-related’ type activities (Harrison & Nixon, 2002; Marasovic et al., 1997).

Factors that may impact on the ‘unit-related’ category include resources that are available in the ICU. In the current study ‘unit-related’ activities were defined as restocking of stores, entry of computer information related to all patients in the unit, clerical activities including the filing of patients’ notes and staff education (Pelletier & Duffield, 2003). Staff education during the study time frame was limited, therefore the ‘unit-related’ activities primarily focussed on the clerical activities that are conducted normally by administrative staff. These activities such as answering phones, assembling charts or filing reports (Pelletier & Duffield, 2003), identify non nursing activities that were being attended to by the bedside ICU nurses. In this ICU there was a charge nurse and a ward administration officer for the day shift Monday to Friday, which probably allowed the ICU nurse to concentrate on patient care.

While ‘unit-related’ activities are a small percentage of the overall study results they do provide an insight into ICU nurse activities that are related to the ICU workplace generally. An understanding of the different activities that the ICU nurses in this study were involved in other than nursing activities is important, because of the potential time that is involved with these types of activities. It is important to recognise that there are activities, such as filing that can be done by a ward clerk in the ICU. The activities were observed during a day shift when there is usually support staff available. In this study the number of instances when this occurred was 98 (see Chapter 4, Table 4.5). Of the 98 instances there were 70 (1 hour 8 minutes) that were clerical activities (see Chapter 4, Table 4.5). This finding can lead to the question, if there is less or no clerical support staff on the late or night shift what is the workload for the ICU nurses then after business hours?

The ‘unit-related’ category includes the category of ‘inservice/education’. There were 25 instances that equated to 2 hours and 20 minutes (3.1%) of time observed for the category of ‘inservice/education’ (see Chapter 4, Table 4.5). Wong et al. (2003) described this activity as “attend inservices” (p.2490). In their study this category was observed occurring for 1.8% of the ICU nurses time. However the amount of combined education during the observation period is sparse for the ICU staff. This is a concern

when education provides an important foundation for the ICU nurse and their ability to care for an ICU patient.

The 'unit-related' category in the ICU environment is not widely reported in the literature, perhaps it is an area that should be given greater credence in workload tools. Work activities that ICU nurses do that have been identified as separate from their work role may indicate areas for correction. Staff satisfaction and workload issues could be influenced by the amount of unnecessary 'unit-related' activities that are addressed by ICU nurses.

5.4.4 Personal Activities

The final major category was 'personal' (Pelletier & Duffield, 2003) which reflected personal breaks, communication with other staff that was not related to the work area and meal breaks. In this study in the major category of 'personal' there were 140 activities and equated to 5% of the total ICU nurses' activities (see Chapter 4, Table 4.6), but greater than 16 hours or 21% of the observed time for the ICU nurses (see Chapter 4, Table 4.5). In the literature the findings for personal activities range from 10% to 20% (Bosman et al., 2003; Harrison & Nixon, 2002; Marasovic et al., 1997; Norrie, 1997), similar to the current study findings.

The activity of 'personal' (Pelletier & Duffield, 2003) provides a perspective of the ICU nurses' days that is not related to the patient or the ICU. Greater than 21% of the ICU nurses' time for the study was involved in personal time. One facet of the observed 'personal' activity was the allocated meal breaks for the ICU nurses. The allocated meal breaks that were a part of the ICU nurses day at the research site included a 15 minute morning tea and a 30 minute lunch break. Over the 10 observed early shifts this equalled seven and a half hours, which is just less than 10% of the observed time for this activity. Therefore just greater than nine hours or 11% could be considered unplanned 'personal' activities. The planned 'personal' time within the working day is important to record. It helps to gauge whether the breaks were taken with regularity and for the full allocated time.

One study that explored nurses' quality of care discussed breaks/personal time in a negative light (Hurst, 2005). In the study Hurst (2005) explored the quality of care

delivered by nurses in the United Kingdom. In part he discussed personal time of ward RNs. The study exploring the interaction between the patients, nurses and the ward environment described wards of high quality and low quality (Hurst, 2005). The quality of the ward was based on a calculation of a number of nurses' activities measured against 'predetermined quality standards' (Hurst, 2005). Hurst (2005) indicated that RNs working in low quality wards took more personal time than RNs in high quality wards. The author questioned in this context whether break time was a 'proxy' indicator for job satisfaction that could be considered a factor of workload (Hurst, 2005). It was identified that the activity of 'break time' was taken more on the low quality wards suggesting a less efficient work environment (Hurst, 2005). A contrasting perspective by Lee (2001) identified the importance of the 'morning tea ritual' for RNs. The morning 'tea break' was the chance to leave the floor and provided RNs the chance to have an informal and unplanned debrief with their colleagues. Lee (2001) indicated that this provided the RNs with a chance to vent their feelings away from the clinical area. He believed that while the break time was ritualised it was an important facet of a RNs work day. Lee's (2001) description suggests that the breaks observed were providing clinical respite for the ICU nurses.

In this study, break time was captured as a regular event for the ICU nurses in their work day (see Chapter 4, Table 4.5). The allocation of meal breaks during a work shift is a mandatory requirement (Queensland Industrial Relations Commission, 2006). The findings in this study suggest that there was time for the ICU nurses to have a break, or do something 'personal'. In the context of this study it was viewed in the same light as Lee's (2001) study that the ICU nurses' 'personal' time was a necessary part of the working day for this group of nurses. Capturing the break time and other 'personal' time during a working shift provides a useful perspective because it indicates if staff are able to replenish or walk away from their environment for 'personal' time. Rauhala et al. (2007) described a relationship between an increasing workload and increasing illness for nurses. This is an important point when considering the challenges in developing an environment that promotes staff satisfaction. Other studies have identified personal time type of activities as findings of their studies but did not discuss them as part of the study dialogue (Harrison & Nixon, 2002; Marasovic et al., 1997; Norrie, 1997; Pelletier, Duffield & Donoghue, 2005). Having time for personal activities in the ICU could be an important consideration for efficient management of the work environment. The

literature on 'personal' time in ICU is limited and this finding adds a different perspective to what is published at present.

This section has described the findings in relation to the major and minor activity categories (Pelletier & Duffield, 2003) of the ICU nurses' work day that were observed in this study. The literature that has explored ICU nurses has implied that the 'direct care' has the greatest importance for the ICU nurse and patient (Harrison & Nixon, 2002; Norrie, 1997; Wong et al., 2003). However in this study it has been identified that there are other activity categories 'indirect care, unit-related' and 'personal' that could impact on the ICU nurse and their care of the patient. The 'indirect care' is largely an unrecognised part of the ICU nurses' working day that in this study involved 32% of their time (see Chapter 4, Table 4.6). The 'unit-related' category highlighted in part what education was occurring for the staff. The category of 'personal' identified in this study that staff were going on regular breaks and that these breaks were a reasonable proportion of their shifts. As discussed by Lee (2001) 'personal' time is an important time in a shift for nurses. The time away helps them to informally debrief which could help in dealing with the workload in the ICU. The next section will explore the ICU nurses' work activities from a theoretical aspect that considers all activities as having a broader scope for the ICU nurse.

5.5 Schema of ICU Nurses' Work Activities

In the previous two sections the findings of the study have been broken down into frequency and time of activities, and activity categories. This has provided an understanding of the activities occurring for the ICU nurses as they were worked a day shift in the ICU. This section will describe and analyse the ICU nurses activities, by utilising a schema of work activities (Billett, 2001b) to describe the ICU nurse activities from a new perspective. The concept of the schema of work activities (Billett, 2001b) was used to provide a deeper understanding of descriptions of the activities within work practice. The six schema categories were 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility' of work activities (Billett, 2001b). The classification of the activities was based on the experience of the observer and discussion groups with ICU nurses. The observer for this study was the researcher who is a senior clinical expert in a tertiary level ICU in Brisbane. Classification of the

activities was based on what the ICU nurses needed to enact to perform their nursing care. These factors combined with the knowledge of the ICU environment provided cues for the observer that aided in categorising the different elements of the schema of work activities (Billett, 2001b). Each category was classified as being a regular or irregular activity based on the schema. Some activities were scored as not applicable.

5.5.1 Routine Activities of ICU Nurses

The concept of 'routine' activities in the ICU has a different meaning to the 'routine' activities for the ward RN or the emergency department RN, one major difference being the extensive use of invasive technology and non invasive technology (Bucknall, 2003). It has been recognised that the use of technology in ICUs has increased significantly over the decades (Wiles & Daffurn, 2002). The technology includes electronic patient monitors, information systems, other treatment modalities such as mechanical ventilation and dialysis.

Activities that can be classified as 'routine' in the ICU environment may reflect how often they are performed or whether they are considered an intrinsic part of ICU, such as observing the patient monitor and patient. The regular nature of observing the patient monitoring equipment in combination with the patient in the ICU can be considered a 'routine' activity for ICU nurses. Where an activity may become 'non routine' is when the ICU patient and the patient monitor indicate an acute change in the patient's clinical status to the ICU nurse. Fairman (1992, p.56) described the observation actions of ICU nurses as "watchful vigilance", intense patient observations are intrinsic to ICU nurse actions. The patient monitors complement the ICU bedside nurse's patient observation.

In this study 94% of the ICU nurses activities were classified as 'routine', which is consistent with other research. Wikström and Sätterlund Larsson (2003) believe that the activities in the ICU are mainly routine. Activities are coordinated and integrated, where the different "actors" know what they have to do and understand their place in the mechanism that is the ICU environment (Wikström & Sätterlund Larsson, 2003, p.376). The staff in ICU are 'actors' who are involved in regular and 'everyday practices', however Wikström and Sätterlund Larsson (2003) did recognise a complexity for some of the routine activities being performed. This is in line with what was identified with the schema of work activities (Billett, 2001b) in this study.

The concept of routine nursing activities in the literature has also been described as “...ill-defined and seldom used in the field of nursing...” (Zisberg, Young, Schepp & Zysberg, 2007, p.442). The authors believed that research explored the aberrations to participant’s routines or the rigidity of routines (Zisberg et al., 2007). Wikström and Sätterlund Larsson’s (2003) description of routine activities and Billett’s (2001b) definition of ‘routine’ provide a counter argument to Zisberg et al. (2007) Billett’s (2001b) suggests that a ‘routine’ activity can be performed by a worker who is familiar or has previously experienced the activity and can perform it with ease. This description provides a succinct explanation and was adapted in this study. The ICU nurses were observed for 94% of their time involved in ‘routine’ activities. The ‘routine’ actions described by Billett (2001b) relate to remembered experiential factors. This was interpreted to reflect the ‘routine’ activities that ICU nurses perform.

5.5.2 The Discretion Activities of the ICU Nurse

The category of ‘discretion’ is a reflection of whether the person is acting autonomously or not as they perform an activity (Billett, 2001b), in essence the ability of the person to make different levels of decisions. Billett (2001b, p.23) described it as a “...broader or narrower range of decision making...” process. Autonomy has been described in the literature in relation to ICU nurses. Authors have identified that ICU nurses’ were autonomous in the clinical actions towards ICU patients (Rose, Nelson, Johnston & Presneill, 2007; Tummers, van Merode & Landeweerd, 2002; Varjus, Suominen & Leino-Kilpi, 2003). In contrast Papathanassoglou et al. (2005) found that ICU nurses had limited autonomy in “technical tasks” and “low decision autonomy” (p.154). The research methods used to capture autonomy included questionnaires (Papathanassoglou et al., 2005; Tummers et al., 2002; Varjus et al., 2003) or self documentation (Rose et al., 2007). In this study the ‘discretion’ of the ICU nurses was observed and documented by the non participant observer. This suggests that there were two perspectives for researching autonomy, the perception of the participant and the perception of the observer. It is difficult to say which provides the better option to capture this type of nursing action.

The discussion groups provided the researcher in this study an opportunity to compare his perceptions of ‘discretion’ (autonomy) with other ICU nurses prior to observing ICU nurses in the clinical environment. The responses of the ICU nurses in the group

discussions to questions about ‘discretion’ (autonomy) indicated that the overall average for ‘yes’ responses to the questions (see Appendix K) equated to 73.8%. This suggested that the ICU nurses generally believed that they were autonomous in their actions for the majority of the questions/scenarios presented to them (see Appendix J). However, the question related to CVVHDF (see Appendix J) presented to the discussion groups had a different response. Less than 20% of the discussion groups indicating they felt they had ‘discretion’ (autonomy) (see Chapter 3 Figure 3.2). The responses by the ICU nurses in the group discussion were in alignment with the researcher’s perspective of autonomy in the clinical setting. There was one ICU patient during the study that required EDD-f dialysis. The nurse demonstrated ‘discretion’ in her activities. This may relate to the fact that generally the ICU patient requiring dialysis will have an ICU nurse who has experience with the equipment and who are able to care for the acutely ill ICU patient if required.

The category of ‘discretion’ (autonomy) for this group of ICU nurses indicated that they were working autonomously during their shifts for greater than 94% of the observed time. This implies that the ICU nurse participants in this study were able to make decisions and act on them. The decisions were in relation to their patients and/or relatives and did not reflect unit or organisational decisions. This is similar to the findings of Varjus et al. (2003). In their study the authors identified that ICU nurses “... felt they had more autonomy in decision-making and actions concerning patient care than in decision-making and actions concerning the intensive care unit as a whole” (Varjus et al., 2003, p.31). The individual decisions related to the patient’s care were decided by the observed bedside ICU nurses.

Decision making by critical care nurses has been widely described in the literature (Bucknall, 2003; Bucknall, 2000; Currey & Botti, 2006; Currey, Browne & Botti, 2006; Currey & Worrall-Carter, 2001; Hancock & Easen, 2005; Papathanassoglou et al., 2005; Rose et al., 2007; Varjus et al., 2003). Studies that have explored Australian ICU nurses and their decision making identified the frequency of their decisions. Bucknall (2000) indicated that the observed ICU nurses made two decisions per minute in the clinical setting. In another study Currie and Worrall-Carter (2001) observed ICU nurses making 3.3 decisions per minute. In this study the findings related to the category of ‘discretion’ (autonomy) indicate there were a large percentage of decisions made by the ICU nurses.

This study's findings support the findings related to the frequency of decision making described by Bucknall (2000) and Currie and Worrall-Carter (2001).

It appears that the different nursing cultures across the world and patient ratios could affect the degree of autonomy that ICU nurses are able to employ. The English ICU staffing for an ICU patient is similar to the Australian ICU, 1:1 ICU patient/nurse ratio but there would still be differences in the health system management. Autonomy will also be influenced by the private or public hospital models. A question to be asked relates to how much autonomy the ICU nurses have in their environments and how this may affect the efficiency and job satisfaction of the staff and patient outcomes. This time and motion study, applying Billett's (2001b) schema suggest that the ICU nurses in this study had a significant amount of autonomy.

The autonomy of a clinician as they work in the ICU environment implies that there is an ability to make decisions and act on them. In an Australian study of critical care nurses Bucknall (2003) identified that the availability of resources and the work environment could directly affect the ability of the critical care nurses to be autonomous. Bucknall (2003) suggested that if the environment was cramped or crowded that these factors increased the stress levels for the staff and affected their decision making abilities. In contrast if the environment was open plan, spacious and well lit there was a positive effect on the ICU nurses and their decision making. The environment of this research project site was open and uncluttered so it is possible that the findings of autonomy in this study may in part reflect what was identified by Bucknall (2003). The environment as one aspect could have a direct effect on the ability of the ICU nurses to act autonomously. Nursing actions and decisions can have a significant impact on the patient.

This group of participants had worked as Registered Nurses for a mean of 18 years and in this ICU a mean of 3 years. This may have provided the ICU nurses with the confidence to work autonomously (discretion). The autonomy and confidence of ICU nurses has been discussed in the nursing literature previously (Papathanassoglou et al., 2005). The authors suggested that ICU experience would affect the decision making ability of ICU nurses (Papathanassoglou et al., 2005).

The preparation of ICU nurses so that they can develop the skills to be independent autonomous workers in their environment is an essential ICU goal. Recognising the ability of ICU nurses to be able to be autonomous when caring for either stable or critically ill ICU patients is important. The ‘discretion’ (autonomy) of the ICU nurse can be also considered with the ‘intensity’ of the activity.

5.5.3 The Intensity of Activities for the ICU Nurse

Billett (2001b) suggests that the ‘intensity’ of an activity may require the worker to be capable of multi skilling and have the ability to anticipate and plan ahead based on what is presented. The category of ‘intensity’ as discussed in Chapter 2, section 2.3.2 reflects the micro events that the ICU nurse is dealing with as they care for their patient. Discussion in the literature that consider the nursing intensity in relation to workload tools suggest that nursing intensity in part reflects nursing workload (Fagerström & Rainio, 1999; Lundgrén-Laine & Suominen, 2007; Rauhala & Fagerström, 2004; Welton, Unruh & Halloran, 2006; Yamase, 2003). In a recent study Lundrén-Laine and Suominen (2007, p.98) defined nursing intensity in the ICU environment “Nursing intensity depends on patients’ need for care and it indicates the nursing workload caused by the patients’ caring needs”. In this definition the authors suggest that the patient’s needs are the main foci for the intensity that the ICU nurses may face while caring for their patients. Yamase (2003) suggests that the nursing intensity is one of the facets to be considered when assessing the workload of ICU nurses.

In this study the ‘intensity’ of the observed nursing actions incorporated all facets of the ICU nurses. In total 4.4% of the ICU nurses’ activities were ‘intense’ (see Chapter 4, Table 4.9) was considered ‘intense’. The difference between this study and other published studies lies in the focus. In this exploratory study the intensity of an ICU nurse complete work activity was observed to further understand what occurred. Yamase (2003) considered 88 key direct nursing activities when documenting intensity, in this study all activities were perceived as potentially being intense. This allowed for a broader view of the ICU nurses actions. It is suggested in this study that while there was only a small percentage (4.4%) of ‘intense’ activities that were observed, it is an accurate representation of what was occurring for this group of ICU nurses. In this study the ‘intensity’ for the ICU nurse activities was patient focussed. Where this category may become more useful is when it incorporates the other Billett (2001b) categories. As

described previously the categories of ‘intensity’ and ‘complexity’ while close in description can provide two descriptions of what the ICU nurse may be experiencing as they do different activities.

5.5.4 The Complexity of Activities for the ICU Nurses

The category of ‘complexity’ refers to surrounding factors that can affect the ICU nurse and their decision making (Billett, 2001b). An ICU nurse may be dealing with a critically ill ICU patient who requires a number of nursing cares and the patient’s family is present at the bedside. In this situation there may be need to prioritise the patient cares while also communicating to the family. Bucknall (2003) suggested that complex factors can be unpredictable aspects of the ICU nurse’s work. The ICU nurses need to be flexible in their work environment to deal with what unexpectedly presented (Bucknall, 2003). The complexity of patients has been described as having a significant effect on clinical decision making (Bucknall, 2003). This is an important point for consideration. The complexity surrounding an activity can be seen as one indicator of workload when considering potential stressors that the ICU nurses may face when dealing with the unexpected in their work day.

Hays, All, Mannahan, Cuaderes and Wallace (2006) discussed stressors that ICU nurses experience as they worked in the clinical environment and suggested different levels of stressors for them. The authors identified a number of stressors including, “responsibility/decision making” which was rated as a moderate stressor by the ICU nurses (Hays et al., 2006, p.191). Considering that complex situations can impact on decision making for the ICU nurses (Bucknall, 2003) and that the decisions can be stressful (Hays et al., 2006). The complexity factor for the ICU nurses is an important consideration of what they may experience. In this study the ICU nurses were involved in activities that were ‘complex’ for 25% of the observed time. When considering this in the context of the predominantly stable elective post operative patient group; during a week day early shift with experienced ICU nurses caring for the patients. The category of ‘complexity’ identifies a potentially significant factor that may impact on ICU nurses decision making. In a different ICU work scenario with a dilute skill mix and patients of high acuity there may have been a higher level of complexity and greater stressors experienced. This could have a direct impact on the ICU patient and the ICU nurse experiencing this heightened situation in their workload.

5.5.5 The Observed Multiple Activities for the ICU Nurses

The category of ‘multiplicity’ reflected the number of single activities that were interrelated (Billett, 2001b), and in part reflects the workload of the ICU nurses. The ICU nurse caring for a newly arrived post operative cardiac patient will be presented with a number of activities that can be interrelated. There will be a number of different patient observations that need to be documented. In this study the category of ‘multiplicity’ recognised one perspective of workload factors that impacted on the ICU nurse. The majority of the patients were elective stable cardiac patients, yet there was evidence that this group of ICU nurses experienced ‘multiple’, ‘intense’ and ‘complex’ factors within some of the work activities. The findings in this study suggest that there is variability in the ICU nurses’ day when caring for ICU patients. This presents a perspective of ICU nurse’s workload with an ICU patient that is in contrast to Adomat and Hicks (2003) findings.

Adomat and Hicks (2003) argued that the ratio of the one ICU nurse to one ICU patient should be reviewed based on their findings. In their video observational study of two ICUs Adomat and Hicks (2003, p.402) stated that “...despite complex care needs, a high percentage of nursing activities observed in each unit consisted of low skill activity”. The findings of ‘low skill activity’ by Adomat and Hicks (2003) imply simple activities that can suggest less workload for the ICU nurse. Whereas in this study it is argued that by analysing the individual work activities of the ICU nurse it can be demonstrated that for each activity there is potentially a number of facets affecting the nurses’ workload (Billett, 2001b). A cluster of ‘low skill’ activities may also demonstrate an ICU nurse who has prepared and planned their care of an ICU patient. In this study it is argued that the work activity itself is only one factor when predicting workload for ICU nurses. Care should be exercised when describing a group of single ICU nurse activities as a definitive explanation of workload.

5.5.6 Accessible Actions of the ICU Nurses

The ‘accessible’ category in this study referred to the observed activities of the ICU nurses which were considered to reflect whether knowledge was accessible or hidden (Billett, 2001b). This was assessed based on how the ICU nurses performed activities. The observer watched how the activities were performed by the ICU nurses This is in

keeping with Billett's (2001b) theory related to accessibility. Billett (2001) suggests that knowledge may be hidden in the concept of the action or the person may understand or have access to the knowledge. The schema of work activities (Billett, 2001b) is in part identifying tacit knowledge in action for the ICU nurses. The concept of tacit knowledge has been discussed in the literature as the unseen knowledge that guides the actions of the clinician (Carlsson, Dahlberg & Drew, 2000; Carlsson, Drew, Dahlberg & Lützen, 2002; Herbig, Büssing & Ewert, 2001; Leonard & Inch, 2005). Tacit knowledge is an experiential knowledge but does not necessarily indicate expertise (Carlsson et al., 2002). It does not define expertise of the observed ICU nurse but can indicate when the activity presents challenges for the ICU nurse. Understanding and categorising tacit knowledge provides an insight into the work of the ICU nurse.

The 'accessible' category provides an insight into the tacit knowledge that can guide the ICU nurse during their working day. The working day for an ICU nurse may involve a number of activities that could be expected and unexpected. The ICU nurse will make decisions based on what is occurring at the time. The literature on tacit knowledge generally implies that the nurses' actions are focussed on the level of direct patient care (Carlsson et al., 2000; Carlsson et al., 2002; Carroll, 1988; Herbig et al., 2001). The schema of work activities (Billett, 2001b) were applied to the observed activities that were classified as direct, indirect, unit-related and personal categories (Pelletier & Duffield, 2003). This study's approach lends credence to the potential that other activities can impact on the ICU nurse.

The schema of work activity (Billett, 2001b) categories of 'routine' and 'accessible' were considered to reflect tacit knowledge of the ICU nurses. The other categories 'discretion', 'multiplicity', 'intensity' and 'complexity' reflected the actions based on the tacit knowledge. However, Billett's (2001b) description indicates that all of the categories are interconnected. In Figure 5.1 a graphical display of the findings in relation to the Billett's (2001b) schema of work activities for the 10 ICU nurses is presented as they worked a day shift. This figure is the third and final representation of the schema of work activities (Billett, 2001b) (see Chapter 3, Figure 3.7 & Chapter 4, Figure 4.1). Figure 5.1 provides a summary of the results of the different Billett (2001b) categories. The figure combines the schema categories with the research findings. This provides an understanding of what this group of ICU nurses were doing as they cared

for their patients. The ‘not applicable’ activities were not included in the percentages displayed in Figure 5.1.

Figure 5.1. Billett’s (2001b) Schema of Work Activities for the 10 ICU Nurses

The ICU nurses’ activities have been presented in this section incorporating the schema of work activities (Billett, 2001b). The discussion explored the concepts of tacit knowledge, decision making and workload in relation to the activities that the ICU nurse experienced during their working shift. The schema of work activities (Billett, 2001b) provides a new insight into the work of the ICU nurse. Nursing activities may have a number of facets that can impact on an ICU nurse and their decision making. The everyday practices of ICU nurses involve multiple facets. The ICU nurses in this study demonstrated an autonomous approach to their patients and were able to make numerous clinical decisions. This reflects the ability of this group of ICU nurses to work in an environment where decisions can be impacted by complex and multiple factors.

5.5.7 Research Methods Utilised in the Study

The time and motion method was used to observe the ICU nurses in the clinical setting. This method was developed originally to observe workers and their actions (Lowry et al., 1927). The documentation of the workers actions and the time it took to complete activities allowed the observers to identify inefficient work practices and suggest better methods of practice (Lowry et al., 1927). In healthcare time and motion has been utilised widely to observe clinicians in their natural setting (Adomat & Hicks, 2003; Burke et al., 2000; Finkler et al., 1993; Gillanders & Heiman, 1971; Graff, Wolf, Dinwoodie, Buono & Mucci, 1993; Knickman et al., 1992; Langlois et al., 1999; Linden & English, 1994; Lurie et al., 1989; Tang, Mazabob, Weavind, Thomas & Johnson, 2006; Wirth, Kahn & Perkoff, 1977).

The time and motion observation method that was used in this study provided an opportunity to observe the nursing work of ten ICU nurses in their natural setting. The non participant nature of this study method allowed the ICU nurses to get on with their work without interruption. The ICU nurses' work activities were captured as distinct actions which provided a reasonable description of their work. The time and motion data also provided the opportunity to consider the simultaneous activities that occurred. This would not have been possible with the work sampling method.

The categorisation of activities into major and minor groups described in Pelletier and Duffield's (2003) tool provided a consistent method to quantify the ICU nurses' actions. However, there are categories that could be explored in this tool. There were categories that did not adequately describe the ICU nurses' work activity. The category of 'medication and IV administration' provides a broad view of medication administration. Yet there are differences between administering an oral medication such as an oral laxative or antacid compared to connecting an ICU patient to an IV inotropes. The category of 'procedures' is another category that requires refining. Different procedures for ICU nurses will have different impact on them. For example, 'procedures' such as caring for an ICU patient who has an indwelling catheter and arterial line insitu will not have as much impact on an ICU nurses as opposed to caring for an acutely ill ICU patient who is having continuous dialysis. A consistent approach to classifying ICU nurses' activities will provide the opportunity for research to be compared. The work activity tool (Pelletier & Duffield, 2003) was a useful method of describing work

activities in this study. Using the tool in conjunction with the time and motion method of observations and Billett's (2001b) schema of work activity theory in this descriptive study provided a complementary observation process.

Billett (2001b) developed the schema of work activities theory to identify "...the requirements of particular work situations..." (p.23). The schema was described generically so that it could be applied to any workplace. The description of the activities 'routineness', 'discretion', 'intensity', 'multiplicity', 'complexity' and 'accessibility' (p.23) provided a guide that could be applied to an observation tool of ICU nurse activity. The use of the schema of work activities theory (Billett, 2001b) was a new approach. Billett (2001b) describes the schema as a method of understanding workplace activity. The schema was utilised with this in mind. Observing the ICU nurses' activity using the schema of work activity theory (Billett, 2001b) provided a new way to perceive work activities in the clinical environment. The schema of work activity theory was a novel approach to ICU nurses' work. The advantage in using this schema was that it provided the opportunity to describe different aspects of ICU nurses' work. It complemented the time and motion method and work activity data by describing six facets of each action by the ICU nurse.

In this study the time and motion method provided a method to capture ICU nurses' activity in the natural environment. The work categories assisted in grouping all of the observed activities in a consistent manner. The schema of work activities theory (Billett, 2001b) provided a novel theory to apply to the ICU nurses activities that considered six facets of an activity. The combination was used in the natural clinical setting effectively. In the next section the limitations of the study will be discussed including the research method and the schema of work activity theory.

5.6 Limitations

This study described and analysed the ICU bedside nurse activities on a day shift. Limitations that should be considered include the fact that this was a relatively small homogenous group of ICU nurses in one private hospital site for one particular shift time. However, this homogeneity in terms of participants and timing of data collection, provides an in-depth understanding of these nurses' work. The size of the sample for a time and motion study is generally small due to the intense and detailed nature of the

observations which provides a rich data set (Finkler et al., 1993). In this study it was decided to observe 10 participants on an early shift which was a manageable sample size and yielded 3,081 activities for analysis. The study did not capture the activities that occurred in the other shifts, thus the findings cannot be generalised to these other shifts. Participants were selected using convenience sampling which may have introduced a risk of bias in the sample (Polit & Beck, 2004), although the sample represented a variety of age groups and experience levels.

The time and motion method used in this study involved non participant direct observation. The potential challenges with the time and motion method include the observer effect on participants where they may alter their behaviour while being observed (Finkler et al., 1993; Pelletier & Duffield, 2003; Roethlisberger & Dickson, 1939), potential observer bias (Polit & Beck, 2004, p.394) and observer fatigue (Casey, 2006). Observer bias has been discussed as a potential issue in observational studies and should be considered as a potential bias for this study. A number of observer biases have been described in the literature (see Chapter 3, 3.6.2), including, “enhancement of contrast effect, central tendency bias, the halo effect, assimilatory biases, errors of leniency, and errors of severity” (Polit & Beck, 2004, p.391). The different observer biases refer to how the observer can possibly manipulate the observed data to favour their data collection, or personal assumptions by the observer during data collection can taint the accuracy of the observations. In this study the observer was unknown to the staff removing any suggestion of bias related to staff familiarity. The observation paper tool (see Appendix I) provided for a consistent documentation of what was witnessed. This does not completely remove the potential for errors of leniency (Polit & Beck, 2004), however the sheet was designed so the observer could document without comments, which eliminated any subjective comments being documented with the observations. The student research undertook several trial sessions of data collection, both on his own and with others and the data collection instrument was refined several times in an attempt to address the potential for observer bias. The observer did not work at the research site, therefore he had no hidden agenda to present favourable findings. While there is the potential for a number of potential observer biases in this study, the design of the tool, observing staff unknown to the observer and not working in the establishment assisted in reducing the potential for observer bias. The biases highlight the potential issues for the observer and the challenge to maintain an objective

observation position. It is suggested that pretesting and training of the observer aides in reducing the risks of these biases (Polit & Beck, 2004) which was done in this study.

To address this potential issue of observer fatigue, the observer ensured that he had a break when the ICU nurses had their meal breaks. Therefore the observer had two breaks per day during the observation period. This allowed him to rest and refresh which assisted in addressing potential fatigue. Further, the observer was used to working 8-12 hour shifts in the ICU, which may have assisted him in his efforts to concentrate for the time duration.

The challenges of observational research related to the Hawthorne effect are well documented and should be considered a limitation of this study (Bucknall, 2003; Bucknall, 2000; Darmody, 2005; Finkler et al., 1993; Pelletier & Duffield, 2003; Roethlisberger & Dickson, 1939). Currey and Botti (2006) suggested that the complete observer is less intrusive in the clinical environment, this reduces the impact on the participant and the Hawthorne effect. To reduce the potential Hawthorne effect in this study the observer positioned himself back from the participant and ICU patient but within hearing distance of the participant. This allowed the observer to remain as unobtrusive as possible.

Authors have also indicated that knowing the environment where the study will take place can help to reduce the Hawthorne effect (Bucknall, 2000; Casey, 2006). In this study the observer was an experienced ICU nurse who had worked in a number of ICUs across two states of Australia. He understood the general machinations of the ICU environment, this allowed him to understand how an ICU patient may present and how an ICU nurses would position themselves to provide care. The observer used this knowledge when positioning himself in the ICU environment.

A final limitation to consider is the application of Billett's (2001b) schema of work activities theory. The descriptions guided the development of the observation tool for this study. The challenge it to factually present the theory in the context that Billett (2001b) described and meant for it to be applied. The documentation of Billett's (2001b) categories is subjective in nature. To address the subjectivity the researcher utilised the group discussions and set questions. This allowed the researcher to compare his perspective of the Billett (2001b) categories with groups of ICU nurses. As well, the

researcher relied on his previous experience as an educator in ICU to observe the ICU nurses' activities and careful attention during the analytic phase to address this potential limitation.

5.7 Implications and Recommendations

In this study the findings indicate that there are a number of perspectives to consider when mapping out the ICU nurse's day. The direct nursing activities of the ICU nurses are important to recognise, however there can be a number of facets to the ICU nurse's day. The indirect care and simultaneous activities described in this study could impact on the ICU nurse workload, but generally are not recognised in workload tools described in the literature. The types of activities that the ICU nurses perform are an important consideration. The minor activities described in this study indicate a potential inefficient use of ICU nurses' time in relation to cleaning (Chapter 4, Table 4.5). When there are reducing numbers of ICU nurses in the environment it is important identify what are appropriate ICU nurses' work activities and what can be performed by ancillary staff.

Another consideration of ICU nurses' work is the six potential facets of each activity performed. What is routine for one ICU nurse could be new or not routine for another ICU nurse. Workload tools generally are described in a manner that implies that all ICU nurses are equal in skill, capability and knowledge (Ball & McElligott, 2003). The ACCCN staffing guidelines (ACCCN, 2002) consider the need for support of bedside ICU nurses and the post graduate specialist qualifications of staff. However, a post graduate qualification for an ICU nurse indicates that she/he has met the requirements of a university course. It does not necessarily indicate the ability of the ICU nurse in the work environment. This leads to the question. How will the different work activities of the ICU nurse affect their workload?

It is suggested that the ICU nurses' workload is comprised of a number of facets that are generally not considered part of their workload. The ICU nurses' work in this study was described mainly as routine. Yet a patient requiring admission to an ICU can be unpredictable. The use of Billett's (2001b) schema of work activities theory provides a method of identifying/assessing factors that may impact on ICU nurses in the clinical setting the can translate to clinical workload. Understanding work activity factors of the

ICU nurse in the Australian context is crucial for development of relevant and practical measures of workload tools.

An increased workload for ICU nurses has been described as a significant stressor in the ICU (Carayon & Alvarado, 2007). Carayon and Alvarado (2007) suggest that a high workload can lead to issues for the ICU nurses including altered health, burnout and job dissatisfaction (Carayon & Alvarado, 2007). A workload tool that does not recognise potential factors such as indirect care or simultaneous activities may lead to an increase in staff dissatisfaction and workload issues for ICU nurses. The effect of an increased workload has the potential to affect the quality of care and patient safety (Carayon & Alvarado, 2007). When staff are experiencing a high workload and are under pressure and/or fatigued, the risk of errors could increase. In the ICU environment errors can have significant impact on critically ill patients which places an importance on developing a workload tool that has a broad view of what is classified as ICU nurse work.

5.7.1 ICU Nurse Work Activities and Recommendations

The work of ICU nurses in this study was categorised into four main categories, ‘direct’, ‘indirect’, ‘unit related’ and ‘personal’ (Pelletier & Duffield, 2003). It was highlighted that the ‘direct’ and ‘indirect’ categories comprised 92% of the nurses’ activities and 72.9% of their time (see Chapter 4, Table 4.6). Workload tool development has been described in the literature from the perspective of capturing direct ICU nursing care activities (see Yamase, 2003 and Miranda et al., 2003). The concepts of ‘unit-related’ or ‘personal’ activities for ICU nurses are not readily considered as part of the ICU nurse’s day. It is recommended that workload tool development should incorporate all of these factors when attempting to identify factors that may impact on an ICU nurse’s workload. The ‘indirect’ component of nursing could capture the preparation work for patient transfers to the operating theatre or to have a scan off the unit. The ‘unit-related’ activities could for example identify how much time is spent filling in a workload tool document to identify the ICU nurse’s workload. Or, how much time could be allocated to education and unit meetings. The ‘personal’ time that is backed by legislation is not described in workload tools, however these activities take time and it means that the bedside ICU nurse is off the floor. This is an important consideration for a calculation on ICU nurses time. Do workload tools consider the workload for the ICU nurses whole

shift or is it based on the ICU nurses shift less their personal time? A workload tool that incorporates the intrinsic nature of these work activity categories may capture more effectively the factors that will impact on an ICU nurse's workload.

The next recommendation is related to the efficient use of ICU nurses in their workplace. The minor category of 'room/equipment setup/cleaning' (Chapter 4, Table 4.5), which is part of the broader indirect category was in the top four of all observed work activities for the ICU nurses (Chapter 4, Table 4.5). The category was observed occurring 248 instances and equated to 9.2% of the total time for the ICU nurses. This is a concerning figure considering that the data was collected Monday to Friday on a day shift. Staff satisfaction may be affected if the ICU nurses feel that a significant portion of their time involves cleaning duties. The hospital management should ensure that there are ancillary staff available to perform this work.

Findings from this study imply that ICU nurses' work activities are not single direct care actions that occur in a linear manner, one after the other. Infact, work activities can occur simultaneously. The findings in this study suggest that some workload tools for ICU nurses need to be revisited in relation to the potential for simultaneous activities and the correct allocation of work for ICU nurses. It is recognised that some facets of nursing work are difficult to define in workload tools, such as, simultaneous activities or the "vigilance" ICU nurses are observing for any changes in the clinical presentation of the patient (Ball & McElligott, 2003, p.234). Perhaps it is the recognition that there is the possibility for factors to affect ICU nurses as they skilfully care for their patients.

Future research could explore what ICU nurses thoughts are about the work they have performed. Research studies into these areas may provide a greater understanding of the nursing work that occurs in an ICU. Future research could provide information for developing workload tools and education that considers the different aspects that affect the ICU nurses as they work. The work activities by Pelletier and Duffield (2003) require refinement so that recommendations related to the type of ancillary staff who can be utilised is possible. Refining the categories to explicate the different possible classes of drugs being administered may make it possible to consider appropriate allocation of work.

5.7.2 Recommendation for Workload Models

Across the world there are different methods that have been developed to anticipate the required nursing workload for the patients in an ICU (Miranda et al., 1997; Miranda et al., 2003; Padilha et al., 2007; Pyykkö et al., 2004; Pykkö et al., 2001; Volpatti et al., 2000; Walther et al., 2004). These methods in general will consider what is involved for the ICU nurse to care for an ICU patient by identifying key activities and weighting the activities to indicate potential workload. Most of these tools consider only the activities nurses directly provide to the patients and families. It is recommended that workload tools that are in use today need to be revised to include a flexible aspect that allows for variables within the ICU nurses' work day.

By exploring and understanding the impact of other ICU nurses' activities beside direct nursing care a crucial part of their workload can be recognised. The flow on effect may be that patient safety and staff satisfaction issues are identified and addressed. It appears that in the literature these factors are regarded as less important or not identified when considering the ICU nurse workload and efficiency. Whereas in this study it is suggested that work activities that are classified as 'indirect', 'unit-related' and 'personal' activity are important facets of the work day and should be considered in the assessment of workload.

Future research could explore the nursing activities of ICU nurses for all shifts and across different hospitals. A comparison between private and public ICU nurses' work activities would also provide an insight into workload issues that may be relevant to the different health management system. Research could also explore the development of a workload tool that includes the work activities that are not 'direct' nursing care and that is relevant to the Australian ICU environment.

5.7.3 The ICU Nurse and the Schema of Work Activities Theory

The schema of work activities by (Billett, 2001b) provides a unique opportunity to analyse the ICU nurses' activities in their day shift. The breakdown of each activity into the multiple aspects highlights perspectives that are not considered in workload tools in the literature. In essence an activity is not just an activity. The ICU nurse's work may be 'routine', not requiring autonomy, 'not intense', 'not complex' or 'multiple'. Or, it may

be the opposite. The study findings related to Billett's (2001b) schema of work activities in conjunction with the time and motion observations provided an important view of the tacit knowledge that was utilised by the ICU nurses.

Billett's (2001b) schema of work activities provide a method analyse in depth, nurses work. The schema may help identify the challenges nurses of different skill levels can have in the ICU environment. From an educational perspective there is the potential for developing education that is directed to the clinical needs based on the schema of work activities (Billett, 2001b). By observing ICU nurses as they care for their patients clinically and utilising the schema of work activities (Billett, 2001b) to categorise the work activities a fresh perspective of ICU nursing care, coordination and decision making can be captured. Another factor where the schema of work activities may be useful is in staff allocation.

Research that explores decision making in the Australian ICU context describes the ICU nurse as they perform direct patient care (Aitken, 2003; Bucknall, 2003; Currey & Worrall-Carter, 2001). Billett's (2001b) schema provides a way to examine this work in an in-depth way and may be complimentary to the decision making research. The schema recognises that work activities can be analysed in a multidimensional way, some dimensions which may reflect decision making. It is suggested that future research could further examine the application of Billett's (2001b) schema of work activities in the ICU environment. Studies could extend the application of the schema to other shifts and other hospitals; public, private, specialised and general ward areas.

5.7.4 The Skill Mix Challenge in ICU

The general principle of one ICU patient to one ICU nurse ratio for ICU patients across Australian ICUs presents a financial and technical challenge. This method of allocation provides the physical presence of an ICU nurse at the bedside. The allocation of ICU nurses by senior staff is a serious process. Senior staff will strive to provide the most appropriate skill mix and distribution of staff to patients. However there may be other factors to consider for safe patient care. The recognition of the potential for simultaneous activities and the need for personal time for ICU nurses may alter the weighting that allocating staff place on patients. The senior staff who are allocating staff may need to deal with another factor, changing skill mix.

Skill mix generally in Australian ICUs consists of a mix of RNs who are involved in direct bedside care. However, there are trials being developed to explore Enrolled Nurse (EN), ICU nurse combination in ICUs in New South Wales (NSW Health Nursing and Midwifery Office, 2007). This could be a challenge when ICU nurses who are in charge have to allocate a mix of staff appropriately for an ICU. The findings in this study have indicated that work activities in the ICU are varied, there are simultaneous activities occurring and the activities can have various facets. The EN will be working with an ICU nurse in a direct delegation role. The allocation could be one ICU nurse and one EN for a critically ill patient or as a team where there are two ENs allocated to two stable ICU patients and one ICU nurse in a supervisory role (NSW Health Nursing and Midwifery Office, 2007). The challenges this presents to allocation could in part be related to what is required for two stable ICU patients and whether the patients remain stable for the whole shift. If there are ICU nursing staff capable and available for the next shift to be the coordinator the care of the ICU patients and how to deal with allocation if sick leave alters the skill mix in the unit. If the intensive care patient suddenly requires cares that are beyond the scope of practice of the ENs a situation presents where allocations may need to be altered rapidly; could this lead to patient harm. The findings in this study identified that there were a large proportion of 'routine' activities (94.2%) for the ICU nurse. Yet, it was also noted that there were a large amount of autonomous (95.8%) actions that were observed. The EN working in the ICU environment performing direct patient care activities will be delegated work by an ICU nurse. Education that prepares the EN to succeed in the ICU environment will need to encapsulate the wider picture of ICU patient care that would not have been covered in their initial training. The ENs could possibly be faced with a number of clinical scenarios that require quick thinking and autonomous decisions.

The concept of skill mix has been widely discussed in the literature (Buchan et al., 2001; Buchan & Dal Poz, 2002; Currie et al., 2005; Duffield et al., 2005; Richardson, 1999; Shuldham, 2004). A different view point on managing the different staff skill level in the ICU is "skill matching" (Rischbieth, 2006, p.397). Rischbieth (2006) recommends the concept of 'skill matching' of staff, the allocation of clinically assessed ICU nursing staff to the appropriate patient. The principle of 'skill matching' Rischbieth (2006) believes would address the issue where qualifications and skill level are not equal. The ACCCN (2002) guidelines in contrast imply that a significant percent of

critical care qualified ICU nurses in the workplace will equate to a high skill level. This is a shortfall of the ACCCN (2002) guidelines. Having a high percentage of critical care qualified staff in an ICU is a positive situation but it does not guarantee skill level. Perhaps, as Rischbieth (2006) suggests 'skill matching' provides an opportunity to be proactive in staff allocation/skill mix in the clinical environment. It can be based on.

5.8 Conclusion

This research study aimed to describe and analyse the activities of the ICU nurse as they worked a day shift in the intensive care unit. The site of the research was a large private hospital ICU in South East Queensland. The research question; 'What are the activities critical care nurses undertake in the ICU?' has been explored by using the time and motion continuous observation process. Categorising the work activities of the ICU nurses (Pelletier & Duffield, 2003), and utilising the schema of work activities described by Billett (2001b). It is argued that these methods of observation and analysis provide relevant information regarding the ICU nurse at work.

The work day for an ICU nurse in this study was primarily a combination of direct and indirect care that involved simultaneous activities. While describing direct nursing care is important to understand, the action of 'indirect', 'unit-related' and 'personal' (Pelletier & Duffield, 2003) are potentially unrecognised factors of ICU nurses' workload and work day. Billett's (2001b) schema of work activities; 'routineness', 'discretion', 'intensity', 'complexity', 'multiplicity' and 'accessible' highlighted a new perspective of the work activity that has not been previously identified in the nursing literature. The findings in this study suggest that nursing activities can have multiple facets and these facets can provide an understanding into the decision making and workload for an ICU nurse. The ICU nurses demonstrated an autonomous approach as they cared for their ICU patient. By combining time and motion method with the schema of work activities (Billett, 2001b) a new method of observing the tacit knowledge and decision making processes of the ICU nurse participants in the clinical environment was captured. In this study the ICU nurse was observed in the clinical environment as they made numerous decisions about their patients. It was found that the ICU nurses make decisions regularly and autonomously.

The clinical observation of the ICU nurse is vital to provide relevant and factual descriptions of their work practice. It is important to continually explore and define the ICU nurse at work. A nursing action is not simply a single unit that occurs in a linear manner, there are multiple factors at play. The financial pressures that drive health systems across the world directly impact on staffing practices at the local hospital sites. The goal for health organisations is to provide safe quality care with a shrinking workforce in a transparent manner.

The care of an ICU patient in the current Australian financial climate is a balance of safe quality patient care and appropriate fiscal management. To achieve safe quality care in the Australian ICU environment, recognition of the work activities/workload that ICU nurses' perform is crucial. In this study the ICU nurses' demonstrated the ability to multi task and work autonomously as they cared for their patients. While the majority of their actions were considered routine the activities could still be intense and complex. This suggests that the ICU nurses' work is more than caring for one ICU patient and performing one activity at a time. It is a combination of actions. The ICU nurse to ICU patient ratio is one part of the workload calculation. The ability and skill of the ICU nurse is an important factor that is not considered in workload tools today. To develop a practical and useful ICU workload tool in the Australian environment there must be an understanding of variety of factors that constitute the ICU nurses work day.

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Appendix A

Ethical approval from Griffith University ethics committee.

GRIFFITH UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE

09-Dec-2004

Dear Prof Chaboyer

I write further to your application for ethical clearance for your project "Developing an Evidence-based Workforce Model for Nursing Services in Acute Care Hospitals" (GU Ref No: NRS/35/04/HREC). This project has been considered by Human full review.

The Committee resolved to grant this project provisional ethical clearance, subject to your response to the following matters:

Please note two core members of the Committee were absent for the consideration of this application. Though the following outcome is being communicated to you, this approval may be subject to additional matters raised by the absent members. I will contact you if any additional matters are raised.

Provision of letters of support from the hospitals involved in the research. However, you may be authorised to commence this research once the other matters outlined here have been addressed.

Clarification of how the disclosure or observation of unsafe or illegal practices be managed.

The procedure for intervention (as per your response to question 12h) being discussed in the information sheet.

Given the above intervention strategy, clarification of how the research team will handle the potential patient anxiety during an intervention of unsafe practice.

Clarification of the feedback mechanism for consumers and patients, and this being explained in the informed consent package.

This decision was made on 07-Dec-04. Your response to these matters will be considered by Office for Research.

The ethical clearance for this protocol runs from 07-Dec-04 to 01-Dec-07.

Please forward your response to Gary Allen, Manager, Research Ethics, Office for Research as per the details below.

Please refer to the attached sheet for the standard conditions of ethical clearance at Griffith University, as well as responses to questions commonly posed by researchers.

It would be appreciated if you could give your urgent attention to the issues raised by the Committee so that we can finalise the ethical clearance for your protocol promptly.

Regards

Gary Allen
Manager, Research Ethics
Office for Research

Bray Centre, Nathan Campus
Griffith University
ph: 3875 5585
fax: 3875 7994
email: g.allen@griffith.edu.au
web:

Cc:

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GRIFFITH UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE

13-Jan-2006

Dear Prof Chaboyer

I write further to your application for a variation to your approved protocol "Developing an Evidence-based Workforce Model for Nursing Services in Acute Care Hospitals" (GU Ref No: NRS/35/C4/HREC). This request has been considered by the Chair.

The Chair resolved to approve the requested variation:

Request for additions to the research team of Professor Mary Courtney, Ms Di Sapwell, Michael Abbey (Student), and Julie Moyihan (research assistant)

This decision is subject to ratification at the next meeting of the HREC. However, you are authorised to immediately commence the revised project on this basis. I will only contact you again about this matter if the HREC raises any additional questions or comments about this variation.

Regards

Gary Allen
Manager, Research Ethics
Office for Research
Bray Centre, Nathan Campus
Griffith University
ph: 3875 5585
fax: 3875 7994
email: g.allen@griffith.edu.au
web:

Cc:

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55528526

GRIFFITH UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE

25-Feb-2005

Dear Prof Chaboyer

I write further to the additional information provided in relation to the conditional approval granted to your application for ethical clearance for your project "Developing an Evidence-based Workforce Model for Nursing Services in Acute Care Hospitals" (GU Ref No: NRS/35/04/HREC).

This is to confirm receipt of the remaining required information, assurances or amendments to this protocol.

Consequently, I reconfirm my earlier advice that you are authorised to immediately commence this research on this basis.

The standard conditions of approval attached to our previous correspondence about this protocol continue to apply.

Regards

Gary Allen
Manager, Research Ethics
Office for Research
Bray Centre, Nathan Campus
Griffith University
ph: 3875 5585
fax: 3875 7994
email: g.allen@griffith.edu.au
web:

Cc:

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Appendix B

Ethical approval John Flynn private hospital

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NURSING

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John Flynn – Gold Coast Private Hospital

19th August 2005

Professor Wendy Chaboyer
Research Centre for Clinical Practice Innovation
Griffith University
PMB 50
GCMC Bundall QLD 9726

Dear Professor Chaboyer

Application Number 05/02 – Developing an Evidence-based Nursing Workforce Model in Acute Care Hospitals

This letter is to officially inform you that your research project has been recommended by the John Flynn Hospital Ethics Committee and formally approved by the Hospital Director, Lloyd Hill as follows:

- Application 05/02 – Developing an Evidence-based Nursing Workforce Model in Acute Care Hospitals Patient Information and Consent Form
- Information Sheet – Observation Study Version 3/29 July05
- Information Sheet – Critical Incident Technique Interviews Version 3/29 July05
- Information Sheet – Health Professionals Focus Groups Version 3/29 July05
- Information Sheet – Consumer Focus Groups Version 3/29 July05

The John Flynn Human Projects Research Ethics Committee is recognised by the NH&MRC as an appropriately constituted ethics committee, and conducts and approves all applications in line with NH&MRC Guidelines.

Please find attached two copies of this approval. Could you please sign the "copy" and return.

Yours sincerely

Di Sapwell
Secretary John Flynn Human Projects Research Ethics Committee and
Director of Nursing

42 Inland Drive, Tugun, Tugun, QLD 4224 PO Box 1, Tugun QLD 4224 Telephone 07 5598 9000 Facsimile 07 5598 0173

Appendix C

Information sheet for Observation Study

Date: 1/8/2005

Project Title: Developing Evidence-Based Nursing Workforce Model in Acute Care Hospitals

Project Number:

The aim of this research is to develop a strategy to improve how nurses are allocated to patients. We hope to develop guidelines from what we learn that will make a positive difference to nurses' allocations in the hospital. To do this it is necessary to first learn what nurses do when caring for patients. This is the first part of a three part research study.

I and another research person who are experienced registered nurses are looking for staff working in medical wards and the intensive care unit who are willing to allow us to follow them and record what takes place during a shift as they care for patients. If you agree to allow us to do this we will ask you to sign an informed consent form. We will also approach the families of the patient(s) you are caring for to ask for their permission to follow you. One of us will follow you for 4 hours on an early or late shift. We will record what tasks are performed by you and the time that it takes to do a task using a laptop computer.

Maintaining confidentiality is important so, when entering data into the computer I will use code words so that you and others cannot be identified. No findings which could identify you will be published. The only people who will have access to the coded data will include me, my supervisor and other members of the research team. The data collected will be stored securely for five years as prescribed by university regulations.

If during the observed time it is noted that you are undertaking activities that are outside your scope of practice; in accordance with legal regulations and hospital protocols we will have to ask that you cease the activity. We will direct you to notify the supervising registered nurse to seek assistance with the activity. This will be done with tact so as not to alarm the relatives or patient(s) in your care.

If you agree to participate you may withdraw your consent at any time by informing me. Patient's relatives may also withdraw their assent of us observing you care for their relative. They can simply inform you or me. No reason is necessary for withdrawal from the study and there will be no negative effects to you.

If you have any queries or would like to be informed of the aggregate research finding, please contact:

Professor Wendy Chaboyer PhD, RN. Signature: _____

Telephone: (07) 5552 8518

Fax: (07) 5552 8526

Address: Research Centre for Clinical Practice Innovation
Griffith University
PMB 50 Gold Coast Mail Centre
Bundall, Qld, 9726

Should you have any complaint concerning the manner in which this research is conducted, please do not hesitate to contact John Flynn-Gold Coast Private Hospital and Medical Centre Research Ethics Committee, quoting the Project Number (***):

The Secretary (Hospital Director)
John Flynn-Gold Coast Private Hospital and Medical Centre Research Ethics Committee
John Flynn-Gold Coast Private Hospital and Medical Centre
Inland Drive
TUGUN 4224
Telephone (07) 5598 9008 Fax (07) 5598 0173
E-Mail execsec@manyegroup.com.au

Appendix D

Developing Evidence-Based Nursing Workforce Model in Acute Care Hospitals

Consent Form

Observation Study

Investigators:	Professor Wendy Chaboyer (Griffith University) Ms Di Sapwell (Affinity Health – John Flynn Hospital) Professor Mary Courtney (Queensland University of Technology) Associate Professor Marianne Wallis (Griffith University & Gold Coast Hospital) Dr Philippa Seaton (Griffith University) Dr Kim Forrester (Griffith University) Mr Michael Abbey (Master of Philosophy Student)
Contact Person:	Professor Wendy Chaboyer
Address:	Research Centre for Clinical Practice Innovation, Gold Coast Campus, Griffith University, PMB 50, Gold Coast Mail Centre, Queensland 9726
Phone Number:	(07) 5552 8518
	Email: w.chaboyer@griffith.edu.au

I agree to take part in the above John Flynn-Gold Coast Private hospital and Medical Centre research project. I have read the above Explanatory Statement. I understand that agreeing to take part means that I am willing to:

- Be involved in this research which will include participating in a time and motion study. This will include having a trained observer accompanying me as I work, noting the nursing activities I am undertaking.
- Participate in this research which will involve the electronic collection of the observation data, that will be placed on a computer using identification codes that do not personally identify me.
- I have had any questions answered to my satisfaction and I understand that if I have any additional questions I can contact the research team.
- I understand the risks involved.
- I understand that although there may be no direct benefit to me from my participation in this research, this study will contribute to the development of evidence-based guidelines that may help improve nursing work and patient care
- I understand that my participation in this research is voluntary and will not impact on my employment in any way, and that I am free to withdraw during the observation period, without comment or penalty.

I understand that I can contact the Hospital Director, John Flynn-Gold Coast Private Hospital and Medical Centre Research Ethics Committee on (07) 5598 9008, execsec@manyegroup.com.au or Manager, Research Ethics, at Griffith University Human Research Ethics Committee on 3875 5585 (or research-ethics@griffith.edu.au) if I have any concerns about the ethical conduct of the project; and

Please tick the appropriate box

- ☐ The information I provide can be used by other researchers as long as my name and contact information is removed before it is given to them
- ☐ The information I provide cannot be used by other researchers without asking me first
- ☐ The information I provide cannot be used except for this project
- ☐ If visually impaired or cannot read Yes or No
- ☐ If yes I have had the form read to me and understand the contents

Name: _____ (print name)

Signature: _____

Date: _____

Witness:

I believe that _____ understands the above project and gives her/his consent voluntarily

Name: _____ (print name)

Signature: _____

Date: _____

Address: _____

Appendix E

Time and motion studies in the health service literature

Year	Author/s	Country	Description of study	Description of sample	Findings
1916	Gilbreth	USA	Discussion of possible standardisations in surgery	Surgeons in hospitals generalised comments	Author identified a lack of standardisation of equipment and surroundings in hospitals. Main finding was not clearly delineated.
1971	Gillanders & Heiman	USA	Comparisons of 3 intern programs	6 interns from 3 different hospital programs	Time spent: Documentation 20.5%, 18.5% communication in general, 14.5% communicating with relatives and friends of patients, procedures 10%
1977	Wirth, Kahn & Perkoff	USA	Measure work of physicians in a group practice comparing time and motion and work sampling data collection methods	12 Physicians observed in two different timeframes	No significant difference between both data collection methods in 82% of physicians observed. Differences were noted in non-patient activities.
1989	Lurie, Rank, Parenti & Snoke	USA	Explore what house officers did when they were on call	35 house officers in 3 different hospitals	87-175 minutes of on call time spent on direct patient evaluation, 66-197 minutes documenting patient evaluations. 17-31 minutes spent on each new patient. Authors concluded that the house officers spent more time charting than being involved in direct patient care.
1992	Knickman, Lipkin, Finkler, Thompson & Kiel	USA	Identify what residents do in their work time	8 interns in 2 different hospitals	1,726 activities coded. Total of 13,383 minutes documented. Average time for each activity 7.75 minutes. Authors identified that half of the resident's activities for patients needed to be done by primary physicians. The authors suggest that work could be allocated to other health professionals.
1993	Finkler, Knickman, Hendrickson, Lipkin & Thompson	USA	Secondary analysis of time and motion data of medical residents in two hospitals. The authors applied work sampling analysis to this data to compare results	Work sampling data from time and motion data of Knickman et al. 1992. Authors used quarter, half and hourly time slots of time and motion data to compare findings	The quarter hour intervals of work sampling data was different compared to the time and motion data in 20% of the sample by 100%. The authors suggest that while the work sampling data was less than required the findings suggest the size of the work sample is crucial to indicate probability in a work environment. The projected work sampling results were different by 20% from the time and motion results in 8 of the 10 time and motion categories.
	Graff, Wolf, Dinwoodie, Buono & Mucci	USA	Investigating ED physicians' workload using 5 categories, nonselected, walk-in, observation, laceration repair and critical care	6 ED physicians caring for 1,347 patients	The authors found that physicians spent 24.2 minutes per non selected patient, 9.8 minutes per walk-in patient, 55.6 minutes per observation patient, 25 minutes per laceration repair patient and 31.9 minutes per critical care

Year	Author/s	Country	Description of study	Description of sample	Findings
			patients		patient.
1994	Linden & English	USA	Exploring cost and quality outcomes in a unit after practice redesign based on work sampling and time and motion data	Work sampling observations of nursing caregivers in 12 minute time blocks over 2 weeks. Time study observations of activities performed by RNs	The observed activities ranged from 3.5 minutes to 33 minutes for the RNs.
1999	Langlois, Vytialingam & Aziz	Australia	Study comparison of regular x-ray procedures and the implementation of new x-ray technology	220 radiology examinations	Provided baseline information comparing the different types of radiology processes.
	Bratt, Foreit, Chen, West, Janowitz & Vargas	USA & Ecuador	Assessing methods to measure clinicians time	5 days of observations of physicians	136 minutes of contact time, 38 minutes of non contact productive time and 50 minutes of Non productive time.
2000	Bell, Penning, Cousineau, White, Hartle, Gilbert et al.	USA	Aim to define manpower and costs for obstetric epidural insertions	55 patients	Findings indicated that the mean time for the management of obstetric analgesia was 90 mins. The mean time for insertion and confirmation of effectiveness was 43 minutes.
	Burke, McKee, Wilson, Donahue, Batenhors et al.	USA	Compare time and motion and self report methods	8 Registered nurses	Percentage of activities: patient care 25.4% 1,269 activities, 33.5% administration 1,460 activities, 29.9% medication administration 292 activities.
2002	Racine & Davidson	USA	Study patient waiting times, visiting room and RN usage	All admissions to pediatric practice 26/4/99-24/8/00	Study identified areas for improvement. Interventions put in place and time and motion study conducted. Decreased mean time for patient waiting times other findings static compared to previous observations.
	Zupancic & Richardson	USA	All neonatal activities observed	154 infants in neonatal care	Nurses spent 76% of time in direct care of infants compared to other health professionals.
2003	Adomat & Hicks	UK	Closed circuit video observations of Intensive care nurses to determine accuracy of workload/patient scoring system	48 continuous shifts were observed and recorded using a video camera. Ten minute snapshots were sampled from continuous recordings	Four categories of patient acuity defined. RNs spent less time with critically ill ventilated patients than with patients of a lower dependency.
	Bosman, Rood, Ouedesman-van Straaten, Van der Spoel, Webster et al.	The Netherlands	Assessing effect of Intensive Care Information System on documentation time for uncomplicated cardiothoracic surgical patients using a mix of work sampling and time-motion method	145 consecutive cardiothoracic patients over six week period were randomized into paper or computer documentation groups and observed, on admission and registration phases (after admission)	The admission phase was longer for the computer documentation group. But there was a 30% reduction in documentation time in the registration phase for the computer documentation group. This equated to 29 minutes/8 hours reduction in documentation time using computer documentation.
	Penner, Cone &	USA	Time and motion study of emergency department	437 radio reports	Identified that one category of radio report could be removed from regular emergency calls

Year	Author/s	Country	Description of study	Description of sample	Findings
	MacMillan		communications		to emergency department.
	Sulmasy & Sood	USA	Explored time spent with patients close to end of life	146 seriously ill patients	RNs spent greater amount of time with patients with do not resuscitate orders than with patients who did not have a do not resuscitate order.
	Wong, Gallegos, Weinger, Clack, Slagle & Anderson	USA	To identify percentage amount of time spent on documentation and other ICU nursing activities. Before and after introduction of ICU information system	10 ICU nurses observed for 4 hours each	Documentation time decreased from 35.1% to 24.2% using ICU computer system. Direct patient care increased from 31.3% to 40.1%.
2005	Colombo, Solberg, Vanderhoeft, Ramsay & Schouten	The Netherlands	Develop tool to help nurse managers when planning staffing	3 general and 7 oncology/haematology practices	147 activities timed. RNs were observed doing 16.3 activities/patient admissions.
	Darmondy	USA	Observe Clinical Nurse Specialists in an acute care setting	5 CNS for a total of 20 hours	44% time nursing personal activities, 30% patient/client activities, 16% other activities & 10% organisation/ system activities
2006	Aragon	USA	Evaluating nursing work in relation to the management of tight glycemic control	Study site level 1 trauma centre. ICU RNs in different ICUs in centre (medical, surgical, neurosurgical, burn/trauma, coronary care units and cardiothoracic) were observed. In total 122 ICU RNs	Mean time taken for hourly blood glucose levels was 4.72 minutes. Extrapolated to indicate that 2 hours in a 24 hour period could be required for a one ICU patient to maintain tight glycemic control
	Banet, Jeffe, Williams & Asaro	USA	Observing effects of introduction of computerised system into the ED	17 four hour sessions of observations took place	Direct patient care time did not change but documentation time improved
	McArdle, Lee, Gibb & Walsh	UK	Observing hand hygiene between healthcare workers and ICU patients	120 hours in 1 hour blocks of all the ICU beds in a 12 bed ICU. The observations captured all healthcare workers in direct and indirect contact with ICU patients. Three timeframes of midnight to 0800, 0800 to 1600 & 1600 to 2400hrs	On average each patient experienced direct contact 159 times/day and indirect contact 191/day by all healthcare workers. Based on study, to provide 100% hand hygiene compliance healthcare workers would need to spend 230 minutes/patient/day.
2007	Tang, Weavind, Mazabob, Thomas, Ying et al.	USA	To observe workflow in a remote monitoring ICU	Six physicians and seven RNs were observed for 47 and 39 hours. Time spent on task and frequency were analysed	Four major categories of tasks were identified for both physicians and RNs. Patient monitoring for physicians 70.3%, RNs 45.9% of work time. Collaboration physicians 3.3%, RNs 3.4%. System maintenance; physicians 23.3%, RNs 3.9% and miscellaneous 23.3%, RNs 17.6%. A fifth major category for RNs was health record maintenance 30.3%.

Appendix F

First data collection form with test data included

	Stopwatch			Cardiac pt post op 1155hrs	
	Start	Stop	Total	Activity	Code
1	00:00	00:35	00:35	Prepare for CXR	IDC
2	00:38	00:50	00:12	Needing keys (for drug cupboard)	IDC
3	00:50	01:00	00:10	Check drain (cardiac)	DC
4	01:20	01:30	00:10	U/O	DC
5	01:30	01:49	00:19	Check drains	DC
6	02:00	02:18	00:18	Communication with I/C	IDC
7	02:30	02:50	00:20	Obs	DC
8	03:00	03:50	00:50	Observing monitor	IDC
9	03:50	04:16	00:26	Fix arterial line	DC
10	04:28	05:56	01:28	Draw up analgesia	IDC
11	06:17	14:29	08:12	x-ray and support tube (ett)	DC
12	08:06	08:12	00:06	Drain Check	DC
13	08:24	08:45	00:21	Neuro obs and temp	DC
14	08:57	09:00	00:03	Check monitor	IDC
15	10:51	10:53	00:02	observer monitor	IDC
16	11:50	12:19	00:29	fix transducer height	IDC
17	14:39	14:59	00:20	Adjust height of bed	IDC
		Total	14:21		
				DC = Direct Nursing Care 8 (activities)	10:04
				IDC = Indirect Nursing Care 9 (activities)	04:17
					14:21

Appendix G

Second data collection form with test data included

Description of Pt:												
	Start	Stop	Total Time	Activity	Code	R	D	I	M	C	A	
1	00:00	00:20	00:20	Obs	DC	Y	Y	N	N	N	Y	
2	00:21	00:33	00:12	Reading pt pathology results	IDC	Y	Y	N	N	N	Y	
3	00:33	01:58	01:25	Check and draw up drugs	IDC	Y	Y	N	N	N	N/A	
4	01:58	02:36	00:38	Administer IV drugs via burette	DC	Y	Y	N	N	N	N/A	
5	02:36	03:18	00:42	Clean desk top, put away sharps	IDC	Y	Y	N	N	N	N/A	
6	03:18	03:46	00:28	Check Monitor Obs	IDC	Y	Y	N	N	N	Y	
7	03:46	03:50	00:04	Enter Obs	DC	Y	Y	N	N	N	N/A	
8	04:01	04:41	00:40	Communicate with Nurse next store	P	Y	N/A	N/A	N/A	N/A	N/A	
9	04:41	05:15	00:34	Communicate with IIC nurse	IDC	Y	N/A	N	N	N	N/A	
10	05:23	05:46	00:23	Communicate with Clinical Facilitator	U/H	Y	N/A	N/A	N/A	N/A	N/A	
11	05:46	06:56	01:10	Personal Communication	P	N/A	N/A	N/A	N/A	N/A	N/A	
12	06:56	07:01	00:05	Monitor Obs	IDC	Y	Y	N	N	N	Y	
13	07:01	07:54	00:53	Find part for ventilator tubing	IDC	N	Y	N	N	N	N	
14	07:54	08:20	00:26	Check drains (obs)	DC	Y	Y	N	N	N	Y	
15	08:20	08:47	00:27	Obs	DC	Y	Y	N	N	N	N/A	
16	08:57	09:08	00:11	Handwash	IDC	Y	N/A	N/A	N/A	N/A	N/A	
17	09:16	09:22	00:06	Monitor Obs	IDC	Y	Y	N	N	N	Y	
18	09:22	09:50	00:28	Handover to bedside relieving nurse	IDC	Y	Y	Y	Y	N	Y	
19	09:50	15:00	05:10	CN Meeting	U/H	Y	N/A	N/A	N/A	N/A	N/A	
20			00:00									
21			14:22									
DC = Direct Nursing Care 5				P = Personal 2		01:50						
IDC = Indirect Nursing Care 10				U/H = Unit/Hospital 1		05:33						
Routine (R): Yes = regular knowledge not requiring advanced knowledge, No = non routine requiring advanced knowledge												
Discretion (D): Yes = degree of autonomy broad ; No = limited (are decisions run by IIC												
Intensity (I): Yes = ≥ 3 variables affecting decision; No = 1 - 2 variables												
Multiplicity (M): Yes = complicated pt care requirements												
Complexity (C): Yes = decision making is affected by compounding variables												
Accessibility (A): Yes = information easily accessible; No = difficult to access												

Appendix H

Third data collection form test data included

Description of Pt: AAA post op pt											
	Start	Stop	Total	Code	Activity Comments	R	D	I	M	C	A
1	00:00	04:07	04:07	IDC							
2	00:30	01:07	00:37	DC	Pt communication	1	1	0	0	0	0
3	01:07	01:15	00:08	DC	Change pump setting for sedation	1	1	1	0	0	0
4	01:15	01:55	00:40	IDC	Hang pump on pole	1	0	0	0	0	0
5	01:55		#####		Missed data						
6	01:58	02:06	00:08	DC	Pt communication	1	0	0	0	0	0
7	03:00	03:06	00:06	IDC	Check orders	1	0	0	0	0	0
8	03:45	03:50	00:05	DC	Pt communication	1	0	0	0	0	0
9	04:03	04:07	00:04	IDC	Communicate with xray staff	1	0	0	0	0	0
10	04:40	04:50	00:10	DC	Check drains	1	0	0	0	0	0
11	04:50	05:41	00:51	IDC	Computer obs	1	0	0	0	0	0
12	04:53	06:06	01:13	DC	Pt communication	1	0	0	0	0	0
13	06:06	06:16	00:10	DC	pt obs	1	0	0	0	0	0
14	06:32	06:36	00:04	DC	Pt communication	1	0	0	0	0	0
15	06:42	07:08	00:26	IDC	Dr Communication	1	0	0	0	0	0
16	07:21	07:27	00:06	DC	Check pt ETT	1	1	0	0	0	0
17	07:27	08:36	01:09	DC	Pt communication	1	0	0	0	0	0
18	08:36	08:40	00:04	IDC	Pt obs on computer	1	0	0	0	0	0
19	09:15	10:25	01:10	DC	Pt communication	1	0	0	0	0	0
20	08:26	08:36	00:10	IDC	Pt notes read	1	0	0	0	0	0
21	08:36	08:40	00:04	DC	check pt	1	0	0	0	0	0
22	09:15	10:25	01:10	DC	Pt communication	1	1	0	0	0	0
23	09:15	09:22	00:07	DC	Bolus IV drug	1	1	0	0	0	0
24	09:22	09:25	00:03	IDC	Check pt monitor	1	0	0	0	0	0
25	10:42	10:56	00:14	IDC	Check ventilator	1	0	0	0	0	0
26	10:56	11:35	00:39	IDC	Check pt drips	1	0	0	0	0	0
27	11:35	12:15	00:40	IDC	Chart obs	1	0	0	0	0	0
28	12:15	12:20	00:05	IDC	Dr Communication	1	0	0	0	0	0
29	12:30	12:42	00:12	IDC	Sign obs	1	0	0	0	0	0
30	12:55	12:58	00:03	DC	Check pt	1	0	0	0	0	0
31	12:58	14:00	01:02	IDC	Chart obs	1	0	0	0	0	0
32	14:09	14:20	00:11	IDC	Staff Communication	1	0	0	0	0	0
33	14:27	14:50	00:23	DC	Pts obs	1	0	0	0	0	0
34	14:50	15:09	00:19	IDC	pt charting	1	0	0	0	0	0
35			00:00								
	Total Time 14:45										
	DC = Direct Nursing Care 16			06:47	P = Personal		1 = Yes	2 = No			
	IDC = Indirect Nursing Care 17			09:53	UH = Unit/Hospital		0 = N/A				
Routine (R): 1 = regular knowledge not requiring advanced knowledge, 2 = non routine requiring advanced knowledge											
Discretion (D): Blank = degree of autonomy broad ; N = limited (eg are decisions run by i/c)											
Intensity (I): 1 = 1 variable affecting decision; 2 = ≥ 2 variables								0 = Not applicable			
Multiplicity (M): 1 = non complicated pt care requirements; 2 = complicated pt care requirements											
Complexity (C): 1 = decision making is NOT affected by compounding variables; 2 = decision affected by compounding variables											
Accessibility (A): 1 = information easily accessible; 2 = difficult to access											

Appendix I

Example of data collection form used at John Flynn Hospital ICU with research data entered into form

General Comments about the ward (pt. load and type, agency staff on unit, staff levels, etc.)					Participant No.:					
					Date:					
					Day of Week:					
	Start	Stop	Code	Activity Comments	R	D	I	M	C	A
1	7:00:20	7:09:00	11	Verbal Handover at bedside	1	2	1	1	1	1
2	7:10:57	7:11:05	10	Introduction to patient	1	2	1	1	1	1
3	7:12:23	7:17:28	5	Prep for extubation of patient	1	2	1	1	1	1
4	7:13:08	7:13:32	10	Pt communication	1	2	1	1	1	1
5	7:15:00	7:15:20	1	Vent settings	1	2	1	1	1	1
6	7:16:04	7:16:29	1	Suction	1	2	1	1	1	1
7	7:17:33	7:17:50	10	Pt communication	1	2	1	1	1	1
8	7:18:04	7:20:01	13	Ventilator off tidy area up	1	2	1	1	1	1
9	7:18:25	7:18:34	2	mouth suction	1	2	1	1	1	1
10	7:19:08	7:19:31	2	mouth suction	1	2	1	1	1	1
11	7:20:29	7:20:40	10	Pt communication	1	2	1	1	1	1
12	7:21:09	7:21:21	2	mouth suction	1	2	1	1	1	1
13	7:21:53	7:22:15	10	Pt communication	1	2	1	1	1	1
14	7:27:40	7:28:20	17	Staff communication	1	2	1	1	1	1
15	7:29:57	7:30:25	14	Medication prep	1	2	1	1	1	1
16	7:30:57	7:31:02	4	med administration	1	2	1	1	1	1
17	7:31:08	7:31:15	10	Pt communication	1	2	1	1	1	1
18	7:31:19	7:34:30	1	observations	1	2	1	1	1	1
19	7:32:20	7:32:32	10	Pt communication	1	2	1	1	1	1
20	7:33:59	7:35:17	2	mouth suction	1	2	1	1	1	1
21	7:34:26	7:34:37	10	Pt communication	1	2	1	1	1	1
22	7:35:35	7:36:06	10	Pt communication	1	2	1	1	1	1
23	7:37:30	7:37:50	1	Monitor observation	1	2	1	1	1	1
24	7:37:30	7:37:50	10	Pt communication	1	2	1	1	1	1
25	7:38:17	7:40:34	14	signing off meds & meds prep	1	2	1	1	1	1
26	7:40:35	7:40:51	4	Med administration	1	2	1	1	1	1
27	7:41:16	7:42:46	14	Medication prep	1	2	1	1	1	1
28	7:41:36	7:41:47	10	Pt communication	1	2	1	1	1	1

Note. Activity Codes from Pelletier and Duffield (2003)

Code 1: Admission/assessment, Code 2: Hygiene, Code 4: Medication/IV administration, Code 5: Procedures, Code 10: Patient/family interaction, Code 11: Verbal report handover, Code 13: Room/equipment setup/cleaning, Code 14: Medication/IV preparation. See Appendix K for complete description of codes.

Work theory descriptions: R = Routine, D = Discretion (autonomy), I = Intensity, M = Multiple, C = Complex, A = Accessible (knowledge) (Billett, 2001a)

Scoring for each activity was 1= No and 2 = Yes, however the 1 or 2 related to the category. The activity category R was 1= routine or 2 = not routine. Activity category D, 1 = No discretion (no autonomy) and 2 = Discretion (autonomy). The category I, 1 = Not intense, 2 = Intense nursing action. Category M, 1 = Not Multiple, 2 = Multiple. Category C, 1 = Not complex, 2 = Complex. Category A, 1 = Accessible (knowledge) and 2 = Not Accessible (knowledge not accessible).

Appendix J

Questions for informal ICU discussion groups.

Question 1 relating to IV medication administration

1. Do you regard giving IV antibiotics as a routine or non routine nursing activity?
2. Do you believe when giving a charted IV medication to a patient that you have discretion in prioritising when to give it?
3. Does giving an IV antibiotic compound the intensity of your nursing activities and decision-making for the patient?
4. Do you believe that giving an IV antibiotic will add to the range of nursing activities that you have to do for that patient?
5. Do you regard giving an IV antibiotic as adding to the complexity of your decision-making for a patient?
6. Do you feel that you have an understanding of the action of an IV antibiotic?

Question 2 relating to titrating an inotrope

1. Do you regard titrating an inotrope on a patient as routine or non routine activity?
2. Do you believe you have discretion in prioritising when to titrate an inotrope for a patient?
3. Do you feel that titrating an inotrope compounds the intensity of your nursing activities and decision-making for the patient?
4. Do you regard titrating an inotrope on a patient will add to the number of nursing activities that you have to do for that patient?
5. Do you regard titrating an inotrope on a patient as adding to the complexity of your decision-making for the patient?
6. Do you feel that when you are titrating an inotrope on a patient that you have an understanding what is taking place?

Question 3 relating to charting patient observations

1. Do you regard doing patient observations such as an arterial BP, Temperature, GCS as routine or non routine nursing activity?
2. Do you believe you have discretion in prioritising when to do pt observations such as an arterial BP, GCS, and Temperature?
3. When doing a set of observations such as arterial BP, temperature and GCS does this compound the intensity of your nursing activities and decision-making for the patient you are caring for?
4. Do you believe that doing observations such as arterial BP, temperature and GCS adds to the number of nursing activities that you have to do for that patient within a set period of time?

- 5 Do you regard doing observations such as arterial BP, temperature and GCS for a patient as adding to the complexity of your decision-making for the patient?
- 6 Do you believe that you understand what is taking place for a patient as you are doing their observations?

Question 4 related to continuous veno-venous haemodiafiltration dialysis (CVVHDF)

1. Do you regard setting up dialysis on a patient as a routine or non routine activity?
- 2 Do you feel that you have discretion in prioritising the management of dialysis for a patient?
- 3 Do you feel when you are setting up dialysis that it compounds the intensity of your nursing activities and decision-making for the patient?
- 4 Do you feel that setting up dialysis for a patient will add to the number of nursing activities that you have to do for that patient?
- 5 Do you regard setting up dialysis on a patient as adding to the complexity of your decision-making for the patient?
- 6 Do you feel that you have an understanding of the dialysis process?

Question 5 related to patient hygiene

- 1 Do you regard mouth care on a ventilated patient as a routine or non routine activity?
- 2 Do you believe that you have discretion in prioritising when to do the mouth care for a ventilated patient?
- 3 When doing mouth care on a ventilated patient does this compound the intensity of your nursing activities and decision-making for the patient?
- 4 Do you believe that doing mouth care on a ventilated patient will add to the number of nursing activities that you have to do for that patient?
- 5 Do you believe that doing mouth care on a ventilated patient is adding to the complexity of your decision-making for the patient?
6. Do you feel that you understand the benefit of mouth care for a ventilated patient?

Question 6 related to Bi-level positive airway pressure (Bipap) ventilation

1. Do you regard setting up the Bipap machine for a patient as a routine or non routine activity?
- 2 Do you feel you have discretion in prioritising when to troubleshoot the Bipap on a patient?
- 3 Do you feel that when you are troubleshooting the Bipap machine for a patient that it compounds the intensity of your nursing activities and decision-making for the patient?

- 4 Do you feel that when you are troubleshooting the Bipap machine for a patient it adds to the number of nursing activities that you have to do for that patient?
- 5 Do you regard troubleshooting the Bipap machine on a patient as adding to the complexity of your decision making for the patient?
- 6 Do you feel that you understand how Bipap ventilation works on a patient?

Appendix K

Discussion Group ‘Yes’ Responses to Clinical Scenarios

Discussion groups	1	2	3	4	5	6	Average
<hr/>							
Billett’s schema of work Activities theory categories							
Routineness	83%	88%	100%	33%	92%	58%	75.7%
Discretion	88%	96%	92%	17%	83%	67%	73.8%
Intensity	54%	88%	25%	100%	50%	75%	65.3%
Multiplicity	88%	79%	83%	100%	58%	83%	81.8%
Complexity	88%	96%	71%	92%	17%	75%	73.2%
Accessibility	33%	96%	100%	83%	100%	92%	84.0%
<hr/>							
Total average yes response							75.6%
<hr/>							

Appendix L

Definition of Pelletier & Duffield's (2003) Work Sampling Codes 1 – 26
(Used with permission)

Codes	Description	Definition
	Direct care activities	
1	Admission/ assessment	Evaluation/measurement of any functional health pattern. Includes objective and subjective findings. Includes equipment attached to the patient, but away from the bedside. Includes documentation [<i>sic</i> in nursing observation charts].
2	Hygiene	Activities which promote or restore patient cleanliness. e.g. shower, bath.
3	Patient mobility	Interventions which promote therapeutic movement of the patient.
4	Medication/ IV administration	Activities which involve dispensing of medications and IVs to patients.
5	Procedures	Performance of patient care skills/ treatment using equipment, devices, or supplies which are applied, inserted, maintained, or removed from the patient. Includes positioning and instructions. Includes documentation. Includes activities associated with universal precautions such as hand-washing or gloving.
6	Specimen collection/ testing	Collection of body fluids from any site for purposes of diagnostic evaluation. Includes specimen testing performed on the unit. Record gathering and testing as one observation, even though testing may be done away from the patient.
7	Nutrition/ elimination	Assisting patient with intake and output, including preparation, encouragement, administration, measurement and follow-up. Includes documentation of same.
8	Transporting patient	Escorting patients to another patient care area or department within the hospital, including discharge. Includes transfer to/ from stretcher/ wheelchair and accompanying a patient to another area for any reason.
9	Assisting with procedures	Helping another health care provider with a patient procedure.
10	Patient/ family interaction	Verbal interactions with the patient and family for the purpose of initiating, intervening, reviewing, revising, and evaluating the patient care plan (and patient education plan). Includes social interaction.
	Indirect care activities	
11	Verbal report/ handover	Giving or receiving an updated description of patient status for the purpose of shift to shift continuity, unit to unit transfer, and

		break or lunch coverage. Live or taped.
12	Communication/ information	Verbal interaction with other departments related to coordination of patient care and patient advocacy. Providing instructions to unit support staff or ancillary non-professional staff. Does not include doctors or other professionals. Referencing written resource materials (e.g. textbooks, phone lists, procedure manuals). Includes bed management. Also includes giving information or specific direction to non-unit ancillary staff in providing assistance with aspects of patient care.
13	Room/ equipment setup/ cleaning	Obtaining and returning equipment or supplies necessary for patient care and preparing equipment/ room for use and clean-up after procedure. Includes any cleaning done in the patient's room.
14	Medication/ IV preparation	Obtaining and making ready medications/ IVs, including dose calculations away from the bedside.
15	Progress notes/ discharge notes	Involves any documentation on progress notes or other charts, excluding admission Does not include charting on observation charts at the bedside]. Documentation in text/ computer or completion of set forms to generate discharge summaries or instructions for patient, GP or other health professional. Includes fax, e-mail.
16	Computer – data entry & retrieval:	Rosters, catering and pathology results.
17	Co-ordination of care: rounds, team meetings	Rounds, communication with doctors and allied health workers or other nurse(s) regarding care, including on the phone, planning for admission or discharge. Includes debriefing.
18	Co-ordination of care: care, planning/ critical pathways	Documenting, reviewing or evaluating forms associated with components of the nursing process reflecting the scope of nursing practice: delegated, interdependent and independent. Includes correlations between interdisciplinary data and nursing judgment. Also includes documentation in text/ computer or completion of set forms to develop, revise or change the patient care plan. Documenting, reviewing, or evaluating both permanent and non-permanent parts of the record which are usually patient-specific and may give direction to the provision of care.
	Unit-related and personal	
19	Teaching & inservice:	Participation in teaching and learning activities, both formal and informal, to meet learning needs. Acting as a resource to students, orientees, reallocated staff and other health care professionals. Includes both prep time and actual attendance.
20	Supplies, check, restock	Checking and reordering of routine unit supplies, paper goods, emergency trolley, medications count, scheduled drug count.
21	Errands off unit	Delivering/obtaining equipment, specimens, meds, or supplies.
22	Meetings & administration	Includes committee work, interviews, reading written communication (e.g. posted memos, log book, e-mail). Includes NUMs'/ others' communicating on non-patient-related matters (e.g. with Human Resources Unit, or about absences from the ward). Includes Rosters and Quality Activities such as audits, CSATs, performance appraisals, written assessments.
23	Clerical	Answering phones (excluding calls related to patient care planning desk-answered patient call lights, delivering messages, filing reports, assembling charts, locating/addressographing forms. Includes printing up patient lists via computer, Completing forms, clinical or otherwise.
24	Environment cleaning	Any cleaning done in "public" areas, such as kitchen, conference rooms, nurses' station.

25	Personal	Personal activities not related to patient care or unit activities. Activities related to meals, breaks, adjusting personal schedules, personal phone calls, socialising with co-workers.
M/26	Miscellaneous	Write as clearly as possible any activity that cannot be explained above.

Appendix M

Data Dictionary for Billett's (2001a, 2001b) Cognitive Schema

Routineness	Routine (1) The degree by which work practice activities are routine. They happen regularly and the person is familiar with the activity.	Not routine (2) Non routine activities require robust knowledge. These activities challenge the person. They can be new, requiring extra thought regarding the activity.	Not applicable (0) This section is for activities that are not related to patients or work. For example the person could be undertaking personal activities such as meal break.
Discretion	No autonomy (1) Where decisions are restricted for the person. The person does not have autonomy. The workplace culture can be a deciding factor in the amount of autonomy a person has. Decisions can be from a higher authority.	Autonomy (2) There is scope of freedom to make decisions related to the activities within their work day.	As Above
Intensity	Not intense (1) Activities that are not intense and have fewer requirements on the person.	Intense (2) Reflects the ability of the person to deal with an intense work task situation. The intense activity is an individual event. However there can be a number of intense activities, see Complexity definition.	As Above
Multiplicity	Not multiple (1) Single activities.	Intense (2) Reflects the ability of the person to deal with an intense work task situation. The intense activity is an individual event. However there can be a number of intense activities, see Complexity definition.	As Above
Complexity	Not complex (1) Activities that are not impacted by confounding variables.	Complex (2) The ability of the person to respond to numerous variables/activities that can affect the person's decision making. These variables can be a mix of intense and not intense activities.	As Above
Accessibility	Accessible (1) The degree to which knowledge required for work performance is accessible. This can be knowledge that is not tangible.	Not accessible (2) Knowledge that is not easily accessed, regarded as opaque, hard to access, understand and utilise.	As Above