Abstract

The time from onset of a cardiac arrest to defibrillation is crucial hence access to and use of a defibrillator by all nurses essential. The purpose of this study was to use an established theoretical framework to examine and describe the defibrillation practices and beliefs of rural registered nurses in the Australian state of Queensland. The Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) guided the research processes for this two phase study. In the first phase, focus group (n = 13) discussions identified the salient beliefs of the population. By eliciting nurses' beliefs, the subsequent quantitative study (n = 434) was conducted to determine the influences of these beliefs on nurses' use or non-use of defibrillators.

The results showed that: (1) less than half of the cohort of participants were permitted to defibrillate; (2) the defibrillation beliefs of those nurses permitted to defibrillate were significantly more positive than those not permitted to do so; (3) the direct measures of TPB and selected variables external to the model predicted a significant portion of the variance in the measure of nurse-initiated defibrillation intention; and, (4) subjective norm emerged as the strongest predictor of intention.

In conclusion, Queensland rural hospital nurses and employers still have some distance to travel down the path of nurse-initiated defibrillation. The TPB is a viable framework on which to base interventions designed to promote defibrillation by rural nurses. Understanding the role of social norms is of central importance to ensure all nurses can initiate the chain of survival expeditiously whenever the need arises.

A shock in time saves lives: Theory of Planned Behaviour and nurse-initiated defibrillation

by

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Declaration Statement

I, Trudy Ann Dwyer, certify that the main text of this thesis is entirely my own work. 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.

Trudy Ann Dwyer

1 August, 2004

CHAPTER ONE

Introduction

"The heart wants to beat and often it only needs a second chance" (Beck 1956, p: 434). The importance of early defibrillation of the fibrillating heart is well documented in nursing and medical literature. Because of their continual presence within the hospital milieu nurses are in a prime position to afford the fibrillating heart a second chance. Where seconds count, nurses must be educated and willing to immediately initiate defibrillation. This dissertation reports on a research study into the defibrillation practices and intentions of registered nurses in rural Queensland, Australia.

Description of the Problem

Coronary Heart Disease (CHD), culminating very frequently as heart attacks, is the leading cause of death in industrialised countries with over half of these being due to sudden cardiac arrest (SCA) (Australian Institute Health Welfare (AIHW) 2004; Ballew 1997). Two of the best predictors of survival following SCA are the initial cardiac rhythm and the time taken to initiate defibrillation (Guwinnutt, Columb & Harris 2000; Ballew 1997; Cummins 1988). Even modest improvements in response times, in the order of one minute, will appreciably

improve survival rates (Martens, Russell, Wolcke, Paschen, Kuisma et al. 2001). Thus early defibrillation by all first responders has been afforded high priority by the International Liaison Committee on Resuscitation (ILCOR) and the Australian Resuscitation Council (Australian Resuscitation Council 1998; Cummins, Sanders, Mancini & Hazinski 1997a).

Because nurses are generally the first person on the scene at a cardiac arrest in hospitals, they are in a prime position to initiate early defibrillation. However simply permitting nurses to defibrillate is not sufficient. While nurses can readily learn to defibrillate, defibrillation in hospitals remains in the domain of specially prepared staff (Finn & Jacobs 2003; Pascoe 2000; Coady 1999; Green 1993). Where nurses are permitted to defibrillate, precious minutes are lost because of hesitancy about initiating defibrillation unsupervised or waiting for persons with defibrillation capabilities to arrive (Coady 1999). The challenge exists for persons responsible for nurse-led defibrillation programs within hospitals to ensure that nurses are not only permitted to defibrillate but actually do initiate defibrillation.

Background to the Study

Sudden cardiac arrest and death have for centuries been the cause of great speculation (Jones & Tovar 1996). According to Jones and Tovar (1996) the Old Testament revealed that the Prophet Elisha resuscitated a child using mouth-to-mouth resuscitation. Today, sudden cardiac arrest and resuscitation continue to intrigue researchers. Subsequently Resuscitation Councils have been formed to improve resuscitation standards and to coordinate resuscitation activities (Cooper & Libby 1997). These resuscitation councils advocate the use of the 'chain

of survival' concept with its four links in the emergency treatment of sudden cardiac arrest. These links include: early access to care, early cardiopulmonary resuscitation (CPR), early defibrillation and early advanced life support (ALS). However the chain is only as strong as its most crucial link, early defibrillation. Approximately 85 percent of adult sudden cardiac arrests are due to ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT) (Soar & McKay 1998; Cummins, Chamberlain, Hazinski, Nadkarni, Kloeck et al. 1997; Finn 1996). The detection and correction of these dysrhythmias by electrical counter shock (defibrillation) is essential for successful resuscitation. Furthermore, the survival rate from collapse to defibrillation declines by five to ten percent each minute without basic life support (BLS) and defibrillation (Harrison 1998; Richards & Kaye 1997). Provided defibrillation is administered within 90 seconds of the initial collapse, the patient's chances of full recovery should improve (Cooper & Libby 1997).

Because the time from onset of cardiac arrest to defibrillation is so crucial, access and use of defibrillators by those first 'on the scene' (first responders) is essential. In-hospitals nurses, generally being the first person 'on the scene' at a SCA, are responsible for initiating resuscitation. In the acute hospital milieu there exists a mixture of wards where nurses have advanced life support (ALS) skills including defibrillation expertise and wards where nurses have only basic life support (BLS) capabilities (no defibrillation skills). The BLS 'first responder' nurses initiate BLS resuscitation while waiting for the ALS team to arrive from other areas of the hospital to defibrillate the patient (Mancini et al. 1997; Stewart, 1993). In smaller regional and rural hospitals across Australia most often there is not sufficient staff

with defibrillation expertise to cover all shifts (Finn & Jacobs 2003; Pascoe 2000). In these areas nurses continue BLS until the ALS team or a doctor arrives, usually from outside the hospital (Gray & Humphry 1997; Finn 1996; Jones & Cooke 1996). For every minute the nurse waits for the arrest team to arrive, the patient's probability of survival decreases (Mancini et al. 1997). Clearly, the concept of early defibrillation by all nurses is a key to improving patient survival (Coady 1999; Mattioni, Koonlawee, Brodsky, Fisher, Riggio et al. 1999; Kaye & Mancini 1996; Stewart, 1993).

Hospitals are slowly changing their protocols and standing orders to ensure that teaching defibrillation and its clinical application becomes a priority (Finn & Jacobs 2003; Pascoe 2000; Coady 1999; Stewart 1993). However simply permitting nurses to defibrillate is not sufficient. Precious minutes are lost as nurses display hesitancy about performing defibrillation unsupervised or when they choose to wait for ALS teams to arrive (Coady 1999). Ultimately while nurses may be permitted to initiate defibrillation, the goal of nurse initiated early defibrillation is not being reached (Coady 1999). If nurses are to initiate early defibrillation radical changes in attitudes are required (Kenward, Castle & Hodgetts 2002). Clearly an issue of concern for those responsible for the implementation of early defibrillation programs in hospitals is to identify what determines whether nurses intend to embrace the early use of defibrillators. To optimise the probability of success of educational programs aimed at modifying behaviour, educators should develop interventions based on an understanding of the factors that define participants' behavioural intentions (Cooper & Libby 1997). To this end, education programs directed at modifying behaviour should be theoretically

sound and multidimensional (Larson & Kretzer 1995). The Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) provide a theoretical framework within which to consider nurses' intentions to initiate defibrillation.

The Theory of Reasoned Action (TRA) and its reformulation, the Theory of Planned Behaviour (TPB), are two of the dominant theoretical frameworks used to explain human behaviour (Trafimow, Sheeran, Conner & Finlay 2002; Cheung, Chan & Wong 1999; Sideridis, Kaissidis & Padeliadu 1998; Powell & Goulet 1996; Ajzen 1988). According to the TRA, people usually behave in a rational manner, make systematic use of available information and consider the consequences of their actions before engaging in the behaviour (Levin 1999; Kretzer & Larson 1998). Behaviour is assumed to be under individual volitional control, therefore a person's intention to perform or not perform early defibrillation is the immediate determinant of whether early defibrillation occurs. Behavioural intention, in turn is a direct function of two independent variables – attitude and subjective norm (SN) (Ajzen 1988). The reformulation of the TRA (namely the TPB) adds the independent variable of perceived behavioural control (PBC) and is deemed more appropriate in situations where individuals do not perceive themselves as having complete control over their behaviour (Ajzen 1991). This research applies the TRA and the TPB to investigate the specific beliefs or predictors of rural registered nurses' defibrillation intentions.

Purpose of the Research

Early defibrillation by all nurses is not occurring. Why this is so has not been explored nor answered adequately. An understanding of the factors associated with nurse use of defibrillators may provide information about variables that influence nurses to use a defibrillator. This information will be helpful in providing insights into the problem of why nurses are not initiating defibrillation and guide the development of nurse initiated defibrillation programs. In brief, no investigation into the beliefs or specific predictors of rural registered nurses' defibrillation practices has been conducted. Therefore the purpose of this research was to use an established theoretical framework to examine and describe the defibrillation practices and beliefs of registered nurses in rural Queensland to identify the variables of greatest importance in understanding, explaining and predicting their intentions to use a defibrillator. There are two main aims of the study.

- To describe and compare the defibrillation beliefs and opinions of rural registered nurses permitted and not permitted to initiate defibrillation.
- To study the efficacy of the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) as models for predicting nurse initiated defibrillation behaviour in registered nurses working in rural acute care hospital settings.

The application of the theoretical framework provides a way of understanding the psychological foundations of the use or non use of defibrillators by nurses. By analysing the psychological underpinnings of rural nurses' beliefs about their

initiating defibrillation, there will be the ability to identify factors that, if changed, should result in altered intentions and ultimately lead to increased use of the defibrillator by nurses, thus increasing patient survival rates following in-hospital cardiac arrest.

Overview of the Thesis

This thesis is constructed into five chapters. Chapter two presents an overall review of the literature concerning the application of the chain of survival concept both in and out of hospital settings. The chapter also provides a description and rationale for the theoretical framework chosen to guide the research. This framework guided the development and implementation of the data collection and subsequent data analysis.

Consistent with the theoretical framework, this is a two phase study. The purpose of Phase One was to obtain a beginning understanding of the defibrillation beliefs of rural nurses with the view to develop a survey instrument. In Phase Two, the developed survey was the administered to the target population of registered nurses working in rural Queensland. Chapter three describes the research methodology and study methods that guided data collection and analysis for Phases One and Two. The results from both phases are articulated in the fourth chapter.

The fifth and final chapter presents the findings of this research study and provides conclusions, the limitations of the study are identified and recommendations for future research are offered. Lastly, publications arising from the study are presented at the end of the thesis.

Conclusions

Early defibrillation by all nurses has the potential to increase patient survival following a cardiac arrest in the hospital setting. This study contributes knowledge to what is known about nurses and defibrillation. It is the first to identify the psychological underpinnings of nurses' attitudes and intentions about their initiating defibrillation.

CHAPTER TWO

Literature Review

Introduction

The review of literature explores the history of cardiopulmonary resuscitation (CPR) and the 'chain of survival' concept, conceptualised to facilitate rapid response to cardiac arrest in both the pre-hospital and in-hospital settings. The roles of nurses in hospital cardiac arrest teams and barriers to nurse initiated early defibrillation are also explored. Lastly, the review investigates the applicability of the Theory of Reasoned Action (TRA) and Planned Behaviour (TPB) as frameworks to guide the study.

Coronary Heart Disease

In Australia, as with the other first world countries, coronary heart disease (CHD) is the largest single cause of death, claiming nearly 26,234 lives in 2000 (53% of all deaths from cardiovascular disease) (Australian Institute Health Welfare (AIHW) 2004). Fifty percent of these deaths will occur before the person reaches hospital.

During 2000 and 2001 in Australia there were 157 899 admissions to hospitals for CHD, with an average length of stay of 4.5 days (AIHW 2004). When comparing rural and metropolitan zones major reports have indicated significant differences in the health status of both groups (AIHW 2002). Both males and females from rural centres have a higher hospitalisation rate and death rate from CHD (AIHW 2002; Strong, Trickett, Titulaer & Bhatia 1998). In Queensland, as in the rest of Australia, coronary heart disease is the leading cause of death for both men and women (Cooroy 2001).

Cardiopulmonary Resuscitation (CPR)

Cardiopulmonary resuscitation (CPR) consists of measures undertaken by personnel in the event of a respiratory or cardiac arrest to restore respiration and circulation. Since the rediscovery of the effectiveness of closed-chest CPR in 1960 and its subsequent widespread adoption, CPR has saved the lives of many, potentially ensuring years of productive life (Ryan 1998; Ballew 1997; Cummins, Chamberlain et al. 1997). As CPR quickly became one of the most widely used and researched procedures, voluntary coordinating bodies developed throughout the world (Cummins, Chamberlain et al. 1997). Organisations such as the European Resuscitation Council (ERC), the American Heart Association (AHA), the Heart and Stroke Foundation of Canada and the Southern African and Australian Resuscitation Councils (ARC) established practical guidelines to improve standards in resuscitation and co-ordinate resuscitation activities nationally (Cooper & Libby 1997; Cummins, Chamberlain et al. 1997). However as there was no standardised recording of outcome data, resuscitation endeavours could not be compared meaningfully between countries (Cummins, Chamberlain et al. 1997).

Consequently, the International Liaison Committee on Resuscitation (ILCOR) was formed in 1992 to facilitate global discussion and consistency of guidelines between these international resuscitation councils (Cummins, Chamberlain et al. 1997).

'Chain of Survival' Out-of-Hospital

The American Heart Association (AHA) in 1974 (updated in 1980, 1986 & 1992) published guidelines for CPR and Emergency Cardiac Care (ECC) (Cummins, Sanders et al. 1997a). To further optimise a person's chance of survival the AHA, in 1990, developed the 'chain of survival' strategy (Cummins, Ornato, Thies & Pepe 1991). This chain of survival concept represents the sequence of four events that must occur as quickly as possible to optimise the person's chance of survival. These four links are early access, early CPR, early defibrillation and early advanced life support (ALS) (Riegel 1998; Cummins et al. 1991). The four links in the 'chain of survival' are graphically displayed in Figure 2.1.

Figure 2.1: The 'Chain of Survival'.

Resuscitation bodies worldwide have followed this initiative (Cummins, Chamberlain et al. 1997). It has been suggested that any break or weakening of links in the chain will lessen a person's chance of survival (Riegel 1998; Cummins et al. 1991).

Early Access

The resuscitation chain is initiated when someone (first responder) identifies a medical emergency and calls for help (Eisenberg & Mengert 2001). The first responder can identify if there is a medical emergency by shaking and shouting at the collapsed person to determine if the person is responsive or unresponsive (Eisenberg & Mengert 2001). The early access link should be activated as soon as possible and in the Australian context, this link is initiated by telephoning 000 (Eisenberg & Mengert 2001). Public awareness programs aimed at early access are invaluable in the community and ensure that precious minutes are not wasted at the start of the cardiac arrest (Smith & McNeil 2002; Meyer, Cameron, Smith & McNeil 2000). Despite these programs early access may not occur or be delayed as early recognition is often confused with fitting or fainting (Meyer et al. 2000). Further, witnesses to a cardiac arrest are often agitated and do not immediately call 000 for help (Smith & McNeil 2002). Often the initial call is made to family, neighbours or the family doctor (Cummins et al. 1991). Similarly, Australian studies concur that bystanders have trouble describing the victim and do not know whom to call (Bernard 1998; Jacobs & Oxer 1990). Evidently this early access link must be strengthened through public education programs.

Early Cardiopulmonary Resuscitation (CPR)

The second link in the chain of survival is early initiation of basic CPR (Cummins et al. 1991). Since its initial description around 40 years ago, the fundamentals of CPR have not changed (Eisenberg & Mengert 2001). CPR is defined as the technique of inflation of the lungs and compression of the heart, used in an attempt to revive a person who has suffered a cardiac arrest (Australian Resuscitation Council (ARC) 1998).

The trained bystander should commence basic CPR immediately, as CPR initiated by the emergency response team (for example an ambulance officer) is often too late (Cummins et al. 1991). Each year millions of people learn CPR (Ballew 1997). However despite this, most people in the community experiencing cardiac arrests either do not receive CPR or receive 'poor' resuscitation (Ballew 1997). In Australia, Bernard's study on the outcome of pre-hospital cardiac arrests found that bystander CPR was not only seldom initiated but often it was of questionable quality (Bernard 1998). A recent Australian study by Smith and McNeil (2002) found of 430 community cardiac arrests reviewed, only forty-seven percent of the witnessed arrests received CPR from bystanders.

In brief, the value of bystander initiated CPR is that it can 'buy time' for the person experiencing a cardiac arrest. Effective CPR should supply sufficient oxygen to keep the brain and heart viable until definitive intervention arrives (Eade 2000). Further, people who receive early CPR are more likely to revert to a 'normal' heart rhythm following defibrillation because CPR prolongs the duration of ventricular fibrillation (VF), thus enhancing the effectiveness of defibrillation (American Heart Association 2000a; Eade 2000).

Early Defibrillation

Two of the best predictors of survival following a sudden cardiac arrest are the initial cardiac rhythm and the time taken to defibrillate (Guwinnutt et al. 2000; Ballew 1997; Cummins 1988). The most commonly encountered cardiac rhythms following cardiac arrest are:

1. ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT)
2. non VF/VT (Marenco, Wang, Link, Homoud & Estes 2001; Kloeck, Cummins, Chamberlain, Bossaert, Callanan et al. 1997).

Management for both groups is the same with the exception that responders are to perform defibrillation for patients in VF/VT arrest (Kloeck et al. 1997). The purpose of early defibrillation is to re-establish a normal spontaneous rhythm in the heart. The application of a direct electrical current shock to the person experiencing the SCA will simultaneously depolarise the myocardial cells thereby enabling the resumption of organised electrical activity in the heart (ARC 2002a). The shock can be delivered in many ways, internally or externally, with the placement of pads on the external chest wall being the most common approach (Note, this thesis refers only to external defibrillation). Defibrillation should be performed as soon as VF/VT is recognised, as untreated VF rapidly progresses to asystole within minutes - and patients in asystole rarely survive (American Heart Association (AHA) 2000a; Mancini & Kaye 1998; Ballew 1997; Kloeck et al. 1997). Figure 2.2 displays how the length of time the person remains in VF is inversely proportional to survival.

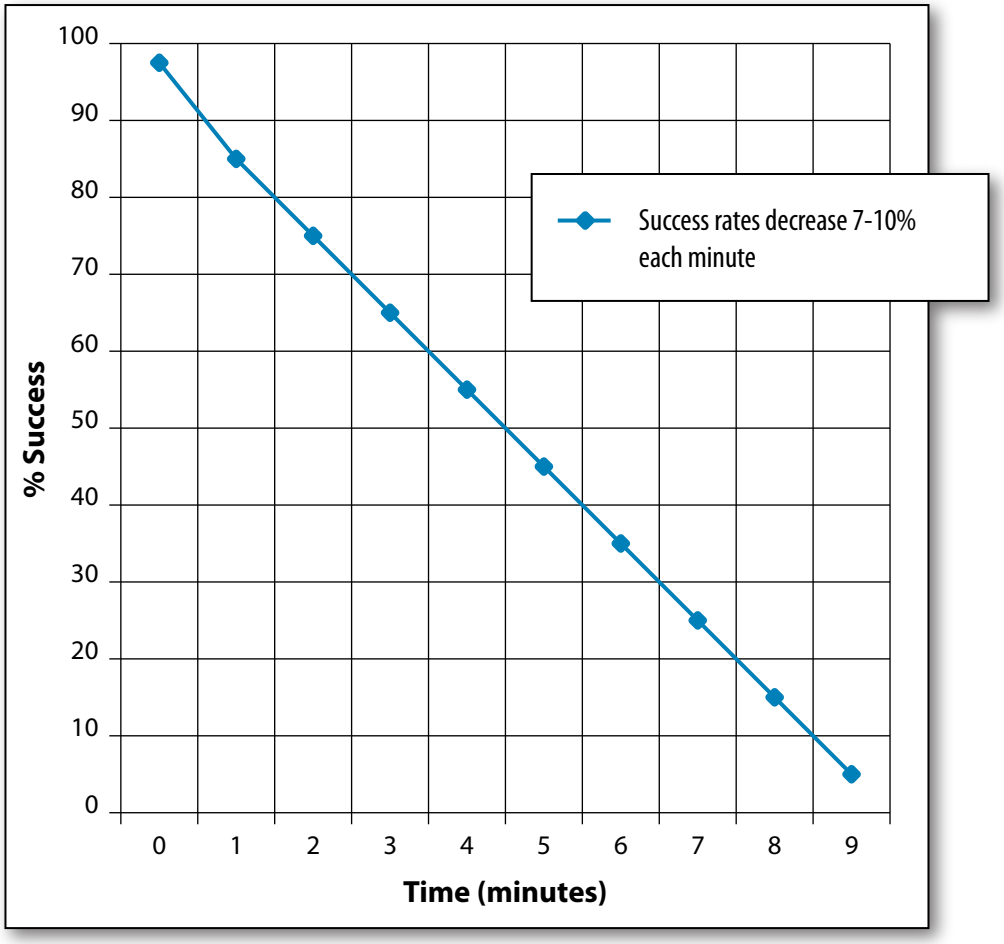

Figure 2.2: Resuscitation success to elapsed time (From: Cummins, Sanders et al. 1997a).

For every minute the person remains in VF their chances of survival decrease by 7 to 10 percent (Eisenberg & Mengert 2001; AHA 2000a; Fielden & Bradbury 1999; Cummins, Sanders, Mancini & Hazinski 1997b; Eisenberg, Pantridge, Cobb & Geddes 1996). Ultimately, despite the most effective CPR, the single most important cause of a decreased prognosis is a delay in electrical defibrillation (Capucci, Aschieri, Piepoli, Bardy, Iconomu et al. 2002; Eastwick-Field 1996a; Kaye, Mancini, Richards, Nagid & Marler 1995).

Early Advanced Life Support (ALS)

Even with the introduction of first responder defibrillation programs, a significant group of victims will rely on the provision of ALS skills (Smith & McNeil 2002). Advanced life support extends BLS to provide the knowledge and skills essential for the initiation of early treatment and stabilisation of people following a cardiac arrest. ALS skills generally include the use of adjunctive equipment for the establishment and maintenance of effective airway management and circulation, cardiac arrhythmia monitoring and recognition, intravenous access and administration of intravenous medications (Eisenberg & Mengert 2001; Eade 2000).

This next section of the chapter expands on the early defibrillation concept to provide an overview of the history of defibrillators, the various types and training of people in their use.

History of Defibrillation

Eade Karl Ludwig in 1850 first described VF as a terminal cardiac rhythm, a rhythm that preceded death (Zeitz, Zeitz & Bowen 2000). From 1930 to 1933 researchers at the Johns Hopkins University, Drs. Ing and William B. Kouwenhoven, conducted several studies to explore the possibility of treating VF with electrical counter shocks (Timmermans 1999). This work led to the development of the open-chest defibrillator for use in hospitals. Around this same time a local electrical company was reviewing all the electrical accidents within the company and found that slightly more than fifty percent of line worker fatalities resulted from VF arrests (Timmermans 1999). Subsequently in 1950

Kouwenhoven and colleagues were contracted by the electricity company to develop a portable closed-chest defibrillator to be used by specifically trained first-aid personnel in the event of electrical accidents among its workers. By 1958 Ing and Kouwenhoven had built the John Hopkins AC defibrillator, but portability was problematic as the defibrillator weighed about 200 pounds (Timmermans 1999). Over the following years Kouwenhoven and Knickerbocker developed the first portable defibrillator that weighed only 45 pounds (Timmermans 1999).

Types of Defibrillators

Today there are essentially two types of external defibrillators: conventional, or manual external defibrillators (MED) and the automated external defibrillator (AED) that is either a fully automated external defibrillator (FAED) or a semiautomatic external defibrillator (SAED).

Conventional or Manual External Defibrillators (MED)

Traditionally the use of the manual defibrillator has been limited to the medical team, specialist critical care nurses or skilled cardiac paramedical staff with appropriate training (Langton & Thompson 1997; Eastwick-Field 1996b). The use of the manual defibrillator requires the user to have accurate, immediate arrhythmia recognition skills, particularly in the high-pressure situation of a cardiac arrest (Eastwick-Field 1996a). Retention of rhythm recognition skills has been found to be difficult, particularly in areas where staff have minimal exposure to patients on cardiac monitors (Eastwick-Field 1996a). Further, the size, weight and cost of conventional external defibrillators have limited their distribution (Varon, Sternbach, Marik & Fromm 1999).

Figure 2.3: Manual or Conventional defibrillator (Lifepak 9) with paddles.

Automated External Defibrillators (AED)

Automated external defibrillators (AED) were developed in 1970 in response to the need to improve early access in the pre-hospital milieu (Marenco et al. 2001; Varon et al. 1999; Cummins, Doherty, Hein, Damon, Doherty et al. 1997). The terms Automated External Defibrillator (AED) and Shock Advisory Defibrillators (SAD) are used interchangeably in the literature to refer to either the Fully Automatic External Defibrillator (FAED) or Semi Automatic External Defibrillator (SAEDs). Both the SAED and FAED allow less skilled and trained personnel to initiate early defibrillation and are illustrated in Figures 2.4 ad 2.5 (Varon et al. 1999; Ballew 1997). Currently FAEDs are not available in Australia.

Figure 2.4: Fully Automatic External Defibrillator (FAED) (Photo used with permission of Medtronic Physio-Control).

Figure 2.5: Semiautomatic External Defibrillator (SAED) (Photo used with permission of Medtronic Physio-Control).

When using an AED the user simply determines if the person is unresponsive, not breathing and pulseless and initiates the use of the defibrillator (Mancini & Kaye 1999; Ballew 1997). The user attaches self-adhesive, pre-gelled defibrillator paddles to the patient's chest (Figure 2.4) and the defibrillator automatically detects and interprets the rhythm without relying on user recognition of arrhythmias (Mancini & Kaye 1999; Eastwick-Field 1996b). An automated defibrillator should respond in one of two ways: deliver a shock (FAED), or advise the user that a shock is needed (SAED). Depending on the design of the SAED, visual and audible prompts, presence or absence of an electrocardiograph display will vary. Many authors use the term SAED for this type of automatic defibrillator (Harrison 1998). The term AED (Automated External Defibrillator) is used generically within this thesis to refer to the FAED and the SAED. The new AEDs may be used in either AED or manual mode (such as the Lifepak 20 shown in Figure 2.5) depending on user preference or expertise. AEDs are programmed to assess the cardiac rhythm and charge the defibrillator three times without operator intervention (Harrison 1998; Kaye & Mancini 1996). The entire cycle of three successive 'shocks' takes about 50 seconds (Kaye & Mancini 1996). Clinical studies show the AEDs can deliver the initial shock up to one minute faster than the conventional defibrillator because of the reduced time taken to attach and operate the devices (Cummins 1994; Stults, Brown, Cooley & Kerber 1987).

Safety and use of the Defibrillator

Because AEDs do not deliver a shock unless the electrode pads are correctly attached and a shockable rhythm detected, the AED is safer than the conventional defibrillator (Mancini & Kaye 1999; Eastwick-Field 1996b). The use of self-

adhesive, pre-gelled defibrillator pads allows hands-free defibrillation for optimum safety (Eastwick-Field 1996b). Further, the excellent skin/electrode contact afforded by the pads as compared to paddles (generally used with manual defibrillators), offers lower impedance, less artifact and ultimately greater user safety (Kaye & Mancini 1998). However there is a greater risk of injury to personnel if the operator does not ensure all persons are clear of the patient prior to discharging the defibrillator (Kaye & Mancini 1998). Automated defibrillators for use in hospitals have an inbuilt motion detection device that ensures the defibrillator will not discharge whilst there is motion artifact (Stults et al. 1987). The machine will advise the operator to stand clear but will not discharge a shock if motion is detected (Eastwick-Field 1996b).

AEDs are designed to isolate rhythms into two categories: shockable and non-shockable (Eade 2000). AEDs have most difficulty identifying and treating fine or low voltage VF (Varon et al. 1999). As AEDs develop they are quicker and are 90 to 100 percent sensitive to VF and 90 to 95 percent sensitive to other rhythms (Eade 2000; Varon et al. 1999). AEDs have a 97 percent termination rate of VF when compared to manual defibrillator (Varon et al. 1999). In addition emergency personnel are twice as fast at delivering the initial shock using AED when compared to using conventional manual external defibrillator (Varon et al. 1999).

When using AEDs, the majority of mistakes have been related to human error (Herlitz, Bang, Axelsson, Graves & Lindqvist 1998; Eisenberg et al. 1996; Walters, D'Auria & Glucksman 1992). Errors in AEDs include failure to discharge a shock, poor battery maintenance, neglecting to advise people to 'stand clear' and ignoring protocol. While there have been rare reports of the device shocking

a conscious patient in VT or SVT, this is operator not device error, as the operator has failed to verify the patient is unresponsive, not breathing and has no cardiac output (AHA 2000a). In the last 30 years there has not been a reported defibrillator operator fatality (Jones & Cooke 1996; Stewart 1993).

Because of the need for rhythm recognition, the skill of defibrillation has traditionally been viewed as an Advanced Life Skill (ALS), ensuring only specially trained persons were permitted to initiate defibrillation. However, the introduction of smaller, lighter, cheaper and easy to use AEDs, has made the goal of early defibrillation in cardiac arrest feasible (Adgey & Johnston 1998; Riegel 1998; Poole, White, Kanz, Hengstenberg, Jarrard et al. 1997). This next section of the chapter explores early defibrillation by first responders, who are neither nurses nor doctors, in a non-hospital environment.

Defibrillation by First Responders in the Pre-Hospital Setting

The concept of early defibrillation holds that the person who arrives first at the scene of the cardiac arrest should carry a defibrillator and be trained to operate it (Cummins et al. 1991). The advent of automated external defibrillators (AED) has seen the role of defibrillation expanded to ensure minimally trained first responders are able and ready to initiate defibrillation (Mosesso, Newman, Ornato & Paris 2002; Smith & McNeil 2002; Marenco et al. 2001; Wassertheil, Keane, Fisher & Leditschke 2000; Mosesso, Davis, Auble, Paris & Yealy 1998; Ballew 1997; Badge 1996; White, Asplin, Bugliosi & Hankins 1996; Kellermann, Hackman, Somes, Kreth, Nail et al. 1993; Weaver, Copass, Hill, Fahrenbruch, Hallstrom et al. 1988; Weaver, Hill, Fahrenbruch, Copass, Martin et al. 1988).

In order to facilitate the use of AEDs and early defibrillation the International Liaison Committee on Resuscitation (ILCOR) recommends that all first responder emergency personnel, in both the out-of-hospital and in-hospital settings be authorised, trained, equipped and directed to operate a defibrillator (AHA 2000a). First responder programs using AEDs are conducted around the globe including Scotland, Denmark, England, West Berlin, Norway, Sweden, Australia, Singapore, Finland, America, Belgium and many other countries (Cummins et al. 1991). Flight attendants, police, fire fighters and other trained lay persons have been successfully educated and permitted to use the AED as first responders (O'Rourke 2002; O'Rourke, Donaldson & Geddes 1997; Eisenberg et al. 1996). The effectiveness of training traditional out-of-hospital first responders such as paramedics, police and fire fighters to use the AED has been shown to improve survival to discharge (Grundry, Comess, De Rook, Jorgenson & Brady 1999; Riegel 1998; Ballew 1997; Becker, Eisenberg, Fahrenbruch & Cobb 1997; Langton & Thompson 1997; Eastwick-Field 1996b; White et al. 1996; Cummins et al. 1991).

In Australia the St Johns Ambulance, the Heart Foundation, and the Australian Resuscitation Council endorse the ILCOR advisory statement on early defibrillation (O'Rourke 2002). Between 1990 and 1995 a cardiac arrest management strategy was employed at the Melbourne Cricket grounds (MCG) (Wassertheil et al. 2000). The strategy involved a three-tiered response with the second level being a CPR/defibrillation unit (using conventional manual defibrillators). Outcomes of the 24 medical cardiac arrests during the 5-year period showed 21 (88%) of the patients were defibrillated at the scene, 20 (83%) successfully. Of these 16 (67%) survived and were discharged home from

hospital (Wassertheil et al. 2000). Automatic defibrillators were introduced into all ambulances in Australia in 1990 and into Qantas aircrafts for use by flight attendants in 1991 (O'Rourke et al. 1997; Jacobs & Oxer 1990). In July 1998, the introduction of AEDs saw Melbourne fire fighters as first responders (Smith & McNeil 2002; Smith, Rich, Pinol, Hankin & McNeil 2001).

As AEDs are user-friendly in their ability to detect and differentiate shockable and non-shockable rhythms and their prompts, the user requires little training (Mancini & Kaye 1998; Ballew 1997; Destro, Marzaloni, Sermasi & Rossi 1996; Kaye & Mancini 1996; Kaye, Mancini, Richards et al. 1995; Cummins et al. 1991). In fact, it is easier to train a person to use the AED than it is to teach them to perform CPR. The advantage of the AED is the operator does not have to be able recognise and interpret cardiac arrhythmias, a skill that unless frequently practiced, will deteriorate rapidly (Eastwick-Field 1996b; Kaye, Mancini, Richards et al. 1995).

The literature reveals the time required for training emergency personnel to use AEDs varies from 30 minutes to eight hours (Capucci et al. 2002; Varon et al. 1999; Mancini & Kaye 1998; Riegel 1998; Cummins, Doherty et al. 1997; Kaye, Mancini, Richards et al. 1995; Walters, Glucksman & Evans 1994; Walters et al. 1992). When incorporating a 30-minute training session on the use of AEDs into basic CPR training for lay persons, Cummins and colleagues (1997) found that while initial learning was good, participants' retention of skills at two to four months was only fair. The researchers concluded that to improve skill retention, initial training or more frequent refresher training sessions might be necessary (Cummins, Doherty et al. 1997). Furthermore, emergency personnel are easier

to train than non-traditional personnel or lay people (Riegel 1998). However organizations such as the ERC recommend eight hours of initial training in order to achieve competency in BLS and defibrillation algorithms (Monsieurs, Handley & Bossaert 2001).

A study initiated to describe the experiences of fire fighters when using an AED to treat patients in cardiac arrest (n = 260), found the device to be non-intimidating and easy to use (Weaver, Copass et al. 1988). Likewise, a recent Australian study that used fire fighters as medical first responders, reported that the participants felt positive about their extra responsibilities. However the fire fighters in this study felt they were not attending enough cardiac arrests to maintain their skills and confidence. The authors concluded that a first responder program should have active maintenance programs aimed at both confidence and skills (Smith et al. 2001).

Since the introduction of AEDs in the early 1980s their development has been rapid and diverse. In 1996 'no screen' defibrillators such as the one displayed in figure 2.2 were introduced into Australia (Eade 2000). These 'no screen' defibrillators have the same diagnostic features of the AED with the only difference being the absence of a rhythm on the screen. The 'no screen' concept was targeted at the general public access defibrillation (PAD) market. Subsequently, defibrillation is now being taught to members of the public in first aid courses (Eade 2000). Studies show non-traditional personnel such as flight attendants, family members, lifeguards and even school children can also be taught successfully to use an AED (Marenco et al. 2001; Grundry et al. 1999; Riegel 1998; Kaye, Mancini, Richards et al. 1995; Cummins, Schubach, Litwin

& Hearne 1989). Cummins and colleagues (1989) in, a study to determine the feasibility of the recruitment of laypersons to use an AED (n = 146), found that both sexes from all age groups easily learned to operate the device (Cummins et al. 1989). The researchers also noted participants' performance declined significantly after the initial training, but returned to satisfactory levels after one retraining session. The researchers concluded that retraining was essential (Cummins et al. 1989). Having noted this, automated defibrillators placed in well-marked public areas have been successfully used by bystanders who had neither previously operated an automatic defibrillator nor been specifically trained in its use (Caffrey, Willoughby, Pepe & Becker 2002). The authors of the latter study concluded that the use of AEDs is strongly recommended for everyone and that a lack of training should not constrain attempts to use a defibrillator in emergencies (Caffrey et al. 2002).

In Australia, public access defibrillator programs are available at the Melbourne Cricket Ground, Jupiter's Casino on the Gold Coast, Parliament House in Canberra, The Royal Life Saving Society of Australia and the Adelaide Aquatic Centre (Johnson 2003; Wassertheil et al. 2000). It is argued that making defibrillators as readily available as fire extinguishers will further enhance survival rates of people who arrest in public places (Varon et al. 1999). It is conceivable that over the next decade AEDs will be sold over the counter as consumer devices (Eisenberg & Mengert 2001).

In many instances CPR and defibrillation alone do not achieve or sustain resuscitation efforts and advanced life support (ALS) measures are necessary to further improve the person's chances of survival (Cummins et al. 1991).

Summary of the 'Chain of Survival' out-of-hospital

The preceding data from the literature identified that sudden cardiac arrest is the leading cause of death in Australia with most of these deaths occurring unexpectedly outside the hospital (Smith & McNeil 2002). The 'chain of survival', if activated both immediately and appropriately increases a person's chances of survival by 30 to 70 percent (Larson, Eisenberg & Cummins 1993). Defibrillation stands alone as the single most vital intervention of resuscitation from out-of-hospital cardiac arrest and must be delivered as early as possible (Smith & McNeil 2002). Early defibrillation is essential because (i) frequently the initial rhythm in SCA is VF; (ii) defibrillation is the most effective treatment for VT and pulseless VT; (iii) the probability of defibrillation success diminishes with time; (iv) VF tends to rapidly deteriorate into a rhythm that cannot be treated. Non-medical people can and do successfully initiate defibrillation as first responders.

As with the out-of-hospital setting, in hospitals each link in the 'chain of survival' is crucial and the earlier the enactment of each link, the greater the chance of patient survival (ARC 1998; Kloeck et al. 1997). The following discussion from the literature presents the 'chain of survival' concept in the hospital setting.

'Chain of Survival' In-Hospital

The 'chain of survival' concept originally developed for out-of-hospital arrests applies equally to in-hospital cardiac arrests (Kaye, Mancini, Richards et al. 1995). When a cardiac arrest occurs in-hospitals the chain of survival is not always adequate from the point of view of timeliness, availability of equipment

and/or staff on hand to use the equipment. The literature identifies strengths and weakness of the 'chain of survival' in-hospitals and the role of the nurse in a cardiac arrest.

Outcome Survival In-Hospital

The chain of survival, while significantly improving out-of-hospital survival, has had less successful outcomes in-hospital (successful outcome is defined as survival to discharge from hospital) (Guwinnutt et al. 2000; Parish, Dane, Montgomery, Wynn, Durham et al. 2000; de Vos, Koster, de Haan, Oosting, van der Wouw et al. 1999; Mancini & Kaye 1998; Cummins, Sanders et al. 1997b; Stewart 1993; Tunstall-Pedoe, Bailey, Chamberlain, Marsden, Ward et al. 1992). After more than 30 years of research on the survival rates following in-hospital cardiac arrest, there remains little consensus about accurate predictors of survival (de Vos et al. 1999; Fitzgerald, Wenger, Califf, Phillips, Desbiens et al. 1997). A number of studies show that in-hospital survival to discharge rates vary from five to 15 percent (Stewart 1993), 15 percent (Lee, Bishop, Hillman & Daffurn 1995, Saklayen 1995) to 21.7 percent (de Vos et al. 1999) and 28.9 percent (Eisenberg & Mengert 2001; Ballew 1997). Many factors such as age, presence or absence of morbidity before or during hospital admission contribute to low survival rates (de Vos et al. 1999; Fitzgerald et al. 1997). Along with these pre-arrest factors, several identifiable variables during the cardiac arrest have been shown to independently predict mortality including the duration of the arrest, the initial cardiac rhythm and time from collapse to defibrillation (Ballew 1997; Stewart 1993).

The marked differences in the inclusion criteria and outcome definitions may further explain the wide variations in survival rates from in-hospital cardiac arrests (Cummins, Chamberlain et al. 1997). In recognition of these wide variations of survival rates in-hospital the American Heart Association (AHA) developed specific guidelines for the documentation of in-hospital resuscitation (Cummins, Sanders et al. 1997a; Cummins, Sanders et al. 1997b). The in-hospital Utstein guidelines (originally developed for out-of-hospital implementation) define data elements that are essential or desirable for documenting and reporting in-hospital cardiac arrests (Cummins, Sanders et al. 1997a). The data elements for documentation of in-hospital cardiac arrests are hospital, patient, arrest and outcome variables (Cummins, Chamberlain et al. 1997; Cummins, Sanders et al. 1997a). In Australia, about 80 percent of large hospitals (greater than 250 beds) routinely collect data on cardiac arrests, compared to 24 percent for hospitals with less than 25 beds (Finn & Jacobs 2003). Frequently data was incomplete and not collected using the Utstein guidelines. Despite collecting these data on cardiac arrests in-hospitals, currently there are no established databases for reporting such information in Australia (Finn & Jacobs 2003).

Another variable that may influence survival rates in-hospitals is the resuscitation of people who do not wish to be resuscitated. CPR is one of the few interventions that require an order to not initiate. Approximately 30 to 40 percent of all patients admitted to hospital who are dying experience CPR (Saklayen 1995). This high frequency use of CPR has been criticised by some as violent, damaging, painful and an undignified intervention (Gillion 1992). Among the small percentage of survivors, their quality of life is often poor and life expectancy is often short

(Hayward 1999). CPR is not appropriate for all hospital patients. Rather than initiating the chain of survival for every cardiac arrest, the use predictors developed to identify patients for whom resuscitation is appropriate should be discussed with the patient and implemented accordingly. However decisions about whether to attempt resuscitation concern the probability of survival, but predications of survival are difficult to make (de Vos et al. 1999). It is proposed that the use of 'Do not resuscitate' (DNR) or 'not for active resuscitation' (NFAR) guidelines can increase survival rates by avoiding futile and costly CPR (Winslow, Beall & Jacobson 2001). 'Do not resuscitate' orders are increasingly being used and have a far greater implication than merely not calling the arrest team (Ebrahim 2000). Health care workers are now encouraged to discuss DNR decisions with patients and their families. However most patients and health care workers overestimate the success of CPR by up to 300 percent (Hayward 1999). Patients and staff in Australian teaching hospitals have poor knowledge of CPR and unrealistic expectations about its success rates (Kerridge, Pearson, Rolfe, Lowe & McPhee 1999). These authors concluded that because factors such as survival and functional status after resuscitation influence patient choices, it is both ethically and clinically desirable that patients be given accurate information (Kerridge et al. 1999). Reluctance of health care workers to initiate such discussions with patients and their families arguably is another major reason for inappropriate CPR and poor survival (Hayward 1999).

De Vos, Koster, de Hann, Oosting, van der Wouw and Lampe-Schoenmaeckers (1999) in a study of 553 CPR patients found that the survival rate of patients with a cardiac morbidity at hospital admission was significantly higher than survival

with a non-cardiac morbidity (29%: 15%). Likewise patients with angina pectoris and ventricular dysrhythmias both had a relatively high survival rate of 37 percent and 70 percent respectively (de Vos et al. 1999). In coronary care units, where patients' primary cardiac arrest rhythm is ventricular fibrillation, successful outcomes may be as high as 90 percent (Marenco et al. 2001; Mancini & Kaye 1998). However, outside critical care areas survival rates plummet (Mancini & Kaye 1998).

Coady (1999) found that within a 430-bed district general hospital in Brighton, UK there were about 250 cardiac arrests each year and general wards accounted for 54 percent of the arrests. Of the patients experiencing cardiac arrests on the wards 25 percent presented in a shockable rhythm (Coady 1999). While about half of in-hospital cardiac arrests occur in non-intensive care areas of the hospital (Coady 1999; Wilson 1998; Destro et al. 1996), survival from cardiac arrests in these areas has not improved in recent decades (Herlitz, Bang, Aune, Ekstrom, Lundstrom et al. 2001; Harrison 1998; Mancini et al. 1997; Stewart 1993). A common explanation for this variance may not only be the co-morbidity of patients in the non-intensive care areas but also the time from collapse to defibrillation (Eisenberg & Mengert 2001; Herlitz et al. 2001).

Typically, dysrhythmias are detected earlier with monitored patients compared to non-monitored patients. Herlitz, Bang, Aune, Ekstrom, Lundstrom and Holmberg (2001) in a prospective study of 557 patients suffering in-hospital cardiac arrests found that while 47 percent of arrests occurred on non-monitored wards the concentration of patients was different. The proportional incidence of cardiac arrests on the non-monitored wards was six times lower than the

monitored areas. Further the etiology of the arrest, symptoms prior to the arrest and outcomes varied between the two groups. Patients in monitored areas had a higher incidence of cardiac disease, were more likely to be VF/VT arrests (56% compared to 44% $p = 0.006$), witnessed arrests (96% compared to 79% $p < 0.0001$) and had a greater chance of survival (43.2% compared to 31.1% $p = 0.004$).

Early Access In-Hospitals

The chain of survival in-hospital begins with early access when a medical emergency is recognised, the medical system is accessed and activated as soon as possible (Eisenberg & Mengert 2001). Because early access in-hospitals is usually easy once the arrest is recognised, early access includes the implied component of early recognition (Cummins et al. 1991). But unless the patient is monitored, recognition can be a problem (Kaye & Mancini 1996). On a busy ward one nurse may be responsible for several patients in many different rooms and unless witnessed, it may be minutes to hours before recognition (Kaye & Mancini 1996). However empirical evidence shows most cardiac arrests do not occur suddenly or quickly. Many patients who arrest in-hospital potentially have detectable or potentially preventable antecedent factors (Bedell, Detiz, Leeman & Delbanco 1991; Goldhill, Worthington, Mulcahy, Tarling & Summer 1990). Frequently cardiac arrests are predictable and are preceded by recognisable physical changes in the patients' condition (Buist, Moore, Bernard, Waxman, Anderson et al. 2002; Franklin & Mathew 1994; Goldhill et al. 1990; Schein, Hazday, Pena, Ruben & Sprung 1990).

Schein, Hazday, Pena, Ruben and Sprung (1990) in a study of 64 in-hospital cardiac arrests found that 84 percent (n = 54) of the patients in the study had changes in their clinical condition up to eight hours prior to their arrest. Goldhill, Worthington, Mulchay, Tarling and Summer (1990) when examining the effectiveness of early assessment of the 'patient-at-risk' on the ward, found many of the critically ill patients had abnormal physiological values before admission to the intensive care unit (Goldhill et al. 1990). Similarly, Buist, Jarmolowski, Burthon, Bernard, Waxman and Anderson (1999) in an Australian pilot study found that patients with unexpected cardiac arrests had been deteriorating for at least one hour (median 6.5 hours, range 0-432 hours) prior to the identification of the cardiac arrest (Buist, Jarmolowski, Burton, Bernard, Waxman et al. 1999). These authors concluded that the key to improved patient survival in-hospital was prevention of cardiac arrests by early detection and intervention to offset the need for cardiopulmonary resuscitation (Goldhill et al. 1990; Schein et al. 1990).

The traditional cardiac arrest team responds to the seriously ill, but frequently the patient is dead by the time the cardiac arrest team is called (Hillman, Parr, Flabouris, Bishop & Stewart 2001). This system failure in the general wards may be related to empowerment issues for nurses and the hierarchal medical system in hospitals (Hillman et al. 2001). Traditionally, when noting a deterioration of a patient's condition, nurses have not been empowered or trained to act on their observations. Often they rely on junior doctors who themselves have limited experience in advanced resuscitation (Cretikos & Hillman 2003; Hillman et al. 2001). Even when the junior medical doctor refers the patient to the senior

clinician, they may be not immediately available or lack the comprehensive knowledge and practical skills in advanced resuscitation (Cretikos & Hillman 2003; Buist et al. 2002; Hillman et al. 2001).

The concept of the Medical Emergency Team (MET) or the patient-at-risk teams (PART) changes and expands the role of the traditional cardiac arrest team to allow early identification, assessment and management of seriously ill patients on hospital wards (Buist et al. 2002; Hillman et al. 2001; Goldhill et al. 1990). Generally, the MET in the tertiary hospital setting comprises (i) an intensive care or emergency department registrar (ii) a senior critical care nurse and (iii) the medical registrar (Cretikos & Hillman 2003). The MET are equipped with resuscitation drugs, fluids and ALS equipment (Buist et al. 2002; Parr, Hadfield, Flabouris, Bishop & Hillman 2001). In smaller rural hospitals the MET may consist of two registered nurses trained in ALS (Cretikos & Hillman 2003).

The MET system was first developed at the Liverpool Hospital in Sydney, Australia in 1990 (Hillman et al. 2001) and has since been implemented in numerous hospitals across Australia (Buist et al. 2002; Cioffi 2000). Studies show that in clinically unstable patients early access including early recognition and intervention by a medical emergency team reduces the incidence and mortality from unexpected cardiac arrests and unanticipated admissions to intensive care (Buist et al. 2002; Bristow, Hillman, Chey, Daffurn, Jaques & Normal 2000; Goldhill et al. 1990).

Early Cardiopulmonary Resuscitation In-Hospitals

Cardiopulmonary resuscitation (CPR) consists of measures undertaken by nurses, doctors and other skilled hospital staff in the event of a cardiac or respiratory arrest. Nurses in a cardiac arrest have a two-fold role, firstly to provide CPR as a holding measure and secondly to participate in or initiate ALS measures that aim to treat or reverse the cause of the cardiac arrest (Davies & Gould 2000). Long-term survival following cardiac arrest is dependent on the quality and timing of the CPR (Kaye & Mancini 1986).

The importance of immediate CPR in hospitals after in-hospital cardiac arrest has been demonstrated in the literature. Herlitz, Bang, Alsen and Aune (2002) in a study that described the survival after in-hospital cardiac arrest in relation to the time from collapse to the start of CPR, found survival to discharge was 33 percent among the 344 patients for whom CPR was started within one minute of collapse. This group differed significantly to the 88 patients where CPR was commenced more than one minute after collapse, where the survival to discharge was only 14 percent (Herlitz, Bang, Alsen & Aune 2002).

In the event of a cardiac arrest, nurses and doctors are perceived by the community to be competent and ready to perform effective CPR (Badger & Rawstorne 1998; Finn 1996; Inwood 1996). Irrespective of their level, health care workers have a professional responsibility to maintain competence in CPR through regular updates (Badger & Rawstorne 1998; Finn 1996). Cardiopulmonary resuscitation (CPR) skills, advanced life support (ALS) skills and knowledge deteriorate significantly if not used or regularly updated (Nyman & Sihvonen 2000; Noordergraaf, Be, Sabbe, Diets, Noordergraaf et al. 1999; Cooper & Libby

1997; Bloomfield 1996; O'Steen, Kee & Minick 1996). The lack of resuscitation skills of nurses and doctors in basic and advanced life support has been identified as a contributing factor to poor outcomes post-cardiac arrest (Inwood 1996). Numerous studies examining the resuscitation skills of nurses found that generally, nurses are poor at performing CPR and have a low overall level of ability (Devlin 2001; Davies & Gould 2000; Nyman & Sihvonen 2000; Bloomfield 1996; Inwood 1996; Crouch 1993; Lewis, Kee & Minick 1993; Wynne, Mareau & Evans 1992; Wynne, Marteau, Johnson, Evans & Whitley 1987). Nyman and Sihvonen (2000) studied 298 nurses and nursing students and found their CPR skills were poor in terms of adequate and prompt assessment of the need for resuscitation. A United Kingdom (UK) study to investigate the CPR competence of 53 qualified nurses found none of the nurses could perform CPR effectively and 30 were assessed as completely ineffective (Wynne et al. 1987). The authors' findings concurred with others in that nurses tend to find certain resuscitation skills more difficult to perform than others, for example few nurses perform chest compressions correctly (Devlin 2001; Nyman & Sihvonen 2000; Greig, Elliott, Parboteeah & Wilks 1996).

It appears the clinical setting where the nurse works is not influential on CPR competence. For example, in a UK study, Inwood (1996) when comparing the knowledge of nurses in cardiac services (n = 37) and intensive care (n = 25) found both groups had poor initial (pre-training) knowledge levels. A later study to evaluate the skills of nurses (n = 30) working in a private hospital found that although the nurses BLS skills were poor, they were no worse than those reported in the public sector (Devlin 2001). Similarly, Ochoa and others (1998) with a

sample of 72 emergency room and intensive care nurses and doctors found that a significant proportion of the participants were slow to locate the carotid pulse in a healthy, young adult. They concluded that more attention should be given to carotid pulse detection in CPR training (Ochoa, Ramallegomara, Carpintero, Garcia & Saralegui 1998). Other researchers concur. Bhar (1997) suggests the recognition of pulselessness by first responders with only CPR training may be inaccurate, the time interval for checking the carotid pulse may be too short, hence the value of the pulse check within the scope of CPR has been questioned (Bahr 1997).

Several studies have compared cognitive knowledge, psychomotor and CPR skills retention of nurses and doctors (Curry & Glass 1987; Gouche & Dobb 1986; Kaye & Mancini 1986). Overall, these studies demonstrated a deterioration of CPR knowledge and skills within a twelve-month period. Curry and Glass (1987) reported a significant loss in doctors' cognitive and psychomotor skills at six months as compared to twelve months for loss of skills with the nursing group (Curry & Glass 1987). While these studies provide an overview of the baseline competence of nurses and CPR skills, care needs to be taken with the interpretation of such results. Often small convenience samples have been used.

An important variable to consider when teaching CPR is skill retention (Cooper & Libby 1997). Reasons for poor retention of CPR skill and knowledge may include instructor competence, teaching methodologies or frequency of updates (Devlin 2001; Bloomfield 1996; Lewis et al. 1993; Wynne et al. 1992). Most efforts to improve CPR skills and knowledge have centred on providing additional and

more frequent educational sessions (O'Steen et al. 1996). However in a review of the effectiveness of such interventions, there has been little improvement in the retention of skills and knowledge.

Although CPR has been associated with improving survival from SCA, it cannot be a substitute for the definitive treatment of defibrillation (Capucci et al. 2002). Leah and Coats (1999) argue that the guidelines designed to enable lay bystanders to give initial CPR following sudden collapse in the community were not designed for in-hospital use and therefore may not provide an appropriate sequence of actions for professionals to take following a sudden collapse of a patient in a hospital ward. Consequently, researchers argue the 'chain of survival' is different in hospital and the sequence of actions should be changed accordingly (Leah & Coats 1999; Kaye & Mancini 1996). That is, defibrillation should precede CPR. In view of the importance of early defibrillation and CPR skills' retention, if a defibrillator is immediately available then defibrillation should take precedence over CPR for people in VF or pulseless VT (ARC 1998; Eisenberg & Mengert 2001). Having noted this, CPR should always be initiated and continued until the defibrillator is available. The initiation of CPR while waiting for the defibrillator to arrive appears to prolong VF and potentially contributes to survival by preservation of circulation to the brain and heart (AHA 2000a).

Early Defibrillation In-Hospital

Traditionally, because of the need for rhythm recognition, defibrillation in-hospitals has been considered a part of ALS restricting its use to specially trained personnel. However, today early defibrillation is viewed as a separate link in

the chain of survival (Cummins et al. 1991). The ILCOR advisory statement on early defibrillation in hospitals, strongly encourages the development of early defibrillation programs for non-physicians including nurses (Jones & Cooke 1996; ARC 1998; AHA 2000). First responder defibrillation is seen as part of rising standards so that nurse-initiated defibrillation (using AEDs) is regarded as a basic, rather than an extended role (Moule & Albarran 2002). The Australian Resuscitation Council in 1998 recommended first responders in the hospital setting initiate early defibrillation and as of 2002 defibrillation using an AED was listed as a basic life-support skill (ARC 2002; ARC 1998). The Australian College of Critical Care Nurses' (ACCCN) position statement on resuscitation by nurses recommends that where a registered nurse cares for a patient who is continuously monitored, the nurse should be competent in initiating and maintaining advanced life support (ALS). Further, where a semi-automatic external defibrillator is available all registered nurses should be competent in its use and this be considered a part of basic life-support (BLS) training and practice (Leslie 1996). The Royal College of Nursing, Australia believe that where practical and possible registered nurses should seek to extend their basic life-support skills to include defibrillation (Royal College of Nursing Australia 1999).

While the impact of early defibrillation on survival in the pre-hospital setting is evident (Smith & McNeil 2002; Capucci et al 2002) the extrapolation of pre-hospital evidence into the hospital milieu has been questioned (Kenward, castle & Hodgetts 2002). Kenward et al (2002) conducted a systematic review of literature

to evaluate reported evidence to support the use of SAED by nurses on the wards. The authors concluded that in terms of patient survival there was limited primary research to support the use of SAED in general wards of hospitals.

Early Advanced Life Support (ALS) In-Hospitals

Many hospitals have multidisciplinary cardiac arrest teams that respond to cardiac arrests in hospitals. These teams are generally composed of physicians, anaesthetists and critical care nurses who are trained and authorised to provide advanced life support (ALS) care (Noordergraaf et al. 1999; Cummins, Sanders et al. 1997b). Advanced skills of these teams generally include defibrillation, airway management and administration of medications (Eastwick-Field 1996a). Most ALS training programs follow The ILCOR International Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Care – A Consensus on Science (American Heart Association 2000b). In Australia structured ALS courses generally follow the Australia Resuscitation Council guidelines.

Internationally and nationally, the anaesthetic intern or resident is the central member of the resuscitation team (Noordergraaf et al. 1999). However often they do not have knowledge or competence with ALS skills (Cowie & Story 2000; Fielden & Bradbury 1999; Noordergraaf et al. 1999; Bell, Harrison & Carr 1995; Quiney, Gardner & Brampton 1995). Fielden and Bradbury (1999) in a UK study of 23 anaesthetists and 25 surgeons, found that 83 percent of the participants failed to defibrillate according to guidelines. The main reasons for not adhering to guidelines were: inadequate knowledge of protocols; including paddle placement; selections of energy levels; and 'stacking' of successive shocks (Fielden & Bradbury

1999). A similar study by Bell, Harrison and Carr (1995) that examined the resuscitation skills of anaesthetists found 70 percent of participants in this study had poor recall of protocols (Bell et al. 1995). In Australia, Cowie and Story (2000) found the resuscitation knowledge of hospital medical officers, junior registrars, senior registrars and consultants to be 50, 62, 84 and 42 percent respectively. The authors concluded that resuscitation training for all anaesthetists and anaesthesia trainees be conducted on a yearly basis (Cowie & Story 2000).

Critical care nurses as members of the ALS team are certified in ALS and generally undergo yearly re-certification. The Australian critical care nurses' professional body, the Australian College of Critical Care Nurses (ACCCN), which is affiliated with the ARC, provides a curriculum guide for ALS programs and a national data base of all ALS competent nurses in Australia. A list of the skills is included in the ACCCN. ALS training is listed in Table 2.1.

Table 2.1: ALS skills recognised by the Australian College of Critical Care Nurses.

ALS Skills
Arrhythmia recognition
Defibrillation
Insertion of intravenous cannula
Administration of first-line pharmacological agents
Advanced airway management, including intubation
Transcutaneous pacing
Post-resuscitation management
Patient transport

Adapted from the (ACCCN Ltd. ALS subcommittee 2000)

While the ACCCN recommend annual updates in ALS for nurses, there is a paucity of research dedicated to examining nurses' retention of ALS skills (Wynne, Lodder, Trapani, Hanlon & Cleary 2002; O'Steen et al. 1996). Wynne et al (2002) in a postal survey involving members of the Victorian Branch of the

Australian College of Critical Care Nurses (ACCCN) (n = 238), identified that the majority of nurses underwent annual ALS assessment and had current ALS accreditation. The nurses from this study felt they were educationally prepared and able to manage a cardiac arrest without a medical doctor being present. Indeed the majority of respondents indicated they had initiated and administered ALS medications in the absence of a medical officer. Rightly the authors noted the sample bias. The sample consisted of critical care nurses who were members of the professional body and possibly strongly committed to advancing critical care practice (Wynne et al. 2002). While critical care nurses in this study were willing and able to initiate ALS, these findings cannot be generalised to all critical care nurses or the generalist nurse with ALS certification. O'Steen and colleagues (1996) conducted a study involving 40 registered nurses employed in critical care areas to examine their retention of ALS knowledge and skills. The authors found that scores significantly decreased in the first year after their ALS certification (O'Steen et al. 1996). While the majority of hospitals in major and regional cities have established ALS teams (Finn & Jacobs 2003), the bulk of rural and remote hospitals in Queensland Australia do not (Pascoe 2000).

Management of In-Hospital Cardiac Arrests

Frequently, the 'chain of survival' is weakened by the practice of deploying ALS teams from the critical care areas within the hospital (SoRelle 2000; Coady 1999; Peberdy & Ornato 1997; Eastwick-Field 1996a; Stewart 1996b). Generally, ward nurses as the first on the arrest scene, perform basic life support (BLS) while waiting for the ALS team to arrive to defibrillate the person (Finn 2001; Marenco et al. 2001; Meerabeau & Page 1999; Inwood & Cull 1997; Mancini et

al. 1997; Eastwick-Field 1996a, 1996b; Kaye & Mancini 1996; Stewart 1993). For every minute the ward nurse waits for someone to arrive who can defibrillate, the patient's probability of survival decreases (SoRelle 2000; Coady 1999; Soar & McKay 1998; Kaye, Mancini, Richards et al. 1995).

In hospitals the tradition of allowing only specially trained nurses and doctors to initiate defibrillation prevails. Despite the presence of defibrillators in most ward areas, nurses are not always trained nor allowed to use them (Finn & Jacobs 2003; Kenny & Duckett 2003; Skrifvars, Castren, Kurola & Rosenberg 2002; O'Higgins, Ward & Nolan 2001; Pascoe 2000; Coady 1999; Green 1993). While nurses may have poor retention of CPR and ALS skills (Devlin 2001; Cooper & Libby 1997; Bloomfield 1996; Inwood 1996; Crouch 1993; Wynne et al. 1992) research has demonstrated that CPR competent nurses working in non-critical areas can assimilate and retain the theoretical knowledge and practical skills of using the defibrillator with relative ease (Mancini & Kaye 1999; Mancini & Kaye 1998; Soar & McKay 1998; Destro et al. 1996; Jones & Cooke 1996; Kaye, Mancini, Richards et al. 1995; McKee, Wynne & Evans 1994).

Green (1993) in a study of 544 nurses that examined how arrests are managed, found that while AEDs were available on 43 percent of wards only 13 percent of staff were trained to use the defibrillator (Green 1993). Likewise O'Higgins, Ward and Nolan (2001) in a study of 261 acute hospitals throughout the United Kingdom, found that while many hospitals were implementing defibrillation programs for nurses on general wards, only 56 percent of hospitals permitted these nurses to perform manual defibrillation (O'Higgins et al. 2001). Further, only 38 percent of the hospitals in the study permitted ward-based defibrillator

competent nurses to use the AEDs (O'Higgins et al. 2001). Again, in the United Kingdom, researchers recognised that ward nurses were often reluctant to initiate defibrillation and implemented a defibrillation course specifically designed for ward nurses (Coady 1999). The objective of the course was to train large numbers of ward nurses (n = 247) so the skill would become an accepted nursing procedure. However at the completion of the study there was no increase in the overall percentage nurse initiated defibrillations, a further 80 percent of patients in the study could have been defibrillated before the arrival of the cardiac arrest team.

To describe the resuscitation policy and practice in Australian hospitals Finn and Jacobs (2003) distributed surveys to Directors of Nursing Australia wide. Of the 665 hospitals surveyed, 3.2 percent (n = 21) indicated they did not have a defibrillator and of the 644 hospitals with defibrillators, 16 percent (n = 101) did not permit registered nurses to defibrillate (Finn & Jacobs 2003).

Destro, Maraloni, Sermasi and Rossi (1996) in a study that evaluated the effects of placing AEDs in two non-intensive areas of the hospital, found their use to be less intimidating than the conventional manual defibrillator and supported rapid defibrillation by ward staff (Destro et al. 1996). Over a period of seventeen months, staff used the defibrillator 13 times for ventricular fibrillation. Six of the patients defibrillated were discharged alive from hospital. The researchers noted that the cardiac arrest team would arrive at the arrest to find that both basic and advanced aid had already been started (Destro et al. 1996). The methodological detail in this study is vague and it is unclear who provided first responder defibrillation.

Knowledge limitations of first responders and policy makers of the benefits of early defibrillation and in-hospital response times, impact on nurse initiated defibrillation in-hospital (Gray & Humphry 1997; Mancini & Kaye 1996; Wright, Bannister & MacKintosh 1994). Despite the wealth of research about early defibrillation in the pre-hospital environment, there remains limited accurate data about response times within hospitals (Gray & Humphry 1997; Wright et al. 1994). Many hospitals continue to leave defibrillation as the role of specially trained personnel because of the belief that response times from collapse to defibrillation are acceptable. Response times vary with the time of day, location of the arrest, proximity and type of defibrillator and the mode of response (Wright et al. 1994). Soar and McKay (1998) in a prospective study of 83 in-hospital cardiac arrests, which assessed the role of the hospital cardiac arrest team, found that the first responder had the greatest opportunity to provide a successful outcome (Soar & McKay 1998). Kaye and others (1995) in a two-year review of unmonitored cardiac arrests within the hospital environment, found the time from recognition of the arrest to the first defibrillation exceeded five minutes (Kaye, Mancini, Richards et al. 1995). Similarly, a European study to calculate the time from collapse to defibrillation on general wards, found that in over half of the arrests, defibrillation took longer than three minutes (Wright et al. 1994). Following this study, nurse-initiated early defibrillation programs were instigated to reduce the time interval from collapse to defibrillation (Wright et al. 1994).

Australian studies show nurse-initiated defibrillation programs using AEDs in tertiary referral hospitals do reduce the time from collapse to defibrillation. Gray and Humphry (1997) evaluated the outcome of implementing a hospital-

wide nurse-initiated BLS/AED program in Western Australia. This program consisted of one hour of training, with a target audience of eighty percent of the staff in the hospital. Prior to the implementation of the program, 18 percent of all hospital cardiac arrests (n = 111) were either VF or pulseless VT cardiac arrests. This rate increased to 20 percent (n = 51) post implementation of the AEDs. In 60 percent of all cases both pre and post AED implementation the doctor arrived more than two minutes after the arrest. Following the implementation of the AEDs 30 percent of all shocks were delivered immediately with nurses initiating over 50 percent of the shocks (Gray & Humphry 1997). The authors estimated the time from collapse to first shock was six minutes prior to the implementation of the program and five minutes after (Gray & Humphry 1997). A similar study conducted in a Queensland tertiary referral hospital involved a project officer appointment with the aim of training more than a thousand staff as first responders using an AED. The researchers found the estimated time to defibrillation was greatly reduced from four minutes to one minute post-implementation of the program (Peters & Boyde 2002).

Again in Australia, Warwick and colleagues (1995) over a four-month period trained 90 percent (n = 43) of one hospital's nursing staff to use an AED. The program was well received with staff highly motivated to use the AED. The researchers concluded that an isolated hospital, with a low incidence of cardiac arrests and no resident medical officer is ideally suited for such programs (Warwick, Mackie & Spencer 1995). When examining the literature on the time from collapse to defibrillation the studies identified above did not outline precisely how or when the initial time was noted nor recorded.

While these Australian studies demonstrated that teaching early defibrillation using an AED was successful with one and two hours of training, researchers have shown that similar results can be achieved without prior instructions (Domanovits, Meron, Kofler, Oschatz, Holzer et al. 1998). Domanovits et al. (1998) conducted a study to evaluate whether hospital staff were able to correctly operate an AED in a simulated arrest situation without any prior instruction. In the study, hospital staff were assigned to either the BLS (n = 40) or ALS (n = 40) group. All participants in the 'only BLS-trained' group were able to deliver the three sequential ('stacked') shocks as compared to 98 percent for the 'ALS-trained' group. When the ALS group used a conventional defibrillator, only 88 percent of participants were able to deliver the three shocks. However this group was able to do so significantly more quickly (Domanovits et al. 1998).

Several studies have shown that in an environment where the first responder may have infrequent exposure to cardiac arrests, skills of using AEDs are readily retained (Mancini & Kaye 1999; Soar & McKay 1998; Kaye, Mancini, Richards et al. 1995; McKee et al. 1994). In contrast, ward nurses when using the conventional defibrillator, have poor retention of cardiac rhythm recognition skills (Soar & McKay 1998). Further, the availability of different models of conventional defibrillators results in confusion and a delay in defibrillation (Sullivan & Guyatt 1986).

None of these articles outlined in this section of the chapter utilised standardised Utstein tools for collection of data. Hence, any comparison of findings should be considered with caution.

Cost of Implementing a First Responder Program In-Hospitals

In Australia conventional manual defibrillators remain the most commonly used device for in-hospital defibrillation (Finn & Jacobs 2003; Kenward et al. 2002; Pascoe 2000). Considering the benefits of AEDs in-hospitals, less than 50 percent of Australian hospitals have an AED (Finn & Jacobs 2003). Cost concerns are a significant barrier to be considered when introducing automated defibrillators in the hospital environment. Because AEDs are less costly, easier to use, have a longer battery life and require less maintenance than traditional conventional defibrillators, it may be cost-effective to have several AEDs placed though out the ward as is the case with fire extinguishers (Eisenberg & Mengert 2001; Varon et al. 1999; Kaye, Mancini & Richards 1995). Peberdy and Ornato (1997) in a study that examined the cost of placing 51 AEDs throughout a 1080 bed hospital, found the cost was 90 cents per admission. The authors concluded that strengthening the chain of survival by placing AEDs throughout the hospital was both feasible and affordable (Peberdy & Ornato 1997). Further, the reduced time required to train and retrain personnel to use AEDs contributed to the cost-effectiveness of introducing hospital wide AED programs (Kaye, Mancini & Richards 1995).

Empirical evidence reveals that nurses can be taught combined BLS/AED skills in two to three hours (Varon et al. 1999; Mancini & Kaye 1998; Kaye, Mancini, Richards et al. 1995; McKee et al. 1994). This is compared to 10 hours to four days for advanced life support (ALS) courses and rhythm recognition when using a conventional defibrillator (Stewart 1996b). Despite the benefits of early defibrillation programs using AEDs, evidence suggests there is little difference in patient survival when using either a manual or automatic defibrillator (Kenward

et al. 2002). In reality the patient's management in a non-advanced cardiac life support system remains the same regardless of whether the machine or the user identifies the rhythm and delivers the shock (Eade 2000). It is the time from collapse to the initial shock that makes the difference.

In summary, even with the presence of highly-trained staff and continuous monitoring of patients in the hospital environment, response times from collapse to defibrillation remain disappointing (Marenco et al. 2001; Ballew 1997; Bannister & MacKintosh 1994). The literature suggests early defibrillation by nurses is not occurring and where nurses are permitted to initiate defibrillation, they are not the ones doing so. It is reasonable to assume that survival rates would be significantly improved even in monitored settings, if defibrillation by all nurses became standard practice (Kenward et al. 2002; Coady 1999; Bannister et al. 1994). Survival to discharge following a cardiac arrest in hospitals, requires a multifaceted approach incorporating all links in the chain. The following review focuses on the chain of survival within the rural context.

Management of In-Hospital Cardiac Arrests in Rural Settings

While limited, a few studies have compared in-hospital cardiopulmonary resuscitation management from the perspective of hospital size or location (Finn & Jacobs 2003; Skrifvars et al. 2002; Pascoe 2000). In Australia the hospital network is classified by geographical location into metropolitan, rural and remote areas. Rural and remote areas across Australia are faced with crucial shortages of medical practitioners with small rural hospitals struggling to maintain adequate services (Humphreys, Jones, Jones & Mara 2002). These issues mean nurses

in rural and remote areas have to care for acutely ill people more often in the absence of medical or allied health support (Hegney & McCarthy 2000). In many rural and remote areas, not only is there reduced medical coverage, frequently there are not enough advanced life support (ALS) qualified staff to cover all shifts (Kenny & Duckett 2003; Wynne et al. 2002; Pascoe 2000; Keyzer 1998; Finn 1996). In these settings nurses initiate and maintain BLS until additional ALS or medical support arrive, usually from outside the hospital (Kenny & Duckett 2003; Wynne et al. 2002; Pascoe 2000; Finn 1996; Jones & Cooke 1996; Warwick et al. 1995). Indeed the more geographically isolated the hospital, the longer the response times for attendance at the arrest (Wynne et al. 2002).

Pascoe (2000) conducted a study to identify the existence of ALS system resources in rural and remote public hospitals in Queensland, Australia. In this study surveys were forwarded to the Directors of Nursing (n = 96) and Medical Superintendents (n = 46) of participating hospitals. Ninety-five percent (n = 52) of the sites did not have a cardiac arrest team and 17 percent (n = 16) of these sites did not have a defibrillator. In 58 percent (n = 56) of the sites, registered nurses were not permitted to initiate defibrillation and the greater the remoteness of the site, the less frequently the registered nurse was sanctioned to initiate defibrillation in the absence of a medical officer (Pascoe 2000). In a cardiac arrest situation the doctor was available either in the hospital, the hospital grounds or in the town 54 percent of the time. The study indicated that 22 percent (n = 21) of rural sites indicated the medical officer was available by phone or situated out of

town (Pascoe 2000). The more remote the facility, the less likely that facility is to have 24-hour medical coverage, a nurse permitted to defibrillate or a defibrillator available (Pascoe 2000).

Kenny and Duckett (2003) conducted a study to explore the issues that impacted on the ability of rural Victorian hospitals to provide effective care and found that the majority of hospitals (n = 60) had few or no staff educated in ALS. The authors cite one Director of Nursing in the study as saying: "…The theatre nurse can do it (defibrillate) but when she is off we are really thin on the ground. We just do (cardiopulmonary resuscitation) until the doctor gets here and hope for the best. I know it is not ideal." (Kenny & Duckett, 2003: p. 618). The authors noted the absurdity of this in rural hospitals where there was no on-site medical staff (Kenny & Duckett 2003).

Internationally, Skrifvars and others (2002) under took a study to compare the present status of in-hospital resuscitation management and training in Finnish hospitals of different levels of care. The hospitals were divided into primary (n = 27), secondary (n = 15) and tertiary hospitals (n = 5). Only 11 percent of the primary hospitals had a cardiac arrest team routinely called to all cardiac arrests as compared to 53 and 62 percent for the secondary and tertiary hospitals (Skrifvars et al. 2002). Management of cardiac arrests in most secondary and tertiary hospitals was by the cardiac arrest team (53% and 62% respectively). However in the primary hospitals the ward doctor (56%), doctor on call (44%) or an established cardiac arrest team (11%) managed cardiac arrests (Skrifvars et al. 2002). Fifty-two percent of the primary hospitals occasionally used out-of-hospital emergency medical services in addition to the in-hospital organisation.

Defibrillation performed by nurses before the arrival of the doctor was normal practice in Intensive Care or Coronary Care units, but on general wards the situation differed. Defibrillation was in most cases performed by a doctor (91%) and less often by the nurse (16%). Overall, participants in the smaller primary hospitals had less defibrillation training and equipment compared to the larger hospitals (Skrifvars et al. 2002). Further, participants from primary hospitals were more likely to report that resuscitation training was not sufficient. Participants noted limited resources in both manpower and funding were the main barriers to their lack of training (Skrifvars et al. 2002). Overall, the authors concluded that valuable time was being lost as nurses waited for someone who could defibrillate and further improvements in the way hospitals respond to cardiac arrests was needed to ensure early defibrillation by nurses occurs without the presence of a doctor (Skrifvars et al. 2002). This was also increasingly important within the context of the smaller hospitals without cardiac arrest teams.

Even within the rural setting the attendance of the ALS team is the recognised 'gold standard' for training in resuscitation care (Warwick et al. 1995). Patients in need of advanced resuscitation require rapid and effective interventions and waiting for the medical ALS team to arrive to defibrillate is delaying intervention too long (Parr 2001). In view of this, several studies have examined the introduction of ALS programs for nurses in the rural setting (Camp, Parish & Andrews 1997; Birnbaum, Robinson, Kuska, Stone, Fryback et al. 1994; Sanders, Berg, Burress, Genova, Kern et al. 1994). In large settings where cardiac arrests are a frequent occurrence there is ample opportunity for skill maintenance, but in rural settings where cardiac arrests are infrequent, skill retention is more difficult

to maintain. ALS skills not used regularly or soon after learning will not become part of the learner's repertoire and will be readily lost (Kaye, Mancini & Rallis 1987). In rural settings, the role of the first responder needs to be exploited to produce the greatest benefit for the patient (Parr 2001).

Birnbaum, Kuska, Stone and Robinson (1994) in a study of 12 rural hospitals (n = 61), to determine ALS training needs, concluded that ALS training requirements for rural hospitals should be tailored to meet local needs (Birnbaum, Kuska, Stone & Robinson 1994). In a later study Birnbaum, Robinson, Kuska, Stone, Fryback and Rose (1994) sought to define the effectiveness of training 197 nurses from seven rural hospitals in ALS skills. The researchers found that the nurses could safely use a conventional manual defibrillator. However these skills deteriorated rapidly in less than six months (Birnbaum et al. 1994). Further, skills deteriorated more rapidly for nurses than for the doctors (Birnbaum et al. 1994). The finding was supported by a similar study conducted to examine the initiation of ALS by critical care nurses in the absence of a medical doctor in metropolitan, regional and remote critical care units of Victoria, Australia (Wynne et al. 2002). The researchers noted that nurses in rural critical care units were more likely to have to wait significantly longer periods for medical support to arrive at a cardiac arrest. Ultimately, rural and regional nurses were placed in a vulnerable position by undertaking duties normally performed by the doctor (Wynne et al. 2002). Rural critical care nurses more frequently had perceptions of being legally vulnerable when undertaking ALS skills without a medical officer present. While

the benefits of nurse-initiated defibrillation is not disputed, it is not known if the role will be embraced on a widespread basis. Therefore the literature was explored for evidence pertaining to nurses' attitudes towards nurse-initiated defibrillation.

Attitudes Towards Defibrillation

The reluctance of medical emergency teams to use new equipment such as defibrillators has been reported in both out-of-hospital and in-hospital settings (Coady 1999; Herlitz et al. 1998; Mols, Beaucarne, Bruyninx, Labruyere, De Myttenaere et al. 1994; Kellermann et al. 1993). In the out-of-hospital setting, a study examining the implementation of AEDs by fire fighters found participants were slow to use the defibrillator if they knew the paramedics were on scene or close behind (Kellermann et al. 1993). Similarly, Prina, White and Atkinson (2002) undertook a study to examine first responders' satisfaction with the use of AEDs and found that while first responders held positive attitudes, they did express concerns about the possibility of liability if the resuscitation was not successful (Prina, White & Atkinson 2002). Mosesso, Newman, Ornato and Paris (2002) identified several barriers to police-initiated defibrillation programs including discomfort with the role, insecurity with the use of the device and a lack of pro-active medical direction (Mosesso et al. 2002). This reluctance to use the defibrillator has been attributed to feelings of vulnerability, a fear of making mistakes and a lack of self-confidence (Mosesso et al. 2002; Coady 1999; Mols et al. 1994).

As with the pre-hospital experience a reluctance to initiate defibrillation can be expected when implementing such programs in hospitals (Kenward et al. 2002; O'Higgins et al. 2001; Pascoe 2000; Stewart 1996b; Green 1993). Where policies have changed to permit nurses on general wards to initiate defibrillation, nurses are not those initiating early defibrillation (Coady 1999). The literature shows that despite an outward enthusiasm towards the benefits of extended use of defibrillators, feelings of guilt and anxiety related to performance, discomfort with the role and a reluctance to defibrillate have been reported with the use of defibrillators (Mosesso et al. 2002; Moule et al. 2002; Coady 1999; Kellermann et al. 1993). Nurses continue to express concerns about the use of defibrillators by persons untrained in rhythm recognition of inappropriate discharge and safety issues (Mancini & Kaye 1998; Finn 1996; Kaye & Mancini 1996; Stewart 1996b). Stewart cautioned that expecting ward nurses to undertake a new role that they may perceive to be excessively complex or difficult in an emergency situation may contribute to a state of 'learned helplessness' (Stewart 1996b) and a dependence on persons traditionally responsible for defibrillation to initiate defibrillation. This observation was mirrored in Finn and Jacobs' (2003) study, where it was noted that nurses in some rural hospitals were only permitted to initiate defibrillation under the supervision of the general practitioner. Indeed, these authors noted that one rural hospital commented that some registered nurses refused to be trained to defibrillate.

If nurses are expected to defibrillate, then efforts must be directed at challenging the existing defibrillation ethos within hospitals. Ultimately, it is not sufficient to simply educate and permit nurses to defibrillate. If nurse-initiated defibrillation

is to occur then radical changes in attitudes are required (Kenward et al. 2002; Coady 1999). Regardless of the documented benefits of nurse-initiated early defibrillation programs, within the rural context some nurses may feel they are being pressured to extend their roles to compensate for the lack of medical presence (Hegney, Pearson & McCarthy 1997). Further, while many high acuity skills (such as defibrillation) are called on, these skills may be required infrequently in rural practice placing limitations on both the development and maintenance of expertise and accordingly the confidence of the nurses performing such skills (Hanna 2001). Where the nurse may no longer feel competent to use these skills, the communities and patients depending on these skills will be disadvantaged (Hanna 2001).

Frequently decisions are made that impact on the role of the rural nurse without an appreciation of individual beliefs and views from the rural context (Keyzer 1998). Prior to initiating protocols that ask rural nurses take on additional roles, the inherent beliefs and attitudes of these nurses and their perceptions of the influence of peers should be explored.

Summary of 'Chain of Survival' In-Hospital

Resuscitation is an active and growing focus of academic inquiry, yet there is much about resuscitation that remains unknown (Cummins, Chamberlain et al. 1997). For example, the true effectiveness of emergency cardiac training programs, how well people remember what they learn or even whether they will perform these skills in a true emergency is not known (Cummins, Chamberlain et al. 1997). Similarly, while there is a plethora of information to support the benefits of early

defibrillation by nurses in the hospital setting, given the traditions of defibrillation, it is difficult to predict whether nurses will actually use the defibrillator in a cardiac arrest.

Radical changes in attitudes are required if nurses are likely to initiate early defibrillation, as merely permitting nurses to defibrillate is not enough. Having a duty of care does not guarantee effective performance in defibrillation, a motivation to learn or even a desire to initiate defibrillation (Moule et al. 2002). While nurse-initiated defibrillation programs may be meeting the objective of allowing more nurses to defibrillate, early defibrillation by nurses is not actually happening (Skrifvars et al. 2002; Coady 1999). The understanding of the attitudes and beliefs nurses have towards defibrillation is deficient. Increasing this understanding will assist in effectively planning interventions that potentially increase the levels of defibrillation by nurses. An existing theoretical framework offers the potential to guide a new exploration of the nurses' attitudes and beliefs.

Theoretical Framework

The application of theories serve to focus the research by shaping the organisation, analysis, interpretation and explanation of data (Minichiello, Sullivan, Greenwood & Axford 2004). Despite policy change to allow rural nurses to defibrillate, there is currently no research that uses a systemic theoretical approach to investigate the specific predictors of rural nurses' use of defibrillators. Insight into the early defibrillation intentions of rural registered nurses may be obtained by exploring the determinants of their attitudes and intentions toward early defibrillation. Attitudes, beliefs and emotional factors relating to the use of defibrillators form

part of the essential components of defibrillation training (Kaye & Mancini 1998). If there is to be an acceptance of defibrillation as an essential part of a nurse's role, these factors must be explored. Inappropriate attitudes or beliefs about defibrillation may hamper implementation and skills development (Walters et al. 1992). The Theories of Reasoned Action and Planned Behaviour suggested the potential to be models for examining attitudes and predicting behavioural intention. To further understand nurses defibrillation intentions this section of the chapter explores the current literature on the theories.

Overview of the Theory of Reasoned Action and the Theory of Planned Behaviour

For a number of years social scientists have shown a growing interest in the relationship between attitudes and actions (Ajzen & Fishbein 1980). This interest led to the development the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) (Ajzen 1988; Ajzen & Fishbein 1980; Fishbein & Ajzen 1975). The Theory of Reasoned Action (TRA) and its extension, the Theory of Planned Behaviour (TPB) are currently the dominant theoretical frameworks used to explain the relationship between attitudes, intentions and actions (Armitage & Conner 2001; Powell & Goulet 1996; Ajzen 1988; Ajzen & Fishbein 1980). According to the TRA, the immediate antecedent of any given behaviour is the individual's intention to perform the behaviour. A person's intentions are determined by their attitudes towards the behaviour and their perception of whether or not persons important to them think that they should or should

not perform the behaviour (subjective norm). The elements of both theories are outlined in Figure 2.6. The TRA is said to be appropriate when the desired behaviour is under a person's volitional control (Ajzen & Fishbein 1980).

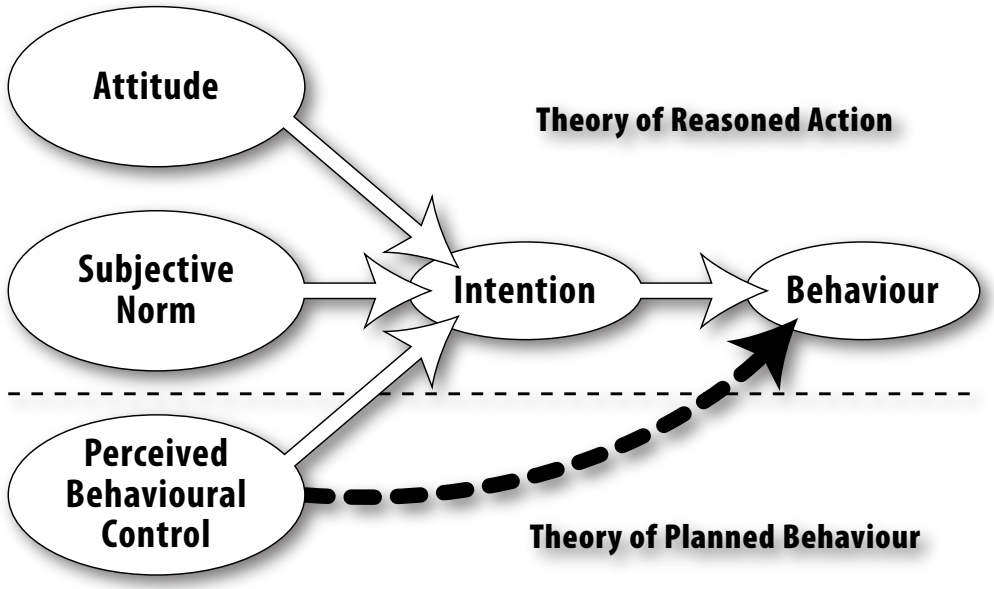

Figure 2.6: The Theory of Reasoned Action.

Because people do not have complete control over their behaviour, in 1985 there was a move to add an element of perceived control. The Theory of Planned Behaviour is essentially an extension of the TRA and adds perceived control as the third determinant of intention (Ajzen 1988). The TPB is appropriate for behaviour that is both under volitional and non-volitional control and is arguably the dominant theoretical framework used to explain and predict human behaviour (Figure 2.6) (Armitage & Conner 2001; Cheung et al. 1999; Sideridis et al. 1998; Trafimow & Trafimow 1998; Marcoux & Shope 1997; Powell & Goulet 1996; Ajzen 1988). To date no studies have used a theory to predict defibrillation behaviour in nurses.

Theory of Reasoned Action (TRA)

The Theory of Reasoned Action has received considerable attention over the last 20 years as researchers attempt to explain and/or predict various aspects of human behaviour (Trafimow et al. 2002; Brewer, Blake, Rankin & Douglas 1999; Sideridis et al. 1998; Powell & Goulet 1996). According to the TRA human beings are assumed to behave in a rational manner and make systematic use of information available to them (Ajzen & Fishbein 1980). Prior to engaging or not engaging in a given behaviour, people will consider the implications of their actions (Ajzen & Fishbein 1980). Assuming that the behaviour is under the individual's control, the intention to perform or not perform the behaviour is the immediate and primary determinant of the action (Trafimow et al. 2002; Powell & Goulet 1996). Therefore there is said to be a relationship between an individual's intention to engage in a behaviour and the actual behaviour (Powell & Goulet 1996). The TRA attempts to associate a person's attitude toward a behaviour with enactment of the behaviour by incorporating beliefs, attitudes and intention to perform as well as the performance of the behaviour (Brewer et al. 1999). According to the TRA, attitude and normative factors can be assessed either directly or indirectly (Ajzen & Madden 1986).

Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour is an extension of the TRA. Ajzen argued that the TRA was satisfactory for understanding and predicting behaviour so long as the action is perceived to be under the individual's control (Ajzen 1988). When the behaviour is not under the individual's direct control the behavioural intention

may predict the person's attempt to perform the behaviour as opposed to its actual performance (Fazekas, Senn & Ledgerwood 2001). Should the behaviour be not under the person's control then the additional variable of perceived behavioural control (PBC) is to be included (Sideridis et al. 1998; Trafimow & Trafimow 1998; Ajzen 1988). This modification to the original formulation TRA resulted in the Theory of Planned Behaviour (TPB) (Ajzen 1988). Thus in the TPB (Figure 2.6) the direct measures of attitudes, subjective norms and perceived behavioural control contribute to the formation of behavioural intentions (Cheung et al. 1999; Trafimow & Trafimow 1998). PBC may affect both intentions and behaviour (as indicated in Figure 2.6 by the broken arrow). Regardless of the strength of a person's intention to perform a behaviour, the implementation of intentions into actions will be partially determined by personal and environmental barriers (Armitage & Conner 2001). PBC will become increasingly useful in the prediction of intention as volitional control decreases (Ajzen 1991). The extended model is appropriate for both volitional and non-volitional behaviour (Marcoux et al. 1997). Because research has shown that the perception of control over the behaviour contributes to an intention to perform it, it has become customary to include perceived behavioural control in studies (Sheeran & Taylor 1999; Ajzen 1991; Ajzen 1988).

Predicting Behaviour from Intention

Central to both theories is the postulation that attempting to perform a behaviour is a function of an individual's intention to perform that behaviour. Further intentions will remain dispositions, until the appropriate time where an attempt will be made to translate these intentions into actions (Ajzen 1991; Ajzen 1988).

At this stage behavioural intentions are the immediate determinant of behaviour and when an appropriate measure of intention is obtained it will provide the most accurate prediction of behaviour (Brewer et al. 1999; Ajzen & Fishbein 1980).

There are ample empirical examples of intentions that are highly correlated with behaviour resulting from the application of the theories (Armitage & Conner 2001; Sheeran, Norman & Conner 2001; Armitage & Conner 1999; Mummery & Wankel 1999; Ajzen 1988). Meta-analyses devoted to the intention-behaviour relationships have been reported with correlations of 0.53 (87 studies) (Sheppard, Hartwick & Warshaw 1988), 0.45 (98 studies) (Randall & Wolff 1994), 0.44 (28 studies) (Sheeran & Orbell 1998) and 0.47 (185 studies) (Armitage & Conner 2001). Ajzen (1988) suggests that if intentions are the immediate determinants of volitional behaviour, then intentions mediate the relationships between attitudes, subjective norms to perceived behavioural control (Ajzen 1988). Further, the addition of attitude, subjective norm and perceived behavioural control do not significantly improve the prediction of intention (Mummery & Wankel 1999). Although the behavioural intention measure may be a step removed from the actual behaviour, it would appear to be a reasonable approximation of actual behaviour.

Intention

The TRA regards human behaviour to be directly determined by individual intention and when people have control over their own behaviour they will act in accordance with their intentions (Trafimow et al. 2002; Powell & Goulet 1996). Thus to understand and predict behaviour, factors associated with intention

need to be assessed (Levin 1999). Intention is a function of the person's attitude (effective response to performing the behaviour) and perceived social norms about the behaviour. That is, with the TRA a person's intention to perform a behaviour is determined by their attitude towards the behaviour and by their subjective norm (Brewer et al. 1999; Ajzen 1988; Ajzen & Fishbein 1980).

Attitudes

Attitude toward behaviour is a value response to an object, person, institution or event, whether it is favourable or unfavourable (Brewer et al. 1999; Ajzen 1988; Ajzen & Fishbein 1980). Attitudes can be assessed either directly or indirectly as a behaviourally based attitude measure (Ajzen & Timko 1986). The direct measures of attitude assesses how positive or negative an individual's attitudes are toward performing the behaviour (Fazekas et al. 2001). In turn, attitudes towards the behaviour are shaped by our salient beliefs about the consequences of the behaviour and our evaluation of the consequences of the behaviour (indirect measures) (Trafimow et al. 2002; Brewer et al. 1999; Levin 1999; Ajzen & Fishbein 1980). The indirect measures are illustrated in Figure 2.7. Thus, to obtain an estimation of a person's attitudes toward performing a particular behaviour, one's salient beliefs about the consequences of performing the behaviour are multiplied by evaluation of these consequences (Ajzen 1988; Ajzen & Madden 1986; Ajzen & Fishbein 1980). It is either the direct measures of attitude or its multiplicative term (indirect measures) that are used to predict behaviour (Fazekas et al. 2001).

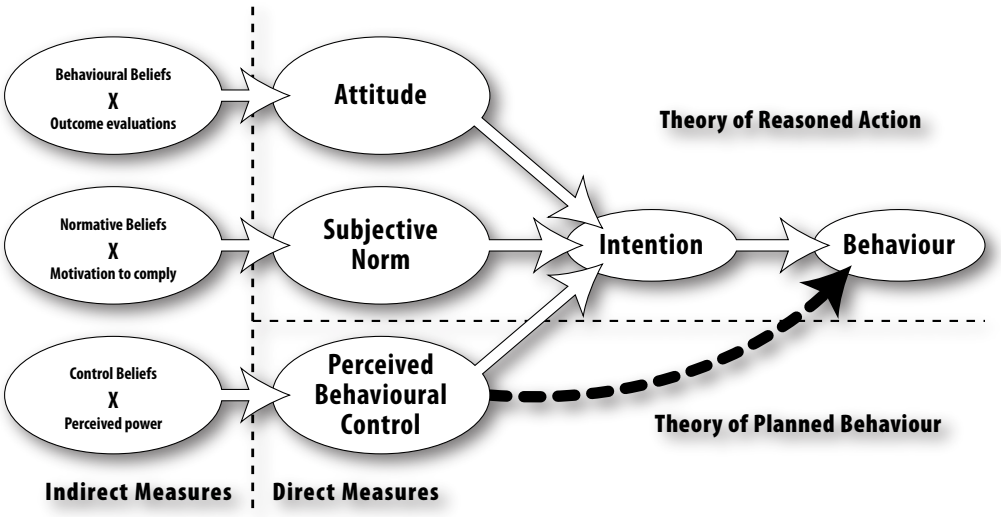

Figure 2.7: Direct and Indirect measures of the theories.

Subjective Norms

The second contributor to the formation of intention is subjective norm (SN). Correspondingly, SN may be assessed either directly or indirectly (Ajzen & Timko 1986). The direct measures of subjective norm assess a person's perception of social pressures, that is a perception that important people approve or disapprove of the behaviour (Trafimow et al. 2002; Brewer et al. 1999; Fishbein & Ajzen 1975). In general, the more favourable (or negative) the person's attitude towards the behaviour, the stronger the intention will be to perform it (Armitage & Conner 2001). The indirect measures of subjective norms are determined by a person's salient normative beliefs (beliefs about what important people or groups of people think the person should do) and how much the person wishes, or is motivated to comply with the suggestions of each of these important others (Trafimow et al. 2002; Brewer et al. 1999). Hence, indirect measures are obtained by the score of the normative beliefs multiplied by the score of the individual's motivation to

comply with significant other (Figure 2.7) (Ajzen & Timko 1986; Ajzen & Fishbein 1980; Fishbein & Ajzen 1975). This study uses only the direct measures to predict behavioural intentions.

Perceived Behavioural Control

Perceived behavioural control deals with the ease or difficulty performing a particular behaviour of interest (Ajzen 1988). As a general rule the more favourable the attitude and subjective norm are towards the behaviour, and the greater the perceived behavioural control, the stronger the person's intentions should be to perform the behaviour (Ajzen 1988). Congruent with the other direct measures of intention, attitudes and subjective norm, PBC is predicted by indirect measures of control beliefs (Ajzen 1991). Control beliefs are defined as the likelihood that certain barriers will facilitate or hinder the performance of the behaviour (Ajzen & Madden 1986). The belief-based measures of PBC are obtained by multiplying the perceived frequency of occurrence of facilitating/inhibiting factors by the power of those factors to inhibit/facilitate the behaviour in question (Armitage & Conner 1999).

Despite the increase in predictive power and considerable support for the TPB, much has been written about the conceptualisation of PBC and the extent to which it is understood (Trafimow et al. 2002; Cheung et al. 1999; Chan & Fishbien 1993; Ajzen 1991). Perceived behavioural control has been described as the extent a person believes:

- they can or cannot perform the behaviour
- the easy or difficulty of performing the behaviour

- the extent the performance of the behaviour is or is not under the person's control (Trafimow et al. 2002; Ajzen 1991).

Others believe PBC deals with past experiences, knowledge, competencies, resources, opportunities and barriers to performing the task (Levin 1999; Sideridis et al. 1998). Ajzen acknowledges the similarities between the PBC and other constructs in the social psychology literature (Ajzen 1991). Notably, Ajzen suggests that perceived behavioural control (PBC) is broadly equivalent to Bandura's (Bandura 1977) concept of self-efficacy and refers to an individual's appraisal of their ability to perform the behaviour (Ajzen 1998). Ajzen notes the main difference between the PBC and self-efficacy is that the PBC is placed within a larger context of beliefs and attitudes that predict intentions (Ajzen 1991).

Uses of Theory Reasoned Action and Theory Planned Behaviour

Both the TRA and TPB have been used successfully in numerous studies to predict and understand individual behaviour in a variety of health-related settings. These behaviours include factors influencing the consumption of milk (Brewer et al. 1999), waste paper recycling (Cheung et al. 1999), blood donation (Giles & Cairns 1995), condom use (Fazekas et al. 2001; Chan et al. 1993), glove use by health care workers (Levin 1999) and care of potential blood donors (Watkinson 1995). As well as explaining human behaviour, many researchers have tested the predictive powers of the models (Armitage & Conner 2001; Sheeran et al. 2001; Smith, A. & Biddle 1999; Baker, Morrison, Carter & Verdon 1996; Godin & Kok 1996).

Empirical Research Utilizing the TRA

Convincing support exists for the use of a social-cognitive model such as the TRA in the design of health education interventions (Baker et al. 1996). The TRA has provided strong and valid predictions of a variety of health-related decisions including, condom use (Baker et al. 1996), milk consumption (Brewer et al. 1999), glove use (Levin 1999) and predicting back pain sufferers' intentions to exercise (Trafimow & Trafimow 1998).

The extent that attitude and subjective norm contribute to the prediction of intention varies with the behaviour (Levin 1999). Baker and others (1996) found the TRA to be robust in its application when applied to 703 heterosexual STD clinic clients' use of condoms (Baker et al. 1996). The researchers found that attitude and social norm accounted for a large proportion of the variance in intention to use a condom. Godin, Valois and Lepage's (1993) study of physical activity noted approximately 30 percent of the variance in intention was explained by the attitudinal and normative components of the theory. Further, the attitudinal component has nearly always found to be the stronger of the two components (Mummery, Spence & Hudec 2000; Hausenblas, Carron & Mack 1997; Godin, Valois & Lepage 1993). Conversely, Brewer and colleagues (1999), in a study of one hundred women to determine the factors influencing the consumption of milk noted that the TRA performed well in explaining milk consumption behaviour. Contrary to the findings of similar studies, this study did not find subjective norm to be significant predictor of milk intake. The authors cautioned against using the model alone as the subjective norm and factors outside the model influenced behaviour (Brewer et al. 1999). Likewise, Smith and Biddle (1999) when examining

attendance at a fitness club found that while the attitudinal and social normative components of the TRA accounted for 13.1 percent of the variance in behaviour, only social norm significantly predicted intention. The authors argue that this was because the participants had a strong intention to adhere and this homogeneity in intentions may have accounted for the relatively low variance (Smith & Biddle 1999). Mummery and Wankel (1999) extended this notion that the relative homogeneity of behaviours of the population may lead to a low predictive ability of the model at the level of behaviour.

The TRA has equally been applied in nursing contexts including nurses' intentions towards self-poisoning patients (McKinlay, Couston & Cowan 2001), nursing students' intentions to work with geriatric clients (Dunkle & Hyde 1995) and nurses working with patients with AIDS (Laschinger & Goldenberg 1993; Goldenberg & Laschinger 1991). British researchers, McKinlay, Couston and Cowan (2001) used the TRA to explore nursing staff attitudes towards self-poisoning patients. A questionnaire was distributed to male and female registered general nurses (n = 74) employed in an acute medical ward and accident and emergency department of a large general hospital. The researchers found that attitudes and subjective norm accounted for 66 percent of the variance in intentions. While both the nurses' attitudes and their subjective norm made a significant contribution, attitudes predominated over subjective norm.
The authors concluded the TRA offered a satisfactory explanation of nurses' behavioural intentions towards self-poisoning patients (McKinlay et al. 2001).

Similarly, a study in an Israel hospital found the TRA proved to be a useful framework for examining nurses' intentions to use physical restraints (Werner & Mendelsson 2001). Three hundred and three nurses from an elder care hospital completed a questionnaire based on the TRA. The researchers found that the TRA explained 48 percent of the variance in nurses' intentions. The measure of attitude, when examined by itself, contributed 43 percent of the variance in scores for intention. Subjective norm and moral obligations assess a small but significant contribution to the model containing the attitudes measure (Werner & Mendelsson 2001).

Empirical Research Utilizing the TPB

Like the TRA the predictive power of TPB is well established in health psychology research (Armitage & Conner 2001; Sheeran et al. 2001; Marcoux et al. 1997; Godin & Kok 1996). The TPB has been tested with a variety of health behaviours such as exercise (Mummery et al. 2000; Smith & Biddle 1999; Wankle & Mummery 1993), smoking (Gantt 2001; Norman, Connor & Bell 1999; Hanson 1997; Godin, Valois, Lepage & Desharnais 1992), sunbathing (Hillhouse, Adler, Drinnon & Turisi 1997), alcohol use (Marcoux et al. 1997), condom use (Fazekas et al. 2001; Craig, Wade, Allison, Irving, Williams et al. 2000), low-fat diet (Armitage & Connor 1999), getting hormone replacement therapy (Quine & Rubin 1997) and attitudes toward providing care for suicidal patients (Pederson 1993).

The review of the literature supports the addition of PBC to the TRA to enhance the predictive power of the theory (Mummery et al. 2000; Armitage & Conner 1999; Levin 1999; Mummery & Wankel 1999; Sheeran et al. 1998; Sideridis et al. 1998; Hillhouse et al. 1997; Marcoux et al. 1997; Jurgens 1996; Ajzen 1991). Sheeran and others using a meta-analysis indicated that intentions and PBC are reliable indicators of behaviour and generally account for between 20 and 40 percent of the variance (Sheeran et al. 2001). Further the authors noted that after controlling for intentions, PBC contributed a significant increment in the variance in behaviour (Sheeran et al. 2001). Likewise Armitage and Conners' meta-analysis of the efficacy of the TPB found the $R = 0.52$ ($R^2 = .27$) for the multiple of intention and PBC with behaviour (Armitage & Conner 2001). Marcoux and Shope (1997) when comparing TRA and TPB, in a longitudinal study of 3946 children in intention to use alcohol, found the TPB was more effective in explaining the variance (76%) in alcohol used when compared to TRA (52% of the variance, significant $P < 0.01$). Similarly, Fazekas and colleagues (2001) when examining condom use among university women found the addition of PBC to previously tested TRA (same study) significantly improved the fit of the model by 9 percent. Authors testing the model caution that, as with the TRA, the extent PBC contributes to the prediction of behavioural intention will vary with the behaviour (Levin 1999).

Godin and Koks' meta-analysis of 76 TPB applications reported that attitude, subjective norm and PBC accounted for 41 percent of the variance in intentions, while intentions and PBC accounted for 34 percent of the variance in behaviours of 35 applications (Godin & Kok 1996). Wankel and Mummery's fitness survey

of over 4000 participants found 31 percent of the variance in intentions was explained by the three variables of the TPB (Wankle & Mummery 1993). Likewise, Craig and others when surveyed school students to identify their intentions to use birth control pills in combination with condoms found the TPB explained between 23 and 45.8 percent of the variance in intention (Craig et al. 2000). These findings are consistent with those from many other studies that have empirically tested the TRA or TPB and condom use which found the theories account for between 10.6 percent and 50 percent of the variance on intention (Fazekas et al. 2001; Richardson, Beazley, Delaney et al. 1997; Baker et al. 1996; Chan et al. 1993). Conversely Hanson, when examining smoking intentions of three ethnic groups of women, found that cultural values and beliefs partially accounted for differences in contribution of subjective norm as a predictor of smoking in the three groups (Hanson 1997).

While limited, TPB was found to be appropriate when applied within the context of nursing, including neuroscience nurses' intentions to care for persons' with HIV/AIDS (Dilorio 1997), nurses' intention to administer morphine for postoperative pain (Jurgens 1996); obstetric nurses' collaboration with midwives (Schottle 1999); and postpartum smoking relapse (Gantt 2001). Jurgens (1996) conducted a study to investigate the cognitive predictors of nurses' (n = 149) decisions to administer morphine for pain post-operatively using the TPB. Over 50 percent of the variance in behavioural intentions was accounted for by the direct measures of the model. Attitude and PBC emerged as the independent predictors of behavioural intentions with subjective norm failing to make an independent contribution (Jurgens 1996). Similarly, a study conducted to examine

obstetric nurses' intentions to collaborate with midwives in the care of midwifery patients, found that subjective norm also failed to contribute to the prediction of behavioural intentions (Schottle 1999). In a recent study, McKinlay and Cowan (2003) used the TPB to explore attitudes of student nurses (n = 172) towards working with older patients. The participants in the study had generally positive intentions towards and attitudes about working with older patients. Although participants' attitudes were the main determinants of behavioural intentions, their subjective norms also played a small, but significant role (McKinlay & Cowan 2003). However their perceptions of control did not predict intention. The authors of this study concluded the TPB did not offer a more satisfactory explanation of student nurses' behavioural intentions toward working with the older person than did the TRA (McKinlay & Cowan 2003). Findings from these studies with nurse participants provide evidence of the predictive power of the constructs of attitude, subjective norm and perceived behavioural control in predicting and explaining behaviour and generally account for 40 to 50 percent of the variance (Gantt 2001; Armitage & Conner 1999; Schottle 1999; Dilorio 1997).

External Variables

The term 'external variables' is used to indicate any independent variables not included in the models. External variables are presumed to influence intentions and/or behaviour indirectly through the formation of attitudes, subjective norm or PBC, hence, are not directly included in the theories (Levin 1999). The external measures are illustrated in Figure 2.8.

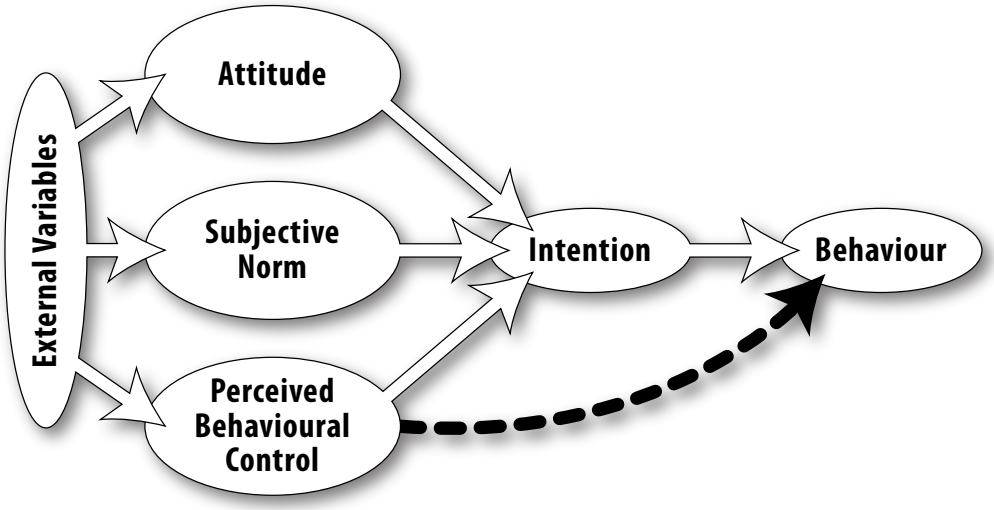

Figure 2.8: The Theoretical Framework and the External Variables.

The impact of additional external variables such as socio-demographic variables, level of education and past experience have been included in studies using the theory and have been shown to increase the prediction of intention and behaviour (Christian & Armitage 2002; Gantt 2001; Armitage & Connor 1999; Conner, Warren, Close & Sparks 1999; Levin 1999; Godin et al. 1993). Although many of these researchers have demonstrated a strong and direct effect on behaviour, Ajzen and Fishbien (1980) note that such variables are mediated by direct and indirect model variables (Ajzen 1998; Ajzen 1991; Ajzen 1988; Ajzen & Timko 1986; Ajzen & Fishbein 1980). Ajzen (1991) has stated that the predictors outside the TPB may be included "if it can be shown that they capture a significant portion of the variance in intention or behavior {sic} after the theory's current variables have been taken into account" (p199). The next section outlines the external variables included in the current research.

External Variable: Past Behaviour

The TRA and PBC have been criticised for excluding the role of past behaviours and its influence on behavioural intention or current behaviour (Leone, Perugini & Ercolani 1999). Ajzen asserts the more one performs a behaviour, the more likely the behaviour is to become a habit, and those habits will influence behaviour independent of attitudes and intentions (Ajzen 1998). Researchers have shown that the inclusion of past behaviour in the TPB can help account for a substantial portion of additional variance in behavioural intention (Christian et al. 2002; Conner et al. 1999; Ouellette & Wood 1998; Godin et al. 1993). Christian and Armitage (2002) when investigating homeless peoples' (n = 104) participation in outreach service programs found that the addition of past behaviour added a further 4 percent in the amount of variance explained by the TPB ($F_{change} = 4.17$, $p < 0.05$). Hence the frequency of past behaviour should be included with the prediction of behaviour.

Ouellette and Wood (1998) contend that if an individual practices a behaviour frequently in a constant context, then past behaviours will guide the behaviour because the processes that control the behaviour are automatic (habitually controlled behaviours) (Ouellette & Wood 1998). When applying Ouellette and Woods findings and the TPB to defibrillation, if the behaviour (nurse initiated defibrillation) is performed infrequently or performed in unstable or difficult contexts (for example a cardiac arrest situation) the impact of past behaviour on the current behaviour will be mediated by intentions (consciously controlled behaviours) (Ouellette & Wood 1998). Within the resuscitation context, Lewis, Kee and Minick (1993) undertook a study in Atlanta, Georgia to explore the

retention of cognitive and psychomotor CPR, skills of 73 nurses (Lewis et al. 1993). Past experience such as the frequency of exposure to CPR, either through certification or participation in arrests, positively affected psychomotor skill scores (Lewis et al. 1993). The longer the time since certification, the lower the psychomotor skill score (Lewis et al. 1993). This is consistent with defibrillation literature that finds that defibrillation skills of nurse deteriorate rapidly with time (Kaye & Mancini 1998; Destro et al. 1996; Inwood 1996).

External Variable: Specific Beliefs

Both the TRA and TPB consider one's general attitudes as an external measure toward defibrillation as predictive of early defibrillation intentions. Research conducted by Ajzen and Timko (1986) found that while general attitudes failed to correlate with behavioural intention, specific beliefs significantly correlated with behavioural intention (Ajzen & Timko 1986). Likewise, Fazekas, Senn and Ledgerwood (2001) propose that general attitudes fail to capture the rich and subtle complexities of attitudes as it offers little practical information in terms of the kinds of specific beliefs that should be targeted context specific education programs (Fazekas et al. 2001). This study therefore examined participants specific beliefs about defibrillation within the theoretical framework of the TPB. Ajzen and Fishbein hypothesised that the influence of specific beliefs on BI are indirect and should be considered external variables (Ajzen & Fishbein 1980). To test this assumption beliefs about defibrillation were treated as external variables and mediate the formation of intention through the direct measures.

Summary of the Theoretical Framework

The literature presented has demonstrated highly significant predictability of both behaviour and behavioural intentions from the direct measures of the Theories of Reasoned Action and Planned Behaviour. Further, given the significant relationship between intentions and performance of the behaviour, the Theories of Reasoned Action and Planned Behaviour were principally designed to predict behavioural intention (Mummery & Wankel 1999; Ajzen & Fishbein 1980). It is then reasonable to assume that these theories could equally be useful in predicting rural registered nurses' early defibrillation intentions.

Conclusion

This review of the literature has suggested the 'Chain of Survival' in-hospitals is weakened by nurses either not being permitted to initiate defibrillation or nurses' reluctance to initiate defibrillation. Currently no investigation into the beliefs or specific predictors of rural registered nurses' defibrillation practices has been conducted. Through the application of a theoretical framework this research will fill these gaps. The Theories of Reasoned Action and Planned Behaviour will be used to examine the variables that are of greatest importance in predicting, explaining and understanding nurses' use of defibrillators.

Explaining and predicting defibrillation behaviour can be achieved through an understanding of the benefits of nurse-initiated early defibrillation on patient survival (attitude), the support of others (subjective norms), perceived level of control (PBC) and defibrillation beliefs (external variables). Because using a defibrillator is a behaviour, hypothetically not under direct volitional control of

the nurse, it was predicted that perceived control (TPB variable) would explain a significant portion of the variance in rural nurses' defibrillation intentions, beyond that accounted for by the TRA variables. Facilitating our understanding and identifying the determinants of nurses' early defibrillation behaviour will ultimately make possible the goal of early defibrillation by nurses.

CHAPTER THREE

Study Methodology and Methods

Introduction

The literature highlighted that rapid response and early defibrillation by all nurses is crucial to improving patient survival following a cardiac arrest. Further, simply implementing protocols that ask rural nurses to adopt additional roles may not ensure all embrace early defibrillation. The first section of this chapter outlines how mixed methodology and the theoretical framework were applied to this study and guided the development and implementation of the data collection instrument and the subsequent data analysis. The subsequent sections provide a detailed description of the methods used for two phases of the study.

Methodology Overview

Knowledge in nursing research has traditionally been acquired primarily through either quantitative or qualitative paradigms. Consequently nursing literature like other disciplines focused on the inherent differences and incompatible nature of these two methodologies rather than the relative value of particular

research technique (Minichiello et al. 2004; Holloway & Wheeler 1996; Polit & Hugler 1995; Datta 1994; Corner 1991; Carter 1988). Qualitative approaches are broadly based on the belief that truth and knowledge are socially constructed and attempts to understand how people look at the world and to comprehend how this motivates them to act in a particular manner (Minichiello et al. 2004; Holloway & Wheeler 1996). Quantitative research on the other hand believes that one truth exists and knowledge is gained through measurement, typically with multiple subjects in controlled experiments (Minichiello et al. 2004). Reichardt and Rallis (1994) believe both paradigms share a commitment to the understanding of the human reality and conviction that research should be rigorous and conscientious. Authors recognise the complementary strengths inherent in both paradigms and how these can be used in tangent to explore the nature of social sciences (Creswell 2003; Tashakkori & Teddlie 1998; Reichardt & Rallis 1994). Mixed methodology contains elements of both quantitative and qualitative approaches and despite it still not being recognised as an independent methodological movement, it is increasingly making inroads into the social and behavioural sciences (Creswell 2003; Gatta 2003; Tashakkori & Teddlie 1998).

This study as with current nursing research has moved beyond the quantitative/qualitative debate to become less constrained by a single method in order to explore the unique area of nursing, in all its complexity. This study uses mixed methodology designs in which both qualitative and quantitative techniques are used as a vehicle for producing comprehensive perspectives of a little-understood phenomenon – nurse initiated defibrillation.

While there is currently no consensus on the precise manner for combining paradigms in a logical way to ensure valid inferences authors have begun to specify criteria implicit in mixed method research (Gatta 2003; Teddlie & Tashakkori 2002; Tashakkori & Teddlie 1998). They include:

1. Implementation of data collection
2. Recognition of the theoretical drive of the research
3. Priority
4. Bias

Implementation of Data Collection

The first criterion refers to the organisation of the data collection. Tashakkori and Teddlie (1998) provide a taxonomy for the organisation of the different types of mixed method designs:

- Equivalent status designs: Sequential (QUAN/QUAL and QUAL/QUAN) and Parallel/Simultaneous (QUAN + QUAL and QUAL/QUAN)
- Dominant-less dominant designs: Sequential (QUAN/qual and QUAL/quan) and Parallel/Simultaneous (QUAN +qual and QUAL/quan)
- Designs with multilevel use of approaches (Tashakkori & Teddlie 1998 p:43).

Consistent with the TRA and TPB framework a sequential mixed method (QUAL/QUAN) design was chosen as appropriate to address the research questions posed by this study. The QUAL/QUAN sequence is a two-phase design where

the research starts with qualitative data collection and analysis on the relatively unexplored topic of (nurse initiated defibrillation) (Tashakkori & Teddlie 1998; Creswell 1995). In the second phase the results are used to inform the design of a structured and quantifiable survey instrument, the quantitative phase (Tashakkori & Teddlie 1998; Creswell 1995). These phases are presented in Figure 3.1.

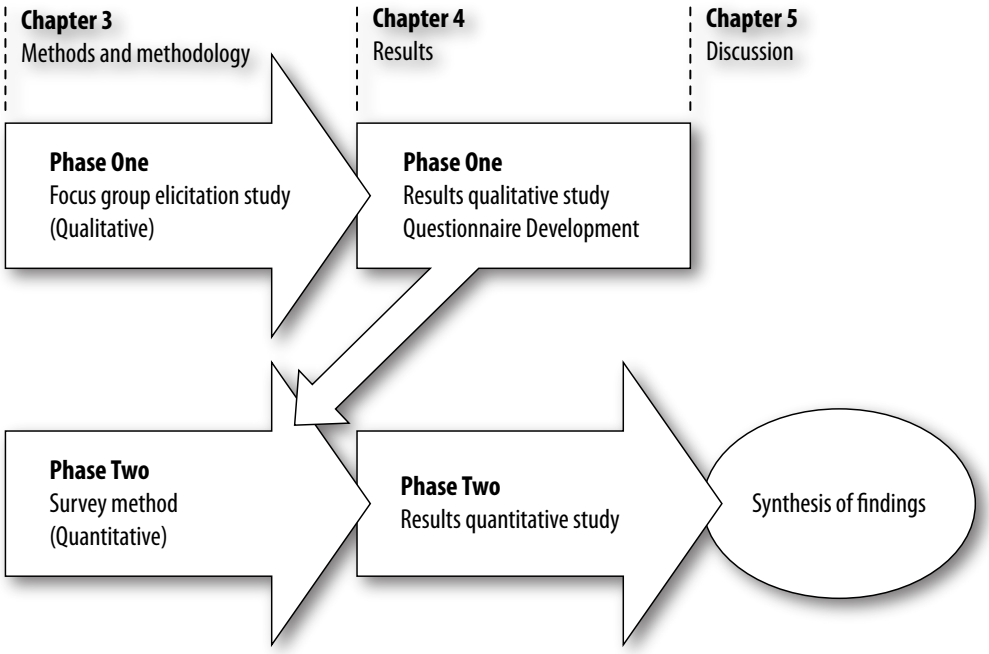

Figure 3.1: Adapted from (Tashakkori & Teddlie 1998).

Recognition of the Theoretical Drive and Phases of the Research

The previous chapter of the thesis explored how the TRA and TPB deal with the antecedents of attitude, subjective norm and perceived behavioural control. These theories postulate that these antecedents consist of salient beliefs relevant to the behaviour in question. A small number of salient beliefs serve as important determinants of a person's attitude, subjective norm and perceived behavioural control (Ajzen 1988). Thus, in order to draw inferences about behavioural

intentions, there must first be an identification of the person's salient beliefs about that particular object (Ajzen 1988). Delineating rural nurses' beliefs about nurse-initiated defibrillation was the first step in designing and conducting intervention studies in this population. This step was necessary because different populations may possess different beliefs regarding the target behaviour (nurse initiated early defibrillation) (Ajzen & Fishbein 1980). The first phase of the research adopts a qualitative approach using focus group method. Focus groups are appropriate for exploring the ideas and perception of the participants and are often used to triangulate data collection (Minichiello et al. 2004; Holloway & Wheeler 1996). Following Phase One, the survey instrument was drafted and a pilot study conducted to determine the internal consistency and clarity of the developed questionnaire.

The second phase, the main study involved the administration of the developed questionnaire to the target audience. The target audience for the second phase was registered nurses employed in acute care hospitals across rural Queensland (rural, remote and metropolitan areas classification).

Priority

The notion of priority refers to whether one paradigm should be afforded priority in the research (Creswell 2003). Consistent with the theoretical framework, the second quantitative Phase was given primacy within this study. As quantitative methods have the ability to generalise, priority was afforded to Phase Two to support the generalisation of results.

Bias

Creswell (2003) cautions that bias can be problematic when using a mixed design, due to the philosophical differences between qualitative and quantitative approaches (Creswell 2003). Quantitative researchers try to be objective by distancing themselves from influencing data collection to develop and understand the world as it is. Whereas the qualitative researcher views themselves as a primary instrument in the collection of the data (Tashakkori & Teddlie 1998). Researchers using mixed designs must balance using their perspective to enhance their understanding without influencing the outcome of the data. Creswell (1994) proposes several strategies to reduce potential bias including; triangulation of data and the use of standardised tools. Details of trustworthiness, generalisability, validity and reliability are described in detail within each of the phases of this chapter.

Application of the theories

Rural registered nurses' intentions to initiate defibrillation are postulated as determined by attitudes, subjective norm and perceived behavioural control. The theories were used to guide the formulation of the research hypotheses and questions, the development of the data collection tool and the derivation of the data analysis plan. In relation to the theories, while a nurse may have a positive attitude toward nurse-initiated defibrillation if the nurse perceives that they do not have control over whether they defibrillate, they will not initiate defibrillation.

The degree to which nurses believe they have control over the behaviour (perceived behavioural control) plays an important role in their initiating defibrillation.

In addition to the direct measures of the theories, external variables such as past behaviour and beliefs influence intentions and/or behaviour indirectly through the formation of attitudes, subjective norm or PBC. If the behaviour (i.e. nurse-initiated defibrillation) is performed infrequently or performed in unstable or difficult contexts (during a cardiac arrest situation) the impact of past behaviour on the current behaviour will be mediated by intentions (consciously controlled behaviours). Hence the inclusion of the external measures of past behaviour (defibrillation experience) and specific beliefs in the TPB were expected to have an impact on defibrillation intentions indirectly by influencing attitude, subjective norm or perceived behavioural control. A schematic representation of the application of the theory in Phase Two is presented in Figure 3.3.

Research Questions

The primary purpose of this study was to use a theoretical framework to identify the variables that are of greatest importance in understanding, explaining and predicting early defibrillation use by rural registered nurses. The research questions posed by this study were:

1. What are the defibrillation beliefs and practices of Queensland rural registered nurses?

2. Do nurses permitted and not permitted to defibrillation hold different beliefs about nurse-initiated defibrillation?

3. Can a theoretical framework be applied to examine rural registered nurses' defibrillation intentions?

Setting

The setting for this study was rural Queensland, Australia and the acute care hospitals in this environment. The differentiation of rural for this study is as defined by the Rural, Remote and Metropolitan Areas classification (Department of Primary Industries and Energy & Department of Human Services and Health 1994).

Defining Rural

To date no clear or unambiguous definition of 'rural' exists (Humphreys 1998; Bell, Daly & Chang 1997). For the purpose of this study the Rural, Remote and Metropolitan Areas (RRMA) classification of 'rural' was used (Strong et al. 1998; Department of Primary Industries and Energy et al. 1994). This classification provides a broad overview of the differences between rural areas which generally have higher population densities compared to remote areas that have lower population densities and are separated from major centres (Bell et al. 1997). The Commonwealth Departments of Primary Industry and Energy, and Health and Family Services in 1994 classified Australian population settlement areas as RRMA (Department of Primary Industries and Energy et al. 1994). This classification is based on Statistical Local Areas (SLA) and allocates each SLA in Australia to a category based primarily on the population density and an index of remoteness (distance to large population centres) (Cooroy 2001). In Queensland

there are 446 SLAs with a median population of 5359 (range: 236 to 65457) (Cooroy 2001; Strong et al. 1998). SLAs cover the state without overlaps or gaps (Cooroy 2001). Table 3.1 illustrates these classifications.

Table 3.1: Description of rural, remote and metropolitan areas (RRMA).

Metropolitan
Capital cities and towns with population of 100 000 or more.
Rural, including regional
Large rural centre
SLAs where most of the population resides in urban centres of population 25 000 or more.
Small rural centre
SLAs in rural zones containing urban centres of population 10 000 – 24 999.
Other Rural areas
The remaining SLAs within rural zones.
Remote centres
Remote areas
SLAs in the remote zones containing urban centres with populations of 5 000 or more.
Other remote areas
Remote areas with populations less than 5 000

Adapted from RRMA 1994 (Department of Primary Industries and Energy et al. 1994)

The RRMA classification was devised in response to a need to collect data in relation to issues of concern to rural and remote Australia (Department of Primary Industries and Energy et al. 1994). The RRMA was appropriate for this study as Queensland Health use this classification to collect statistics about the target population.

Queensland Health is an organisation that delivers a range of integrated health services through a network of Health Service Districts (HSD). The HSD are displayed in Figure 3.2.

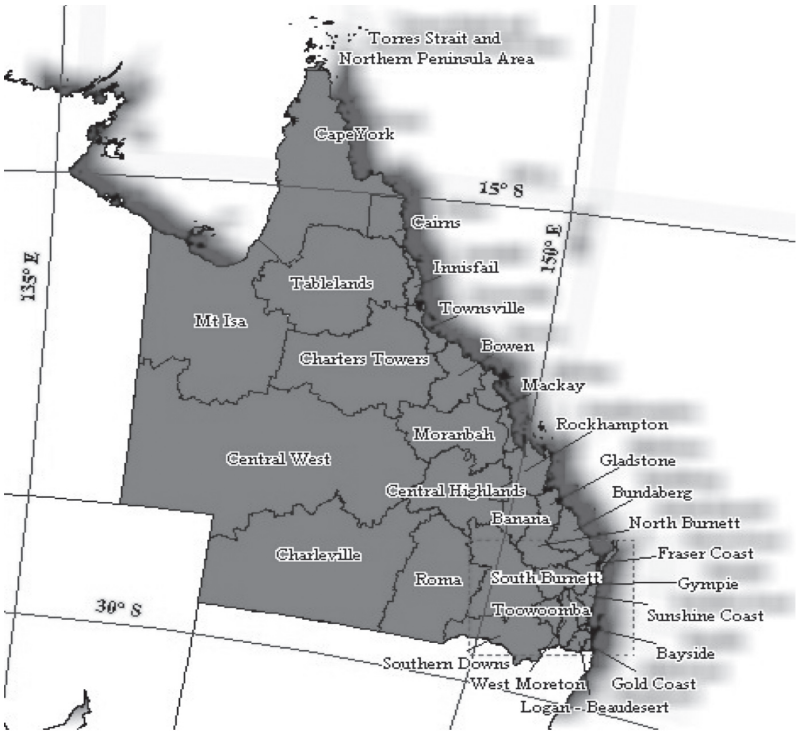

Figure 3.2: Map of Queensland Health Service Districts (HSD). Used with permission of Queensland Health.

The sites selected for this study were Queensland Health acute care hospitals in rural Queensland, each were located in separate towns. To delimit the study, private hospitals and public psychiatric facilities were excluded. The selected hospitals were all classified as either 'small rural centres', 'large rural centres' or 'other rural areas' (RRMA classification) and distributed across 21 of the 38 Queensland Health Service Districts. The number of hospitals within each rural classification is illustrated in Table 3.2.

Table 3.2: Number of Hospitals and Full-time Equivalent Nurses' (FTE) employed within each Rural classification (RRMA Classification).

Classification of Hospital	Number (%) of hospitals	Number (%) of FTE nurses
Large rural centre	7 (12.3)	1791 (53)
Small rural centre	6 (10.5)	590 (17.4)
Other rural areas	44 (79.2)	1003 (29.6)
TOTAL	**57 (100)**	**3384 (100)**

Adapted from (Monthly Activity Collection 2000-2001)

All fifty-seven Queensland rural hospitals were eligible to participate in the study (Monthly Activity Collection 2000-2001). Of the 57 rural sites the majority (n = 44, 79%) were located in 'other rural' centres. Conversely, over half (53%, n = 1791) of all rural registered nurses (FTE) were employed in 'large rural centres' and only one third (29.6%, n = 1003) in 'other rural areas'.

Population

The target population for this study was identified as all registered nurses employed either part-time or full-time within the Australian State of Queensland, in a Queensland Health rural (RRMA Classification) acute care hospital. All the nurses were to be registered with the Queensland Nursing Council (QNC).

In September 1998 Queensland Health employed 20,653 registered nurses, enrolled nurses and assistants in nursing (Ministerial Taskforce 1999). The largest group were registered nurses (n = 16101, 78%) followed by enrolled nurses (n = 3408, 16%) and assistants in nursing (AIN) (n = 1144, 6%) (Ministerial Taskforce 1999). These three groups of nurses constituted 65 percent of all nurses employed in Queensland and 42.4 percent of the total Queensland Health workforce. In May 2002 there were 13,375.30 full-time equivalent (FTE) registered nurses employed by Queensland Health in acute care hospitals. Of these FTE registered nurses, 3384 FTE were working in rural Queensland. The spread of the number of full-time equivalent nurses employed in the three rural settings was shown in Table 3.2.

Ethical Considerations

All research involving human participants requires researchers to protect the rights and welfare of participants (Minichiello et al. 2004). This research study abided by the ethical principles of respect for persons, beneficence and justice (National Health and Medical Research Council (NHMRC) 1999). The principle of respect for persons was ensured through recognition of the participants right to informed consent. There are two aspects of informed consent; the provision of information and the capacity of the participant to make a voluntary choice (NHMRC 1999). With research involving nurses working in a hospital, consent is not only a matter of individual consent, but involves the employing body. Hence consent to access the participants was also obtained from the Director of Nursing prior to approaching the participants.

The ethical principle of beneficence is expressed as the researcher's responsibility to minimise the potential risks of harm or discomfort to participants (NHMRC 1999). The potential risks to participants in the study were considered to be minimal as this study did not propose to change participants' behaviour nor involve any treatment components. Through the provision of fair distribution of benefits and burdens and privacy, the researcher ensured the ethical value of justice to all participants throughout the research. Participants in all phases of the study were advised that no identifying details would be published and that only the researcher and the supervisors would have access to the raw data. Data and consent forms were stored in a locked office, separate to the other study data

sheets. Upon completion of the research, data will be stored for a period of five years in a research office at the Central Queensland University, after which they will be destroyed by incineration.

Prior to the commencement of each Phase of the study, ethical approval was obtained from both the Central Queensland University Human Research Ethics Committee (HREC), the appropriate Health Service Districts (HSD) HREC and access approval from either the Director of Nursing (DON) or the Chief Executive Officer (CEO) of each hospital within the HSD. There is a detailed discussion of the specific ethical considerations for both Phase One and Two of the study in the next section of the chapter.

Phase One: Elicitation Study

Overview

Integral to the Theory of Reasoned Action and Planned Behaviour is the development of the questionnaire. To construct an appropriate questionnaire for the target sample (registered nurses employed in acute care hospitals across rural Queensland) the development of the questionnaire and data collection mirrored those outlined by authors of the theories (Ajzen & Fishbein 1980). Ajzen and Fishbien recommend questionnaire items be derived from an elicitation study administered to a small sample from the population under study. This step was necessary because different populations may possess different beliefs regarding the target behaviour (nurse initiated defibrillation) (Ajzen & Fishbein 1980). This

section of the chapter presents a detailed discussion of the research methods, the research sample, data collection and analysis and trustworthiness for Phase One of the study.

The Problem

The understanding of defibrillation beliefs of rural nurses in Australia is deficient. Increasing an understanding will assist in designing interventions that will promote successful defibrillation practices and consequently successful patient outcomes. Focus group discussions guided by the Theory of Planned Behaviour provided a framework for identifying the salient beliefs of rural nurses towards nurse-initiated defibrillation. The objectives of Phase One were to:

- gain an understanding of rural nurses' salient beliefs about nurse-initiated defibrillation;
- to identify the content for the quantitative questionnaire.

Methods

The research design for Phase One was non-experimental and descriptive-exploratory in nature, incorporating focus group interviews and survey data. Exploratory research was chosen to investigate phenomena about which we know little or nothing, to identify variables for use in subsequent study and to generate hypotheses for the quantitative research. Focus group interviews are a qualitative research method that involves a number of people with common experiences being interviewed by the researcher (or moderator) for the purpose of eliciting ideas about a specific topic and to develop questionnaire items (Minichiello et al.

2004; Basche 1987). Data collection using focus group interviews have been used extensively in market research, social science and health care research (St John in Minichiello et al. 2004; Beyea & Nicoll 2000). During the last decade focus group interviews have increased in popularity in nursing research (Beyea & Nicoll 2000).

The use of focus group interviews at the beginning stages of a project was considered most appropriate as they encourage participants to reflect on their experiences and are commonly used to develop survey instruments (Minichiello et al. 2004). Data collection using focus group interviews was appropriate for Phase One as it promised to yield rich insight into the attitudes, experiences and perceptions of the target audience (St John in Minichiello et al. 2004; James, Rjenzo & Frazee 1996; Denzin & Lincoln 1994) and has been successfully incorporated with the constructs of the Theories of Reasoned Action and Planned Behaviour (Lambert, Conklin & Meyer 2001; Gabhainn, Kelleher, Naughton, Carter, Flanagan et al. 1999).

Setting and Site

The sites selected for this Phase One were two acute care hospitals in rural Queensland (RRMA Classification). Each of these sites was in located 'other rural areas' (RRMA Classification) in separate towns and had 25 and 30 beds. These sites were selected because of convenience and to generate data with a balance of homogeneity and diversity (Easton 1999).

Sample Size

With focus group research, the quality of the research is not dependent on sample size (Morgan 1997). Sample size is determined by the purpose of the research, the nature of what is discovered and data saturation (Morgan 1997). Generally three to five groups are a starting point (Kreueger & Casey 2000). Rather than identifying the number of focus groups to be conducted at the commencement of the study, data collection was terminated when data saturation was reached. Data saturation was determined when the information became repetitive and the researcher was able to predict what was going to be discussed next in the group (Kreueger & Casey 2000; LoBiobdo-Wood & Haber 1997).

Participants

Consistent with focus group discussions, purposive sampling method was employed in order to elicit the target population's salient beliefs. To ensure adequate group sizes, all nurses working the selected hospitals were identified as the target sample and invited to participate. Recruitment did not start until ethical approval was received. Following this the researcher met with the Directors of Nursing (DON) from each of the participating sites to outline the research and gain approval for access. As recruitment is potentially the single most common source of failure in focus groups (Morgan 1995), meetings with the DONs also identified convenient times when an ideal number and mix of participants would be available to attend the focus groups.

Invitations to participate in the focus group discussions were posted on notice boards at the sites. Lunch or afternoon tea was provided as a motivational incentive to participate in the study (Minichiello, Sullivan, Greenwood & Axford 1999). To further reduce barriers to participation, focus groups were conducted at the 'change over' period of morning and afternoon shifts so that nurses from either the morning or afternoon shift had an opportunity to attend. Most participants attended the focus group interviews in their personal time. While it is preferable for the interviews not to be conducted in the work environment, the staff tearoom was both comfortable and accessible to participants (Ashbury 1995). Opinions on the length of focus group sessions vary from half to two and a half hours per session (Stewart & Shamdasani 1990), hence one hour was allocated to conduct each focus group discussion, although actual conduct was longer (Easton 1999).

Generating Group Questions

Prior to the conduct of the focus groups a question guide was developed to focus and guide discussions (Minichiello et al. 1999; Ashbury 1995). Criteria developed by Ajzen and Fishbien provided the framework to guide the development of focus group questions (Ajzen 1991; Ajzen 1988; Ajzen & Fishbein 1980). Ajzen and Fishbien (1980) posit that an individual has the capability of holding six to nine salient beliefs at one given time. The open-ended format to elicit information about salient beliefs allowed participants to respond to the questions suggested by Ajzen and Fishbein (1980). For this study the following focus group questions were asked of all participants:

1. What are the advantages and disadvantages of you being able to use a defibrillator? (Behavioural beliefs)

2. Who approves or does not approve of you being responsible for the use of defibrillators in your clinical area? (Normative beliefs)

3. Can you identify any events that might influence your decision to use or not use the defibrillator if there were a cardiac arrest on your ward today? (Control beliefs).

While these questions were used to guide the discussions, the interviews remained flexible to clarify responses and probe into topics identified by the participants.

Moderator Role

Focus groups, while ideal for allowing the researcher to gain an understanding of the real world of the participants, may only be as good as the skills of the moderator conducting the interviews (Agar & MacDonald 1995). Although the moderator's role is to guide the discussions, too little control may mean the questions are not addressed at all whereas too much control will stifle discussion. The desirability is to tap participants' views rather than reflecting those of the moderator (that is maximizing validity) (Polgar & Thomas 2000). Substantial practice, good interpersonal skills and a proficient understanding of group dynamics are required to achieve this balance (Polgar & Thomas 2000).

As the researcher had previous experience conducting focus group interviews, she elected to be the moderator for the focus groups. Further, as the researcher was immersed in the culture of the identified sample (a rural nurse permitted to initiate defibrillation and employed by Queensland Health), the researcher had the potential to enhance communication and interaction within the groups (Stewart & Shamdasani 1990).

Data Collection Procedures

Two focus group interviews (n = 6 and 7) of one-and-a-half hours and two hours were held. Although focus group interviews can be used as a sole method of data collection, many authors use focus group interviews in conjunction with other methods (Minichiello et al. 2004). The use of questionnaires can supplement transcripts by providing an accurate sense of who was in the group (Morgan 1997). Subsequently, demographic data were collected using a survey. Information collected included participants' gender, career length, current level in the career structure, employment status, professional and educational qualifications and whether they were permitted to initiate defibrillation. With the demographic data, questions derived from the literature elicited information about participants' competence with basic and advanced life support, defibrillator preference and who is the person currently responsible for initiating defibrillation (Appendix D). These data were collected prior to the beginning of the focus group discussions and compared to the focus group responses.

Given the size of the sites, group members all knew each other. Some authors have suggested that it is better if the participants do not know each other prior to the conduct of the focus groups (Kreueger & Casey 2000; Morgan 1995). This similarity of the groups facilitated the initial bonding and made participants feel free to offer their input (Ashbury 1995). Conversely, while naturally occurring focus groups are used, the moderator needs to be acutely aware of the group dynamics and how the hierarchy within the groups may influence discussions (Kitzinger 1995). During the interviews the hierarchal interplays within the group became evident, with one person attempting to dominate the group. However with appropriate use of gate-keeping techniques and moderation, the participants' input became the impetus for generating rich discussion.

Seating was arranged to allow eye contact between all members of the group and the moderator. The provision of refreshments initially facilitated social conversation between participants and this in turn 'set the scene' for relaxed and open focus group discussions (Ashbury 1995). The researcher opened the discussions by welcoming participants and thanking them for their participation. An overview of the research, instructions regarding the process of the discussion and handling of data were then provided and participants informed that the interviews were to be audio-recorded. A tape recorder with distal microphones was placed in the centre of the table, each of the microphones was distributed around the table to ensure recordings were clearly captured. Audio taping the interviews allowed the moderator to observe the non-verbal interactions between group participants (Polgar & Thomas 2000).

Developed open-ended questions were used to guide the discussions. To facilitate discussions within the groups all participants were individually invited to comment on the specific question under discussion and to address themselves to the group (Agar & McDonald 1995). Clarification of responses was sought and questions were re-framed to clarify responses as necessary (Easton 1999).

With the second group, three participants arrived one hour after the commencement of the focus group. Following reiteration of issues of consent and group rules, the researcher initiated discussions again using set questions. All existing members chose to remain despite the arrival of new members. As saturation of responses occurred following the arrival of the additional members, a third group was not conducted (Kitzinger 1995; Stewart & Shamdasani 1990).

At the conclusion of the sessions participants were invited to ask questions and make suggestions or requests of the researcher. Immediately following the interviews the author made written notes detailing each participant's position in the room and their interactions. Notes included information identifying the position of participants in the room and impressions of the interactions and dynamics of participants and non-verbal behaviours.

Data Analysis

Quantitative data from the questionnaire were analysed using the software package Statistical Package for Social Scientists (SPSS) Version 6.1 for Macintosh. Statistical analysis included the use of descriptive statistics to summarise the

characteristics of the sample. In describing the sample a variety of descriptive approaches such as frequencies, percentages, mean and standard deviations were used.

In accordance with the authors of the theoretical framework, content analysis was used to analyse these data from the elicitation study (Ajzen & Fishbein 1980). With content analysis, content categories were identified and texts were systematically coded so that the content could be analysed numerically (Minichiello et al. 2004). The argument for and against a numerical approach is as controversial with focus groups as with other forms of qualitative data (Kreueger & Casey 2000; Morgan 1995).

Each of the audio-taped interviews were transcribed verbatim by the researcher within 48 hours of the focus group discussion and checked for accuracy. The researcher chose to transcribe the tapes verbatim to be fully immersed in this data. To facilitate confidentiality all identifying information was removed and each participant assigned a pseudonym. Next the researcher listened to the interview tapes, read and reread the transcriptions to further develop a close familiarity with this data and to identify key words, quotations and phrases. A list of key ideas, quotations, words, and phrases that reflected the language and feelings of the participants and groups were identified and coded according to the behavioural beliefs (Ajzen & Timko 1986). For example, 'not waiting for the doctor', 'equipment', or even 'having a doctor present but still having to wait for some who could defibrillate', were emerging phrases in the instrumental behavioural belief. All individual responses were identified, where one participant made a comment and there was consensus within the group by means of a verbal response or

merely a nod of the head these responses were individually counted. Common quotations were then grouped under broad belief codes. These codes were labelled directly from the spoken language of the participants, for example 'not having to wait'. Next, similar coded segments of text were categorised (beliefs), organised by their frequency and counted. According to Polgar and Thomas (2000) counting requires the researcher to count the number of times a particular code occurred in these data. Codes were then arranged in descending order of frequency of occurrence and the first 75 percent of all beliefs were referred to as the beliefs of the target population (Ajzen & Fishbein 1980). The beliefs were then developed into a questionnaire and pilot tested prior to use in Phase Two.

Ethical Considerations Phase One

Phase One of the study involved two discrete sites, thus potentially protecting the participants and sites against potential social risk. Given the size of the sites and data collection method, there was the potential risk of nurses reading the report findings to identify the participants or sites. Risk to the individual may include psychological harm such as embarrassment, distress or undue worry (Minichiello et al. 2004). Additionally sites were unidentifiable and results were presented in aggregate.

Prior to commencing each focus group interview, participants were informed both verbally and in writing that they were under no obligation to participate and were advised they could withdraw their participation at any stage (See Appendix D). Participants were given the guarantee that no identifying details would be

published and that only the researcher and the supervisors would have access to the raw data and their identity would only be known to the researcher and other members within the focus group.

Participants involved in the focus groups may involve more risk than the participants completing the written survey, in part because participants may reveal extra detail than they intended to colleagues within the group (Minichiello et al. 2004). Group 'rules' of confidentiality related to the discussions, respect for each other and one person only speaking at a time, were mutually established at the commencement of the discussions. Further a request was made that participants respect each other's privacy and not disclose any of the contents of the discussions to others outside the group. The groups were informed at this stage that all data arising from the research including audiotapes, written notes and consent forms would be stored in a locked office.

Trustworthiness

The integrity of any study depends on its compliance with specific standards of data collection and analysis. Qualitative research methods such as those used in Phase One required the evaluation of trustworthiness of these data. The techniques, credibility, transferability (fittingness), dependability (auditability) and confirmability were used to establish trustworthiness of this Phase (Holloway & Wheeler 1996).

The credibility of qualitative studies requires that these data be true and accurate as viewed by the participant (Kreueger & Casey 2000; Holloway & Wheeler 1996). The author undertook several steps to ensure credibility of the results. During

the conduct of the discussions the moderator listened carefully to discussions, observed responses and sought clarity on areas of ambiguity (Kreueger & Casey 2000; Holloway & Wheeler 1996). At the conclusion of each group key points were outlined and verification reached. Credibility was enhanced when findings of the study were presented to an independent researcher (a registered nurse employed in a rural hospital in Queensland) and this person recognised them as their own experience. This independent nurse read the findings from this Phase and explained how they could relate to experiences of the participants in groups. By returning to the original transcripts the author was able to ensure all conclusions and interpretations were grounded in the data. Lastly, the inclusion of the quantitative questionnaire and subsequent pilot study allowed the researcher to cross check the findings and assumptions, thereby ensuring credibility (Holloway & Wheeler 1996).

Generalisation in quantitative research is equivalent to transferability in qualitative research (Holloway & Wheeler 1996). The intent of this study was not to generalise, rather to provide an understanding of a topic with the purpose of developing a questionnaire. Ensuring the data was complete through data saturation facilitated transferability. All nurses working the selected sites were included in Phase One regardless of their defibrillation experience or nursing qualifications.

Dependability (auditability) is the third alternative for establishing the trustworthiness of the data and refers to the notion of an audit of the research process and conclusions (Sandleowski 1986). That is, a second researcher is able to follow a decision trail and arrive at similar conclusions. Consistent with

dependability, decisions taken about the theoretical, methodological and analytic choices were provided throughout the research (Holloway & Wheeler 1996). Lastly, confirmability refers to the meaningfulness of the data and is dependent on meeting the standards of credibility, trustworthiness and dependability.

Summary

In summary, focus group interviews were used to elicit the beliefs and referents salient to the population being studied. Thirteen nurses from two rural hospitals in Queensland participated in the elicitation study. The focus group interview format to elicit information about salient beliefs allowed participants to respond to questions suggested by Ajzen and Fishbein (1980). These salient beliefs were utilised to construct the study instrument used in the pilot study. The behavioural intentions, attitudes, subjective norms and perceived behavioural control sections of the instrument were constructed in accordance with directions as provided by Ajzen and Fishbien (Ajzen & Fishbein 1980). A full description of the research participants and discussion of findings and the pilot study are presented in chapter four of the thesis. As Phase One results contribute to Phase Two of the study, the reader may wish to, at this point, turn to Chapter Four and read the results of Phase One prior to proceeding to the next section of this chapter.
The next section of this chapter presents the research method, sample and data collection strategies for Phase Two of the study.

Phase Two: Main study

Overview

The two phase research design adopted for this study enabled the researcher to identify rural nurses' salient beliefs about nurse-led early defibrillation in Phase One and develop a questionnaire for Phase Two. This section of the chapter presents a detailed discussion of how the theoretical framework guided the formulation of the research hypotheses, the research method and the derivation of the data analysis plan for Phase Two of the research.

Hypotheses

In order to meet the aims of the study, the following hypotheses were derived from the Theory of Reasoned Action and Theory Planned Behaviour.

Hypothesis: 1

Significant differences would exist in beliefs toward nurse-initiated defibrillation between nurses permitted to defibrillate and nurses not permitted to defibrillate.

Hypothesis: 2.1

The direct measures of the theories will positively correlate with behavioural intention.

Hypothesis: 2.2

The multiple regression of attitude, SN and PBC on Behavioural Intention should be significant.

Hypothesis: 2.3

The inclusion of the measure of perceived behavioural control with the direct measures of attitude and subjective norm will significantly add to the prediction of behavioural intention when compared to the predictive ability of the measures of attitude and subjective norm alone (Levin 1999; Sideridis et al. 1998; Ajzen 1991; Ajzen 1988).

Hypothesis: 3.1

The external belief variables will correlate with behavioural intention (Ajzen 1998).

Hypothesis: 3.2

The inclusion of the measure of past behaviour (the number of times a nurse had defibrillated a person) on the second step of the model will not significantly increase the prediction of intention (Ajzen 1998).

Hypothesis: 3.3

The direct measures of the TPB will predict a significantly larger portion of the population's behavioural intention than the combined external measures (Ajzen 1998; Ajzen 1991; Ajzen 1988; Ajzen & Timko 1986; Ajzen & Fishbein 1980).

Hypothesis: 3.4

The direct measures of the TPB will mediate the relationship between behavioural intentions and the external measures (Ajzen 1991; Ajzen 1988; Ajzen & Fishbein 1980).

Method

Phase Two involved the collection of data using self-administered questionnaires. The administration questionnaires are consistent with the theoretical framework.

Study Sites

Two sites selected for Phase Two were 51 acute care hospitals in Queensland, all were located in separate towns. The selected hospitals were all classified as either 'small rural centres', 'large rural centres' or 'other rural areas' (RRMA Classification). Following ethical approval from 20 HSD, contact was made with the Directors of Nursing (DON) for each of the sites (n = 57) within these districts. At the initial contact, the DON was provided with the research proposal and a request for access approval to conduct the research in each of the hospitals. Of the 57 sites eligible to participate in the study, three were excluded because of delays obtaining district ethical clearance from their HSD HREC. Of the fifty-four hospitals approached to participate in the study, a further three hospitals were excluded. Two sites were not included because of inability to obtain access approval: one stating a similar research had recently been conducted in the hospital, the other because of the belief there were not enough cardiac arrests to warrant the conduct of the study at that site. The third site was excluded as it was utilised in the pilot study. Hence, fifty-one hospitals accepted the invitation to participate in the study. Following ethical clearance and access approval questionnaires with an attached cover letter explaining the study and a postage-free return envelope were forwarded to the DONs or their representative, for each of the 51 accessible sites.

Study Sample

The sample for the Phase Two was selected from the overall population on the basis of a number of criteria. The nurses were all registered with the Queensland Nursing Council (QNC) and employed either part-time or full-time by Queensland Health in public, acute care hospitals in rural Queensland (RRMA Classification). In addition, nurses from either the elicitation study or pilot study were excluded from participating in the main study.

Sampling Method

State wide proportional stratified sampling was used for this phase of the study. The population of rural registered nurses was divided into three separate non-overlapping groups (strata) according to rural (RRMA) classification: large; small rural centres; and other rural areas (Minichiello et al. 1999). A sample of 30 percent of registered nurses from each hospital within each strata were then targeted as displayed in Table 3.3. This sampling method was chosen in the belief that:

- the study sample would be representative of the population;
- there would be adequate representation of both; all rural classifications and nurses within each hospital;
- the sample error would be reduced (Burns 1997).

Table 3.3: Proportional stratified sampling of Main study (Phase Two).

21 Health Service Districts – 57 Queensland Health Rural Hospitals Approx. 3384 full time equivalent (FTE) Registered Nurses (RN) employed			
Sample population	**Stratum 1 Large Rural**	**Stratum 2 Small Rural**	**Stratum 3 Other Rural**
Prior to Ethical and Access Considerations n = 3384 FTE	7 Hospitals 1791 FTE Nurses	6 Hospitals 590 FTE Nurses	44 Hospitals 1003 FTE Nurses
Following Ethical and Access Considerations n = 2926 FTE	5 Hospitals 1383 FTE Nurses • *One centre excluded because of delays obtaining ethical approval* • *One because of access approval*	6 Hospitals 590 FTE Nurses	40 Hospitals 953 FTE Nurses • *One centre excluded because used in pilot* • *One excluded because unable to gain access approval* • *Two centres excluded because of delays obtaining ethical approval*
↓ Selection of 30 percent of stratum proportional to the number of FTE registered nurses per stratum			
30% of Sample population n = 1014 FTE	5 Hospitals 537 Nurses	6 Hospitals 177 Nurses	40 Hospitals 300 Nurses
Sample: 51 sites and FTE 1014 nurses invited to participate.			

Having identified the number of questionnaires per hospital within each strata, questionnaires with pre paid return envelopes were distributed by hospital staff. To entice completion and return of questionnaires an incentive of being eligible for inclusion in a draw for a book prize was offered for return of the questionnaire. The inclusion of incentives such as putting the respondents name into a draw can provide effective and efficient inducement to encourage questionnaire completion (Minichiello et al. 1999). One thousand and fourteen questionnaires were distributed to 51 sites with a response rate of 43 percent (n = 436). The response rate distributions are displayed in Table 3.4.

Table 3.4: Response rate of the research according to RRMA classification.

RRMA Classification	Sample Number	Response n (%)	Response rate percentage
Large rural centre	537	172 (39.4)	32%
Small rural centre	177	39 (8.9)	22%
Other rural areas	300	225 (51.6)	75%
TOTAL	**1014**	**436 (100)**	**43%**

The majority of participants (n = 225, 75%) were from 'other rural areas', followed by 'large rural centres' (n = 172, 32%) and 'small rural centres' (n = 39, 22%). Because of the over representation of the 'other rural areas' any comparisons between RRMA classifications should be made with caution.

Although the sample was not randomly drawn from the entire population of Australian rural nurses, the sample was considered to be reflective of the population of registered nurses working in rural Queensland (according to the RRMA Classification). However the limitations for generalisability is acknowledged.

Sample Size

A sufficient response rate is critical if the sample is to be representative of the population (Minichiello et al. 1999). To ensure adequate power for analysis for the testing of the TPB in Phase Two, a ratio of sample size to independent variables was determined using the following equation: $N \geq 50 + 8m$ (where m is the number of independent variables) (Tabachnik & Fidell 2001). For this study $N = 50 + (8)(11) = 138$. This rule assumes a medium-size relationship between the independent variables and the dependent variable, $\alpha = 0.05$ and $\beta = 0\ .20$

(Tabachnik et al. 2001). A medium effect size was chosen based on previous research that examined concepts from the TPB (Hanson 1997). The number of participants accessed for testing of the TPB in Phase Two of the study was 211.

The Instrument

Data were collected through the use of a 33-item questionnaire, developed in accordance with directions provided by Ajzen (Ajzen & Fishbein 1980). The questionnaire used in Phase Two of the study can be found in Appendix G. The questionnaire consists of three sections: (section A) demographic information; (section B) salient beliefs about defibrillation; and (section C) the theoretical framework measures. Only participants who were expected or permitted to initiate defibrillation completed Section C. To minimise response-bias related to the order in which questions are asked, the direct measures of the theories were interspersed throughout Section C. Some items were reverse scored to minimise the tendency of participants to respond in a particular way. The eleven variables considered in this study are illustrated in Figure 3.3.

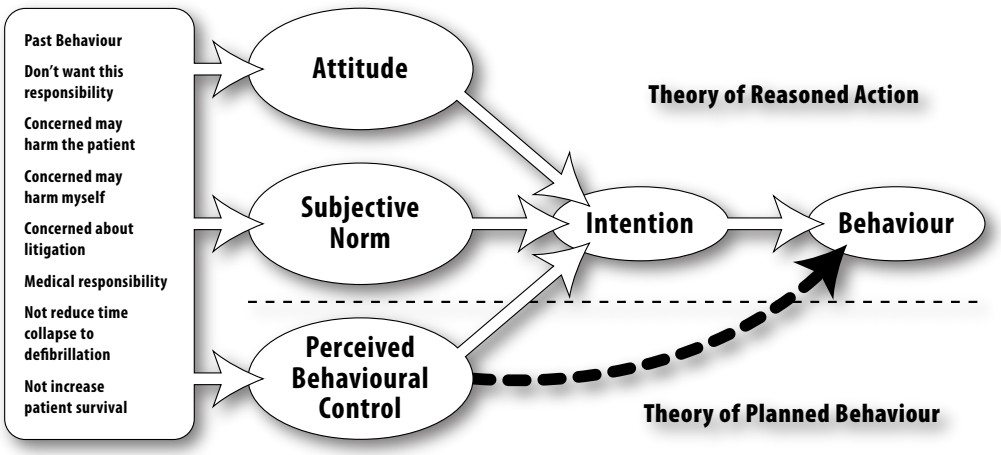

Figure 3.3: Schematic representation of the Theory of Reasoned Action and Planned Behaviour.

Section A – Demographics of Participants

Demographic data were collected to elicit information about the participants' gender, length of time as a registered nurse, length of time employed in the rural setting and the highest qualification completed. Information related to participants' experiences with cardiac arrests was elicited by asking: how many times participants were the first person on-scene at a cardiac arrest and how many times they had viewed a person being defibrillated. Along with individual demographic data, section A required information about the number of hours a doctor was on-site, who was the person responsible for defibrillation and who the person to initiate defibrillation on their ward area was.

Section B – Salient Beliefs and Interrelationships Between Nurses Permitted and not Permitted to Defibrillate.

Section B was developed from responses obtained in the elicitation study and was designed to elicit participants' salient beliefs of about defibrillation. This section was composed of a number of items exploring different dimensions of defibrillation beliefs and was used to:

1. investigate if nurses permitted to initiate defibrillation hold different beliefs about nurse initiated defibrillation than nurses not permitted to initiate defibrillation (hypothesis one); and

2. identify the specific belief factors (external variables) to be used when applying the Theories of Reasoned Action and Planned Behaviour (hypotheses two and three).

Based on responses from Phase One, the participants were asked to rate their beliefs about defibrillation (ten belief items) on a seven-point Likert scale ranging from extremely agree (1) to extremely disagree (7). These are expanded upon later in this chapter under external measures.

Section C – Application of the theories

Only participants expected or permitted to initiate defibrillation in their work place completed section C. This section of the questionnaire contained the direct measures associated with the Theories of Reasoned Action and Planned Behaviour. The theories as operationalised in the study were presented in Figure 3.3. There was one dependent variable (behavioural intention) and the three direct independent variables (Attitude, SN and PBC). In addition eight variables 'external' to the theories were examined. A total of eleven variables were involved in the multiple regression analyses in this study.

Dependent Variable

Behavioural Intention (BI)

The behaviour is the actual performance of the action being measured but in this study the behaviour was not actually measured. According to the TRA and TPB behavioural intention is the best predictor of subsequent behaviour and when an appropriate measure of intention is obtained it will provide the most accurate prediction of behaviour (Brewer et al. 1999; Ajzen 1988; Ajzen & Fishbein 1980; Fishbein et al. 1975). Behavioural intention is the person's perception of whether the behaviour of early defibrillation will be performed. Therefore in this study the behavioural intention to initiate early defibrillation was the dependent variable.

Based on measurement approaches used in previous studies, six behavioural intention questions were used to measure the level of determination to initiate early defibrillation (Levin 1999). The item stem read: "At the next cardiac arrest where I am responsible for initiation of defibrillation I intend to…" (see Questions 17, 20, 24, 27, 28 and 32: Appendix G). Intention measures utilise a seven-point Likert type-scale anchored by Extremely Disagree = 1 and Extremely Agree = 7. Some items are reverse scored. To determine the intention score, items were scored and averaged for each participant. The mean of the intention measure was 6.33 (SD = 0.99). Thus participants with higher mean intention scores indicate higher defibrillation intentions. Cronbach's alpha internal consistency reliability coefficient for the behavioural intention scale in the study was calculated (Cronbach α - 0.88).

Table 3.5: Descriptive data for all measures (n = 210).

	Mean	SD	Range	Number of items	Alpha
Dependent variable					
Behavioural Intention	6.33	0.99	1-7		0.88
Independent variables					
Direct measures					
1. Attitude	5.60	0.84	1-7		0.84
2. Subjective Norm	5.78	1.17	1-7		0.81
3. Perceived Behavioural Control	5.49	1.20	1-7		0.71
External measures					
4. Past behaviour	2.01	1.11	1-4	1	
5. Don't want the responsibility	2.52	1.87	1-7	1	
6. Concerned may harm patient	2.32	1.77	1-7	1	
7. Concerned may harm self	1.76	1.33	1-7	1	
8. Concerned about litigation	2.73	1.85	1-7	1	
8. Medical responsibility	2.10	1.62	1-7	1	
10. Not reduce time	1.38	0.95	1-7	1	
11. Not increase patient survival	1.28	0.91	1-7	1	

Note: Three beliefs and opinion questions were eliminated.
Past behaviour: 1 = never; 2 = 1-3 times; 3 = 4-10 times; 4 ≥ 10 times,
1 = extremely Disagree to 7 = Extremely Agree.

Independent Variables

Direct Measures

All predictors of the theories can be assessed directly, by asking respondents to judge each on a set of scales. Direct measures were developed in a manner consistent with the recommendations of Ajzen and Fishbien (Ajzen & Fishbein 1980). Seven-point Likert-type or semantic differential scales were used to determine the direct measures of attitude, subjective norm and perceived behavioural control. Respondents were asked to rate their intentions from 'extremely disagree' to 'extremely agree' – with a range of scores from 1 to 7 for each item, with 1 representing the negative response. Semantic scales of "extremely, quite, slightly, neither, slightly, quite, extremely", were used to approximate interval level measurements (Osgood, Suci & Tannenbaum 1957). Scoring is conducted in this manner as empirical investigations show that this results in the best correspondence between direct and belief-based measures (Hanson 1997; Ajzen & Fishbein 1980).

Attitude Measures (ATT)

Nine items were used to identify the direct measure of attitude towards participation in early defibrillation. Items used a seven-point bipolar semantic differential evaluation scale (Appendix 3.3; question 33 (a) to (i) section C) scored from 1 to 7. The bipolar adjectives were selected from the pilot study and those recommended by Ajzen. While the semantic wording is not as precise as suggested by Ajzen, it is believed it captures the essence of the model (Ajzen & Fishbein 1980). Participants responded to the question: "My initiating early defibrillation at the next cardiac arrest would be…" Semantic pairs included:

bad/good, unimportant/important, harmful/beneficial, worthless/valuable, dull/exciting, unpleasant/pleasant, punishing/rewarding and not enjoyable/enjoyable. The 9 attitudinal measures were summed to obtain the attitude score with a mean of 5.6 (SD = 0.84). Overall, the attitude measure displayed a high degree of reliability with a Cronbach's alpha coefficient of 0.84 (see Table 3.5).

Subjective Norm Measures (SN)

Subjective norm measured participants' perceptions of what significant others thought about them initiating early defibrillation. Five statements posed as: Most of my peers who are important to me think I should initiate defibrillation as soon as the defibrillator is available (see questions 18, 21, 23, 26, and 30 Appendix G). Participants responded to a seven-point Likert-type scale anchored by Extremely Disagree = 1 and Extremely Agree = 7. The mean of the five items was taken as the measure of subjective norm, with a high score indicative of greater influence from social referents towards early defibrillation. The mean of this scale was 5.78 (SD = 1.17) (Cronbach α - 0.81) and are displayed in Table 3.5.

Perceived Behavioural Control Measure (PBC)

Five items tapped perceived behavioural control. Items used a seven-point Likert-type scale, anchored by Extremely Disagree = 1 and Extremely agree = 7. Questions were posed as: I have very little power over my ability to successfully initiate early defibrillation at the next cardiac arrest (see questions 19, 22, 25, 29 and 31; Appendix G). The mean of the five items was taken as the measure of PBC, the higher the respondent's score, and the greater the degree of perceived control towards initiating early defibrillation (see Table 3.5). The mean of this score was

5.49 (SD = 1.2). Cronbach's alpha internal consistency reliability coefficient for the perceived behavioural control scale in the study was calculated (Cronbach α - 0.71).

External Measures

External variables were considered to have an indirect influence on the formation of defibrillation intentions through their influence on the more proximal determinants of the model. To test this assumption, the external variables of past defibrillation behaviour and the salient belief measures (Section B of the questionnaire; Appendix G) were explored as external variables.

Salient Belief Measures

As previously noted the subscale of salient beliefs was derived from the elicitation study and the focus groups' salient beliefs. A 10-item scale was designed to measure beliefs about initiating defibrillation (Section B). These were entered as external variables.

Past Behaviour

One item was used to measure prior defibrillation experience: How many times have you had to defibrillate a person in a cardiac arrest situation? This item was scored 1 (never); 2 (1-3 times); 3 (4-10 times); 4 (greater than 10 times). As prior behaviour was measured using a single item, no alpha coefficient was computed.

Data Analysis

Data for Phase Two were organised and analysed using SPSS version 10 for Macintosh. The dependent variable, intention, was measured with a single linear analog scale and was treated as interval (Ajzen & Fishbein 1980; Osgood et al. 1957). The direct variables of the model, attitude, subjective norm, perceived behavioural control and the belief components were treated as interval level data (Ajzen & Fishbein 1980; Osgood et al. 1957). All variables were described in terms of frequency, mean and standard deviation. A Kolomogorov-Smirnov Goodness of Fit Test was performed on each of the variable distributions to determine if it was a normal distribution. Only the transformed data are reported in the following chapter and used for all statistical analyses.

In order to investigate if nurses permitted to initiate defibrillation held different beliefs about nurse-initiated defibrillation than nurses not permitted to initiate defibrillation, a one-way multivariate analysis of variance (MANOVA) was conducted. MANOVA is appropriate when there are two or more dependent variables (continuous) and a single independent variable (categorical). The independent variable was whether the participants were permitted to initiate defibrillation (categorical scale, Appendix G, Question 13) and the dependent variables being the participant's specific beliefs about nurse-initiated defibrillation (continuous scale, see Appendix G, Question 12a to 12j). To examine the separate analyses, a higher alpha level was chosen to reduce the chance of Type 1 error. Dividing the original alpha of 0.05 by the number of dependent variables made the

Bonferroni adjustment, hence 0.05 divided by 10 gave a new alpha for Hypothesis 1 of 0.005. Results were only significant if the probability value was less than 0.005 for Hypothesis 1.

The preliminary step in testing the models was to establish that the proposed relationship between BI, attitude, SN, PBC and external variables were valid. The Pearson product-movement correlation coefficient *r* was used to assess the strength of the relationship between scores for intention and the directly measured variables and external variables (Ajzen & Fishbein 1980). Correlations were significant when the observed relation between two variables was unlikely to be due to chance alone $p < 0.05$ (Ajzen & Fishbein 1980). Consistent with Ajzen and Fishbein's proposition, correlations of less than 0.3 are of little use and eliminated as external variables (Ajzen & Fishbein 1980). Three specific belief measures were eliminated because of correlations with the dependent variable of less than 0.3 (This will be discussed in greater depth in Chapter 4, Table 4.9).

To empirically test the theories, not only an index of the relationship between two variables was examined, but also the index of the degree to which one can predict a single variable (the intention) from a simultaneous consideration of other variables (attitude, subjective norm and perceived behavioural control and external variables) (Ajzen & Fishbein 1980). A series of hierarchical regression analyses were performed to assess the predictive utility of the TRA and the TPB. Variables were entered in four blocks:

1. attitude and subjective norms;

2. perceived behavioural control (PBC);

3. past behaviour;

4. external belief and opinion variables.

Data were entered in this way to test the predictive utility of the TRA and TPB as well as the additional predictive utility of the external variables. The addition of PBC as the second step offered the predictive ability of the TPB over the TRA. Comparison of the three direct predictor variables within the sample and selected external variables was conducted using standardised regression coefficients (beta weights) (Mummery et al. 2000). Lastly to determine mediation the external variables were regressed on the three direct measures.

Ethical Considerations Phase Two

Phase Two was a multicentre research and involved obtaining ethical approval from 21 Health Service Districts (HSD), hence an attempt was made to obtain over-riding ethical clearance for all HSD from the Director General of Queensland Health. At the time of the study, such over riding ethical clearance policies did not exist within Queensland Health. However, the Director General of Queensland Health provided a letter of support for the research (Appendix C).

To obtain ethics approval from the 21 HSDs a letter of introduction outlining the research was forwarded to the Chief Executive Officer of each of the HSD requesting the district's ethics application form or process. While the majority of the HSD did not have ethics committees or application forms, all of the districts offered a means of applying for ethical approval for their district. Ethical approval was received from 20 district ethics committees (or equivalent) to conduct the

research. After significant time delays one district granted ethical clearance subject to changes in the proposal but time constraints did not permit the inclusion of this district.

Participants were informed in writing that their participation was voluntary and they could withdraw at any time. All participants were assured of confidentiality and written consent was obtained from participants as specified by specific Health Service District NHMRCs. In accordance with the request of two Health Service Districts ethics committees the prize incentive was removed prior to the distribution of the questionnaires to participants.

As responses were treated as anonymous, no follow-up questionnaires were mailed to participants. However, two weeks following distribution of the questionnaire posters were displayed on staff notice boards in each of the sites to prompt staff to complete and return the questionnaires. Questionnaires were coded into 'large', 'small' or 'other' rural areas.

Anonymity and confidentiality were assured by having a research assistant remove the signed consent sheet and assigning code numbers for each questionnaire. During the research there were no deviations from the approved ethics processes and the study was conducted according to the guidelines established by the NHMRC of Australia. There were no ethical issues or problems identified arising during the conduct of the research.

Reliability

Ajzen and Fishbien (1980) emphasise the need to ensure high internal consistency in the measures of behaviour and in the direct measures of intention, attitude, subjective norm, and perceived control. Reliability is the extent to which the instrument yields the same result in repeated measures (LoBiobdo-Wood & Haber 1997). Internal consistency is one way of assessing a measure's reliability. Examining a measure's temporal stability (test-retest reliability) is another way to estimate the measure's reliability.

Means and internal consistency measures for the items used in Phase Two were summarised in Table 3.5. Cronbach's alpha ranges in value from zero to one with zero indicating no reliability and one being the perfect reliability (Coates & Steed 1999). Nunnally (1978) argues that a Cronbach's alpha of 0.80 is generally acceptable for a mature scale, while 0.70 is acceptable for an immature scale (Nunnally 1978). Three of the four direct measures had alphas greater than 0.80. Although perceived behavioural control was the only measure of the mature scale (TPB) that did not meet the level of 0.80, it was acceptable for the purpose of this study as the tool was immature within the context of the sample and defibrillation. Cronbach's alpha could not be calculated for the external variables, as they were single item measures.

Conclusion

This chapter reported the methods implemented and the processes involved when applying a theoretical framework to identify the variables that are of greatest importance in predicting, explaining and understanding early defibrillation use

by rural registered nurses. Consistent with the theoretical framework the study was conducted in two phases. Firstly, the elicitation study, consisting of two focus groups (n = 6 + 7) to identified participants' salient beliefs about defibrillation. Information extracted in the elicitation study was used to develop the pilot questionnaire. Pilot testing of the developed questionnaire demonstrated its high internal consistency. Following feedback from participants (n = 13) in the pilot study, minor changes were made to the questionnaire and the main study conducted. The second phase, the main study, used proportional stratified sampling to identify a representative sample of registered nurses working in Rural Queensland (RRMA Classification). Data regarding defibrillation practices of rural nurses were collected by means of questionnaire distributed to 1014 participants across 51 sites with a response rate of 43 percent (n = 436). The findings from Phase One and Two are presented in the following chapter.

CHAPTER FOUR

Results

Introduction

This chapter is presented in two sections, in the first the results of Phase One are presented and in the second the results of Phase Two.

Results: Phase One

Phase One, the elicitation study, drew data from two focus groups (n = 7 + 6) conducted with the population of interest (rural nurses working in Queensland acute care hospitals). This phase solicited the salient beliefs of this group of nurses regarding nurse-initiated defibrillation.

Demographics

The study sample consisted of ten females and two males (one participant chose to not complete the questionnaire but participated in the focus group discussion). The range of participants' experience in nursing was from two to 38 years (mean 19.6 years; SD = 12.6) with over half of the participants being Level Two nurses

or above (n = 8) (a definition of Level Two nurse can be found in Appendix A). Participant characteristics are shown in Table 4.1. Similarly half (n = 7) of the sample held some level of tertiary qualifications.

Table 4.1: Characteristics of participants in the Elicitation study.

	n (%)	M	SD
Gender			
Female	10 (83)		
Male	2 (17)		
Career length			
Years		19.6	12.6
Present level in the career structure			
Level 1	1 (8.3)		
Level 2	6 (50)		
Level 3 or above	2 (16.7)		
Enrolled nurse	3 (25)		
Employment status			
Part-time	2 (17)		
Full-time	10 (83)		
Professional qualifications			
General nursing	9 (75)		
Midwifery	2 (16.7)		
Critical care	1 (8.3)		
Highest Qualification			
Hospital certificate	5 (42)		
Bachelor Degree	4 (33)		
Graduate Certificate	1 (8.3)		
Graduate Diploma	2 (16.7)		

Two of the twelve participants identified that they were not currently assessed as competent to perform basic life support (BLS). The remaining ten participants had been assessed competent in BLS within the last 12 months.

Half (n = 7) of the participants were expected to initiate defibrillation on their ward, of these seven participants four had been assessed as competent within the previous 12 months and the remaining three were currently undergoing defibrillation competency assessment. When asked to identify the type of

defibrillator they used, the majority of participants permitted to defibrillate (n = 6) identified the manual defibrillator as the defibrillator of choice used in an arrest. When asked to identify the person responsible for defibrillation on their ward, half (n = 6) of the participants identified the nurse on the ward or nurses from other areas of the hospital. The remaining half identified the doctor from outside the hospital.

Participants in this elicitation study believed the doctor should be primarily responsible for defibrillation when using a manual external defibrillator, whereas the nurse should be the primary person responsible when using a semiautomatic external defibrillator. When asked to identify, in order of priority reasons why they as individuals did not initiate defibrillation the order of responses were: not considered my role; inability to recognise rhythms; not allowed; fear of harming the patient; fear of litigation and fear of harming themselves. The main reasons why defibrillation was delayed on the wards were: waiting for someone to arrive who can defibrillate; the user was unsure of the rhythm; the time taken for the defibrillator to arrive; and equipment failure.

Findings

Focus group questions were designed to elicit salient beliefs within the theoretical framework. Three constructs of behavioural, normative and control beliefs guided the development of the question and analysis of the discussions. Two behavioural beliefs, four control beliefs and four normative belief categories were elicited. Consistent with the authors of the theories focus group findings were analysed using content analysis. This next section provides detail of each of the constructs.

Behavioural Beliefs

Two behavioural beliefs categories emerged from the open-ended question: "What, if any, are the advantages of you being able to use a defibrillator?" Participants were congruent when discussing the advantages of nurses initiating defibrillation. The two categories were 'quicker response times' (15 responses) and 'increased success with resuscitation' (8 responses). An example of the analysis process is presented in Table 4.2. Several participants had multiple responses to questions, consequently the numbers depicted in the tables may be greater than the total number of participants.

In the rural settings where a doctor is not in the hospital 24 hours a day, when a cardiac arrest occurs the doctor has to drive to the hospital from their home or practice. The participants related to the urgency of the situation and the importance of not having to wait. One participant explained:

> *…no medical officer on hand. You have to call them in and it may take 20 minutes for them to arrive – a lot of things happen. (21,2)*

Further, as the participants in the study were generally the first person on the scene of the arrest, they were often in a position to initiate defibrillation rather than waiting for the medical officer to arrive. As one participant commented:

> *…the sheer fact that there is not a doctor here, and you are able to see someone go into VT VF, you are able to revert it and not have to wait (for the doctor). (25,8)*

Within the rural context of this study, there were circumstances where the skill mix of those attending the cardiac arrest warranted nurse-initiated defibrillation. Some participants noted that even when there was a doctor available, having

nurses able to defibrillate reduced the time from collapse to defibrillation as often the nurse had more experience than many of the relieving medical staff. The reflections of two participants provide good examples:

> *Oh, I remember an RN being with a private GP and if she hadn't shocked the patient the GP would still be standing there wondering what to do… (21,9)*

and:

> *…the relieving medical superintendent from… didn't know what to do and only because I said the patient needs defibrillating – that we did it. (23,10)*

Table 4.2: Belief category: Quicker response time.

Behavioural belief: Focus group question
What are the advantages of you being able to initiate defibrillation?
Example of codes
Not having to wait for the doctor to arrive Prompt treatment Not waiting for someone (other than the doctor) who can defibrillate
↓
Category
Quicker response times (15 responses)
↓
Questionnaire item
'My being able to defibrillate will reduce the time from collapse to defibrillation'

The second belief that elicited a high number of responses was 'increased success with resuscitation' (see Table 4.3). Participants believed there was a relationship between nurse-initiated defibrillation and patient survival. The following data reflects participants' perceived advantages of their initiating defibrillation:

> *…the earlier you defibrillate them the better the outcome will be… (22,26)*

and:

> *…the advantages are a higher success rate of reverting to a normal rhythm. (14,13)*

Participants noted patient survival was a determining factor in one hospital's decision to establish nurse-initiated defibrillation programs.

> *I think it (nurse initiated defibrillation) was initiated by the RN because of the fact that there's not a doctor on the premises most of the time and if we waited for him to defibrillate it was often a life lost. So it was initiated out of that… (21,2)*

Table 4.3: Belief category: Increased success with resuscitation.

Behavioural belief: Focus group question
What are the advantages of you being able to initiate defibrillation?
Example of codes
Increase success rate Quicker return of normal rhythm Save the patient
↓
Category
Increased success with resuscitation (8 responses)
↓
Questionnaire item
'My being able to defibrillate will increase the patients' chances of survival'

Others viewed increasing the patients' survival in terms of freeing the doctor to undertake other skills. Participants talked of the collaborative relationship with the doctors in the rural context and how often during a cardiac arrest there was reduced medical and nursing presence. Participants believed that having the nurse responsible for defibrillation freed the doctor to attend to other skills that were beyond the nurses' scope of practice, such as intubation and airway maintenance. A participant response reflected this theme:

> *…they (the doctor) are quite happy doing the airway, they're usually happier when someone else defibrillates, because they can't do every thing. (25,16)*

Overwhelmingly, participants expressed greater advantages than disadvantages of nurse-initiated defibrillation. However a few participants did note that a potential disadvantage to nurse-initiated defibrillation was the risk of harming the patient or themselves.

> *Injury to staff or yourself and injury to the patient… (14,15)*

Participants perceived the potential for injury to the patient was related to user competence with the equipment. The following extract was typical of participants concerns about harming the patient:

> *…the disadvantage would be if some body jumped in not really knowing what they are doing (11,14)*

These comments initiated discussion about participants' perceived control over their ability to initiate defibrillation.

Control Beliefs

Participants were asked to identify any events that might influence their decision to use or not use a defibrillator if there were a cardiac arrest on their ward on that day. The categories of control beliefs elicited were 'rhythm recognition' (22 responses), 'litigation' (15 responses), 'fear of harm to patient or self' (11 responses), and 'roles' (4 responses).

Generally participants expressed the belief that competence does not equate to confidence. While the participants were assessed as competent by the hospital and were expected to initiate defibrillation, five of the participants expressed hesitancy, being 'scared' or 'stressed' about initiating defibrillation. As one participant stated:

…you do feel a little bit extra stress …you know, it is some body's life… (24,10)

and:

Yes the stress on the RN, making the right decision, then if you don't know the rhythm… (25,10)

The main contributing factors to these feelings were rhythm recognition, concerns about harming the patient and possible litigation. In each focus group discussion, confidence with rhythm recognition clearly influenced the majority of participants' decisions to either initiate or not initiate defibrillation unsupervised. The modal beliefs and control belief categories are displayed in Table 4.5.

Table 4.4: Belief category: Rhythm recognition.

Behavioural belief: Focus group question
Can you identify any events that might influence your decision to use or not use the defibrillator if there were a cardiac arrest on your ward today?
Example of codes
Rhythms difficult to interpret Unsure of the rhythm Limited confidence interpreting rhythm
↓
Category
Rhythm recognition (22 responses)
↓
Questionnaire item
'The interpretation of rhythms is difficult"

Participants with less experience initiating defibrillation unsupervised, indicated that even if they were first person on the scene, they would wait for more experienced nurses or doctors to be present to confirm the rhythm and the need for defibrillation prior to defibrillating the patient. The following data extracts are typical of the feelings of the participants with little or no experience actually initiating defibrillation.

I think the first three or four times I would like to have a back-up standing right next to me (12,11)

and:

I think it boils down to, if you are unsure you don't do it (12,21)

In situations where participants were unsure of the rhythm and there was no one around to verify it, they sought other means of clarifying the rhythm. As one participant explained:

…we do the best we can, we take our orders from (the closest referral hospital)… the ECG would be faxed down and we would get our instructions (11,8)

Clearly participants with less experience would benefit from a supportive policy on what to do if there was no doctor around to confirm the rhythm.

The second control belief category that elicited a strong response was 'litigation'. The control belief categories are presented in Table 4.5.

Table 4.5: Belief category: Litigation.

Behavioural belief: Focus group question
Can you identify any events that might influence your decision to use or not use the defibrillator if there were a cardiac arrest on your ward today?
Example of codes
Back up Scope of practice Covered by law
↓
Category
Litigation (15 responses)
↓
Questionnaire item
I am concerned I may incur litigation if I had to initiate defibrillation

Overwhelmingly participants with less experience and confidence with initiating defibrillation were more likely to express concerns about the possibility of litigation. While participants believed that the hospital supported nurse-initiated defibrillation, they were less confident about the level of support they might receive. A participant from the initial focus group reflected:

> *…well basically the person could die if they did the wrong thing at the time. If they may have thought they are doing the right thing and weren't sure of themselves, There is always the risk of harm to the person involved, I mean litigation (11,14)*

Conversely participants confident with their rhythm recognition skills were more likely to be of the opinion that to do nothing meant they ran the risk of litigation as one noted:

> *They can sue you for not doing anything… (22,30)*

Participants expressing these views were more likely to strongly articulate the belief that defibrillation was a nursing role.

Another control belief that elicited a high number of responses from participants was fear of harming the patient or themselves (Table 4.7). Like rhythm recognition, fear of harming the patient was closely associated with confidence and use of the electrical equipment. This was demonstrated by the comment:

> *Injury to yourself and injury to the patient. There are several injuries to people, because mainly using electricity… the workplace health and safety aspects of it as well. (14,15)*

When discussing the issue of not harming the patient the concept of 'doing the right thing by the patient' was raised on several occasions. Knowing the patient personally in the community exacerbated these feelings of doing the right thing by the patient.

Table 4.6: Belief category: Harm.

Behavioural belief: Focus group question
Can you identify any events that might influence your decision to use or not use the defibrillator if there were a cardiac arrest on your ward today?
Example of codes
The patient could suffer
Harming the patient
Harming yourself
↓
Category
Harm (11 responses)
↓
Questionnaire items
I am concerned I may harm the patient if I had to initiate defibrillation
I am concerned I may harm myself if I had to initiate defibrillation

The last control belief elicited was 'roles'. While all participants agreed with the benefits of nurse-initiated early defibrillation, some participants viewed the role of defibrillation as primarily a medical role or the responsibility of a nurse with more experience. These participants believed that despite their being assessed as competent to initiate defibrillation, if the doctor was present, the responsibility and decision to initiate defibrillation reverted back to the doctor. The reflections of one participant provide a clear example of these participants' thoughts on this category:

> *…if the doctor is there, you take your orders from the doctor (12,23)*

This perception may have arisen because there has been a fundamental shift in thinking from one where the doctor or senior nurse is responsible for initiating or ordering defibrillation to one where defibrillation is now the responsibility of the first responder. Participants who had made this shift generally were more confident with defibrillation and expressed the belief that it was indeed their role to initiate defibrillation in a cardiac arrest. As one participant with many years experience initiating defibrillation noted:

> *Because we are comfortable with it (initiating defibrillation) we tend to step forward… I have no hesitation… as far as I am aware no one would challenge me in my decision to defibrillate. (22,26)*

Table 4.7: Belief category: Roles.

Behavioural belief: Focus group question
Can you identify any events that might influence your decision to use or not use the defibrillator if there were a cardiac arrest on your ward today?
Example of codes
If there were a doctor present
The doctor does it
Nurse with more experience present
↓
Category
Roles (8 responses)
↓
Questionnaire question
'Defibrillation is a critical care skill'
'Defibrillation is a medical responsibility'

Normative Beliefs

To identify the normative referents, participants were asked to identify who would approve or not approve of them being responsible for the use of defibrillators in their clinical area. Four normative beliefs represent 100 percent of the responses, these were: patients; nurses; doctors; and the nursing registration body, the Queensland Nursing Council (QNC). Both groups identified similar referents who approve of their initiating defibrillation these were: 'registered nurses' (four responses); 'senior registered nurses' (three); 'the doctor' (six responses); and 'the patients' (two responses). Generally there was consensus that the move to nurse-initiated defibrillation was supported by medical officers within the hospitals:

> *You are going to expand the role because he (the hospital doctor) is quite good. Like he wants us to do as much as we can. So he will be definitely supportive of what we want to do. (15,29)*

Almost unanimously participants' could not identify with anyone who would disapprove of their initiating defibrillation. One participant 'new to initiating defibrillation' believed that others might disapprove of their initiating defibrillation, particularly if they perceived this to be their role. As this participant commented:

> *…it (support) depends if the person (the doctor or nurse) thinks that you are encroaching on their territory. (12,20)*

As previously noted participants with little or no experience at initiating defibrillation expressed concern about their level of perceived support. This concern was particularly expressed within the context of possible adverse

outcomes. Participants sought support from the doctor, the director of nursing or the professional nursing bodies. This next excerpt reflects participants' concerns about their level of support.

> *We need some legal cover, that is how it is these days you need some one to back you up. It has to come from the Queensland Nursing Council. It is all right for the doctor to say to it or the Matron to say it, but that is not going to cover you in a court of law – really. Because the Unions are going to wipe you. It needs to be incorporated into the Scope of Practice or whatever. It just needs to be covered. (15,29)*

Participants believed that because there was no policy from the QNC endorsing nurse-initiated defibrillation, support did not exist.

Discussion: Phase One

The purpose of Phase One was to elicit a beginning understanding of the defibrillation beliefs of rural nurses. Information derived was used to develop the survey instrument for use in the subsequent formal study. The results of this primary study provide insight into nurse-initiated defibrillation from the rural nurses' perspective. The findings indicate that for these participant nurses the concept of nurse-initiated defibrillation was generally embraced. The central issues for nurse-initiated defibrillation programs in the rural setting that emerged from the results were issues related to consequences for patient, support and confidence with rhythm recognition. These observations are not dissimilar to previous studies that have examined the challenges and concerns of nurses when there is a change in the nurse's role (Jones 2003; Bowler & Mallik 1998).

When considering the advantages of nurses being permitted to initiate defibrillation in the rural setting, the participants focused on the benefits for the patient. These included quicker response times and improved survival. The findings of this study provide empirical support for Jones and Cooke's (1996) observation that rural nurses often voiced their frustrations when they were acutely aware of interventions required, but had to wait for the arrival of the doctor to initiate action. Participants in this study concurred with Jones and Cooke's observation that because they were often present when the patient collapsed and understood the patient required immediate intervention, not having to wait potentially increased patient's chances of survival. Conversely, participants expressed the concern of their initiation of defibrillation resulting in harm to the patient or the potential for litigation. It was these same concerns that participants identified as potential barriers to their initiating defibrillation.

While participants in this elicitation study believed that defibrillation was indeed a nursing responsibility that would benefit the patient, there appeared to be a relationship between nurses' level of confidence and the extent to which they embraced nurse-initiated defibrillation. When asked to identify events that might influence their decision to use or not use a defibrillator, participants' identified issues related to rhythm recognition, potential for harm to the patient, litigation and their role within the arrest team. In settings where nurse-initiated defibrillation was a newer concept, participants were clearly less confident about initiating defibrillation unsupervised. These participants believed there was the risk of harming the patient or possibly incurring litigation if they initiated defibrillation unsupervised.

When normative beliefs were scrutinised, participants sought approval from peers including other nurses and doctors. This finding was not surprising as nurses working in rural settings often have a strong collaborative relationship with peers (Blue & Fitzgerald 2002). Participants in this study sought support not only from peers but also the nursing profession to assure them that it was safe for them to initiate defibrillation. There was a belief expressed that the participants were being asked to undertake a new role without adequate legal support. This observation has been noted previously in the literature where rural and remote nurses have expressed the need to legitimise the practices that nurses were undertaking (Witham 2000). Consistent with the literature, rhythm recognition was a major barrier to nurses not initiating defibrillation (Coady 1999; Mancini & Kaye 1998; Stewart 1996a).

Strength and Limitations

The strength of this phase was the use of a qualitative design that allowed the researcher to explore the defibrillation beliefs of the rural nurses. Given the paucity of previous research in this area, the use of focus groups proved an effective approach. The findings of this elicitation study are limited because participants constituted a small non-random sample of the target population, thus negating generalisability.

Summary: Phase One

Focus group method and demographic questionnaire were underpinned by the Theory of Planned Behaviour to provide guidance for Phase One. The TPB was useful in guiding the development of focus group questions and the analysis of

the data. Phase One offers an understanding of nurses' beliefs as they pertain to them initiating defibrillation and has provided some insight into what changes are needed to ensure the success of nurse initiated defibrillation programs. Specific questions that arose from this phase were:

- Do nurses permitted and not permitted to initiate defibrillation hold different beliefs about nurse-initiated defibrillation?
- Do nurses permitted to initiate defibrillation actually intend to initiate defibrillation unsupervised at the next cardiac arrest?

Guided by the TPB, participants' beliefs obtained from Phase One were used to develop a survey instrument to attain quantitative data on rural nurses' defibrillation beliefs and practices. The developed questionnaire was subsequently pilot tested. The next section of the thesis presents an overview of the Pilot study.

Pilot Study Overview

Polgar and Thomas (2000) posit that having developed a new questionnaire it is wise to pilot the questionnaire with a small group of the intended respondents in order to improve its clarity and remove problems. The pilot study involved the distribution of the developed questionnaire to the participant's from Phase one and a third rural site. While the sample size for the pilot study was less than ideal (n = 13) the quality of feedback provided by participants was beneficial and provided valuable information on the structure and detail of the questionnaire. A detailed presentation of the pilot study can be found in Appendix F. As a result of feedback some questions were re-worded and areas of repetition removed. Four items in the demographic section were deleted and a further item added. Items

that participants expressed difficulty completing were modified in accordance with feedback. The direct measures of attitude, while demonstrating high internal consistency, presented some level of confusion for the participants. Hence, minor changes to the presentation of the direct measures of attitude were made to enhance the clarity of questions with the final instrument being shorter. Phase Two of the research applied the developed questionnaire to the population of rural registered nurses working in rural Queensland.

Results: Phase Two

This section of the chapter addresses the research questions and hypotheses. Data from this phase was collected using the questionnaires distributed to registered nurses (n = 436) working in acute care hospitals (n = 51) across rural Queensland. The results are presented in the following order:

- Demographics
- Aim One: Description and comparison of the defibrillation beliefs and opinions of rural registered nurses permitted and not permitted to initiate defibrillation.
- Aim Two: Study the efficacy of the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) as models for predicting nurse initiated defibrillation behaviour in registered nurses within the rural acute care hospital settings. In this section the sample was delimited to include only nurses permitted to defibrillate.

Demographics

The sample included the total and the sub groups of those permitted and not permitted to defibrillate. Of the 436 participants in this study, the majority were female (401/436; 92%) and Level One registered nurses (240/436; 55.3%). The predominance of females is congruent with previous data that reports a 91:1 ratio of Australian female to male nurses (AIHW 2004, Bell 1997). The majority of participants held either a hospital certificate or an undergraduate degree as their highest qualification (n = 351, 80.7%). The mean years of experience as a registered nurse of the sample was 16.3 years (SD = 10.26) with 11 years (SD = 8.84) in the rural setting. Just over half (n = 225, 51.6%) of the sample was employed in 'Other Rural' areas (RRMA Classification). These data is displayed in Table 4.8.

Table 4.8: Demographic profile of nurses in the main study (Phase Two).

	Not permitted to defibrillate (n = 224)			Permitted to defibrillate (n = 211)			TOTAL sample (n = 435)		
	n (%)	M	SD	n (%)	M	SD	n (%)	M	SD
Gender									
Female	213 (95)			188 (89)			401 (92)		
Male	11 (5)			23 (11)			34 (8)		
$\chi^2 = 5.69$, df = 1, p = 0.02									
Career length									
Years	224	16.5	10.93	211	16.1	9.5	435	16.3	10.3
***p = 0.01									
Employed in the rural setting									
Years	224	10.5	9.32	211	11.6	8.3	435	11.0	8.8
***p = 0.24									
Present level in the career structure									
Level 1 Registered Nurse	140 (62.5)			100 (47.6)			240 (55.3)		
Level 2 Registered Nurse	62 (27.7)			87 (41.4)			149 (34.3)		
Level 3 Registered Nurse or above	22 (9.8)			23 (11)			45 (10.4)		
$\chi^2 = 10.18$, df = 2, p = 0.01									
Highest Qualification									
Hospital Certificate	100 (44.6)			83 (39.3)			183 (42.1)		
Diploma	10 (4.5)			10 (4.7)			20 (4.6)		
Bachelor	83 (37.1)			65 (30.8)			148 (34)		
Post Graduate Qualifications	31 (13.8)			53 (25.2)			84 (19.3)		
$\chi^2 = 8.96$, df = 13, p = 0.03									
RRMA Rural classification									
Large Rural	102 (45.3)			70 (33.2)			172 (39.4)		
Small Rural	19 (8.4)			20 (9.5)			39 (8.9)		
Other Rural	104 (47.2)			121 (57.3)			225 (51.6)		
$\chi^2 = 6.11$, df = 2, $p < 0.05$									

*Note the profile of nurses is not consistent because of missing data, *** t-test.*

Cardiac Arrest Experience of Registered Nurses Currently Employed in Acute Care Hospitals Throughout Rural Queensland

The majority of participants (n = 345, 80.23%) in this study had experienced being the first person on the scene at a cardiac arrest (Table 4.9). These findings provide empirical evidence to support previous anecdotal evidence that nurses are often the first person on scene. Of the 345 participants who had experienced being the first person on scene at a cardiac arrest, 42.4 percent (182/345) had done so on four or more occasions. Likewise, the majority of participants (404/436, 93%) had viewed a person being defibrillated on more than one occasion with 65 percent (n = 283) on more than four occasions.

Table 4.9: Cardiac arrest experiences of registered nurses currently employed in acute care hospitals throughout Rural Queensland (n = 434).

	First person on scene n (%)	Viewed defibrillation n (%)
Never	85 (19.8)	30 (6.9)
1-3 times	163 (37.9)	123 (28.1)
4-10 times	91 (21.2)	106 (24.2)
Greater than 10 times	91 (21.2)	177 (40.8)

First person on scene: *How many times have you been first person on scene at a cardiac arrest?,* ***Viewed defibrillation:*** *How many times have you viewed a person being defibrillated in a cardiac arrest situation?*

Across the participating sites generally specially trained nurses (n = 189, 44.2%) or the onsite doctor (n = 166, 38.8%) were responsible for defibrillation on the ward where the participant was employed. A further ten percent (n = 44) of participants identified either the doctor or other persons from outside the hospital as being the primary person responsible for defibrillation on their ward. Having noted this, when it came to initiating defibrillation, predominantly it was the doctor onsite (n = 270, 63.4%) followed by specially trained nurses (n = 95, 21.8%) who were responsible for defibrillation. Table 4.10 details participants' understanding of

the defibrillation protocol of their ward. Again 11 percent (n = 46) of participants identified either the doctor on call or other persons from outside the hospital as those who generally initiated defibrillation on their ward. All participants identified 'other persons responsible for initiating defibrillation' as Queensland Ambulance Officers (QAS). Only seven percent (n = 29) of participants identified the first person on scene as the primary person responsible for defibrillation. Similarly, only 3.5 percent (n = 15) of participants identified the first person on scene as the person who generally initiated defibrillation.

Table 4.10: Perceptions of registered nurses employed in acute care hospitals throughout Rural Queensland related to the defibrillation practices within their ward.

	Person responsible n (%)	Person to initiate n (%)
First person on Scene	29 (6.8)	15 (3.5)
Specially trained nurses	189 (44.2)	95 (22.3)
Doctor onsite	166 (38.8)	270 (63.4)
Doctor on call from outside the hospital	37 (8.6)	41 (9.6)
Other	7 (1.6)	5 (1.2)

Note: *10 missing,* ***Person responsible:*** *Who is the person responsible for defibrillation on your ward?,* ***Person to initiate:*** *Generally, who was the person to initiate defibrillation*

Consistent with previous studies the more remote the site, the less frequently the doctor was onsite (Pascoe 2000). Table 4.11 illustrates the number of hours a doctor was on site at the study sites.

Table 4.11: Participants' perceptions of the number of hours a day a doctor is onsite (n = 431).

Hours a day	n (%)
1-6	121 (30)
7-12	100 (23.2)
13-18	24 (5.6)
19-23	9 (2.1)
24	177 (41.1)

Fifty seven percent (n = 245) of the participants noted a doctor was on site for less than 18 hours a day at their hospital. A doctor was on site 24 hours a day for 41 percent (n = 177) of participants.

Aim One

The initial aim of the research was to describe the defibrillation practices of registered nurses working in rural acute care hospitals and compare the defibrillation beliefs of rural registered nurses permitted and not permitted to initiate defibrillation.

Description and Comparison of Rural Registered Nurses Permitted and not Permitted to Initiate Defibrillation.

Information about the participants' ability to initiate defibrillation was obtained in response to the item; "Are you expected to perform defibrillation at your hospital?" Of the 436 participants less than half (n = 211; 48%) were permitted to initiate defibrillation. Figure 4.1 displays the data distribution of nurses permitted and not permitted to initiate defibrillation at the site where they were employed.

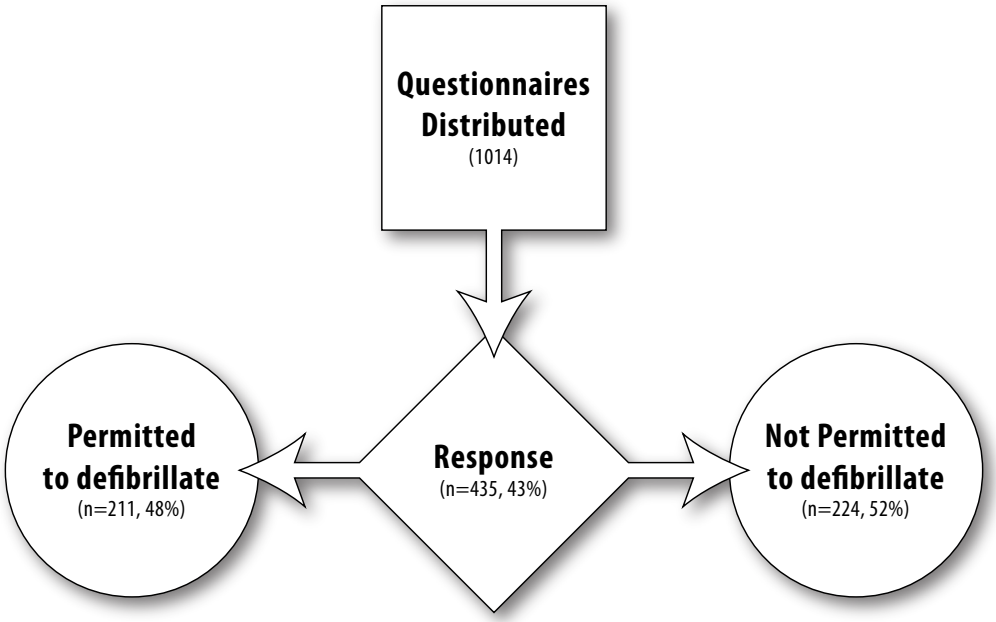

Figure 4.1: Representation of nurses permitted to defibrillate.

It was possible to compare participant responses related to their support to defibrillate and not defibrillate on the basis of gender, career length, length of time as a registered nurse, length of time employed in the rural setting, level in the career structure and their highest nursing qualification. Table 4.8 details information relating to the characteristics of the respondents permitted and not permitted to initiate defibrillation. Those permitted to defibrillate differed in terms gender, career length, career structure and qualifications. The length of time employed in the rural setting was the only shared variable between the two groups.

Gender

While the majority of participants were female (92.2%, n = 401), there was a significant difference between male and female respondents expected to defibrillate $\chi^2(1) = 5.69$, $p = 0.02$ (Table 4.1). Males were more likely to be

permitted to initiate defibrillation. More females (53.5%, 213/401) were not permitted to defibrillate compared to those permitted to defibrillate (46.5%: 184/401). In contrast, the majority (69%, 23/34) of male participants in the total sample were permitted to defibrillate with only 30.3 percent (10/34) not permitted to defibrillate.

Career Length

There was a significant difference in the mean length of practice time for participants permitted and not permitted to initiate defibrillation ($t = 0.37$, $p = 0.01$). The mean length of practice for nurses permitted to initiate defibrillation was 16.1 years (SD = 9.8) compared to 16.5 years (SD = 11.2) for participants not permitted to defibrillate.

Length of Time Employed in the Rural Setting

Table 4.8 displays the mean length of time all participants had been employed in the rural setting in this study. When comparing the length of time employed in the rural setting for nurses permitted and not permitted to initiate defibrillation, there was no statistical significance between the two groups ($t = 1.25$, $p = 0.24$). The mean length of time for nurses permitted to initiate defibrillation was 11.6 years (SD = 8.3) and for nurses not permitted to initiate defibrillate, 10.5 years (SD = 9.32).

Level in Career Structure

While the majority (55.3%; n = 240) of the total sample were Level One registered nurses, only 47.6 percent (100/211) of participants in the 'permitted to defibrillate' group were Level One nurses. The majority of nurses in the 'not permitted to

defibrillate' group were Level One registered nurses (140/224, 62%) compared to the majority being Level Two or Three registered nurses (110/211, 52.4%) in the 'permitted to defibrillate' group. These results displayed in Table 4.8 reveal the differences between the 'permitted to defibrillate' and 'not permitted to defibrillate' groups which were statistically significant ($\chi^2(2) = 10.180$, $p = 0.006$).

Qualifications

Information about the qualifications of the participants was obtained by asking them to identify their highest completed qualification. The results of the total sample are presented in Table 4.8. When comparing responses of those permitted to defibrillate and those not permitted to defibrillate, there was a statistically significant difference between the two groups ($\chi^2(3) = 8.96$, $p = 0.03$). Nurses with postgraduate qualifications were more likely to be permitted to initiate defibrillation. For 86 percent (193/224) of nurses in the 'not permitted' to defibrillate group the highest qualification was an undergraduate degree. When examined more closely almost 45 percent (100/224) possessed a hospital certificate, 4.5 percent a diploma (10/224) and 37 percent a bachelor degree (83/224). In contrast 74.8 percent (158/211) of nurses in the 'permitted to defibrillate' group held undergraduate qualifications.

Rural

The characteristics of participants permitted to defibrillate were compared against the RRMA classifications. There was a statistically significant difference between nurses who were permitted to defibrillate across the three rural classifications ($\chi^2(2) = 6.11$, $p<0.05$). The results are displayed in Table 4.8. Of all respondents permitted to defibrillate, those from 'other rural' areas (57.3%, 121/211) were

almost twice as likely to be permitted to do so, compared to those from large rural settings (33.2%, 70/211). Within the rural settings, less than half of the nurses working in 'large rural' centres were permitted to defibrillate (40.8%, 70/172) compared to 59.2 percent (102/172) who were not permitted to defibrillate. In contrast, nurses working in 'other rural' areas were more likely to be expected to initiate defibrillation (53.4%, 121/225 permitted; compared to 46.6%, 104/225 not permitted).

Defibrillator Preference of the Nurses Permitted to Defibrillate

To determine the type of defibrillator the participants who were permitted to defibrillate preferred to use, participants were asked to identify their preference of defibrillator. Analysed responses are presented in Table 4.12. Of the 204 participants who responded 60.3 percent (123/204) preferred to use a conventional/manual defibrillator and 39 percent (80/204) a semi-automatic defibrillator.

Table 4.12: Defibrillator preference of nurses permitted to defibrillate (n = 204).

	n (%)
Conventional /manual defibrillator	123 (60.3)
Semiautomatic defibrillator	80 (39.2)

This observation was not surprising given the large percentage of Australian hospitals with manual defibrillators (Finn & Jacobs 2003).

Recency of Competency

Participants were asked to identify the last time they were assessed as competent to initiate defibrillation by the hospital where they were employed. Table 4.13 identifies these responses. Almost half (47.4%, 100/211) of participants were

either in the process of being assessed or had been assessed as competent within the previous 6 months. A further 21.8 percent (46/211) had been assessed in the previous twelve months and 17.5 percent (37/211) in the previous 13 to 24 months. Of concern were 12.8 percent (30/211) of the participants who had never been assessed as competent and a further five percent (12/211) who had not been assessed for a period of more than two years.

Table 4.13: Length of time since those permitted to defibrillate were last assessed as competent to perform defibrillation (n = 211).

	n (%)
Never	20 (9.5)
Currently – within last 6 months	100 (47.4)
7-12 months ago	46 (21.8)
13-24 months ago	37 (17.5)
over 24 months ago	8 (3.8)

Number of Times those Permitted to Defibrillate have Defibrillated a Person

To identify the number of times the participants permitted to defibrillate had used this skill in practice participants were asked 'How many times have you had to defibrillate a person?' The data are presented in Table 4.14. The majority of participants (119/211, 56.4%) permitted to defibrillate had done so on more than one occasion with 28.4 percent (60/211) having used the skill on more than four occasions.

Table 4.14: Number of times participants permitted to defibrillate had used the skill in practice (n = 211).

	n (%)
Never	92 (43.6)
1-3 times	59 (28)
4-10 times	25 (11.8)
More than 10 times	35 (16.6)

In summary, participants were predominantly female, level one nurses with an average of 16 years experience in nursing and 11 years in the rural setting. The highest qualification of the majority of the participants was a hospital certificate or a bachelor degree. Most participants had experienced being first person onscene at a cardiac arrest where generally it was the doctor who initiated defibrillation. Just over half of the participants were not permitted to initiate defibrillation. Additionally, over half of the participants noted the doctor was onsite for less then 12 hours a day.

Hypothesis: 1

Hypothesis 1 predicted significant differences in beliefs toward nurse-initiated defibrillation between nurses permitted to defibrillate and those not permitted to defibrillate. A one-way between-groups multivariate analysis of variance (MANOVA) was performed to test this hypothesis. Ten specific belief items were entered as dependent variables and the independent variable was whether the nurses were permitted to initiate defibrillation. The results indicated that those permitted to initiate defibrillation held more positive beliefs about nurse-initiated defibrillation when compared to those not permitted to initiate defibrillation. Table 4.15 presents the means and standard deviations for the ten belief items across the two groups, together with the univariate (*F*-test) tests of significance.

The results indicate statistically significant differences in the belief variable between participants permitted and not permitted to initiate defibrillation, Pillai's multivariate F (10, 410) = 13.88 ($p < 0.001$). Follow up univariate tests of significance yielded significant findings for all 10 dependent variables (using

a Bonferroni adjusted alpha level of 0.005). Examination of the mean values indicated that nurses who were permitted to initiate defibrillation held stronger positive beliefs towards defibrillation than nurses not permitted to defibrillate.

Table 4.15: Mean and standard deviations of nurses' beliefs and opinions toward initiating defibrillation based on permission to initiate defibrillation.

Belief and opinion items	Not permitted to defibrillate (n = 214)		Permitted to defibrillate (n = 207)		*F* (df)
	Mean	SD	Mean	SD	
Learning the rhythms associated with defibrillation is difficult	4.18	2.76	3.4	1.99	$F(1,421) = 11.2$ ($p < 0.001$)
Being responsible for defibrillation is a responsibility I do not want.	4.24	2.23	2.54	1.87	$F(1,421) = 72.0$ ($p < 0.001$)
I am concerned I may harm the patient if I had to defibrillate a patient	3.9	2.16	2.33	1.78	$F(1,421) = 66.0$ ($p < 0.001$)
I am concerned I may harm myself if I had to defibrillate a patient	2.46	1.79	1.77	1.34	$F(1,421) = 19.9$ ($p < 0.001$)
I am concerned I may incur litigation if I had to defibrillate a person	4.14	2.13	2.73	1.85	$F(1,421) = 51.2$ ($p < 0.001$)
I believe defibrillation is a medical responsibility	3.91	2.22	2.12	1.63	$F(1,421) = 88.7$ ($p < 0.001$)
We don't have enough cardiac arrests to warrant all nurses being responsible for defibrillation	4.15	2.37	2.62	2.05	$F(1,421) = 49.8$ ($p < 0.001$)
Defibrillation is a critical care skill	5.09	2.19	4.38	2.36	$F(1,421) = 10.3$ ($p < 0.005$)
My being responsible for defibrillation will NOT reduce the time from collapse to defibrillation	2.32	1.80	1.39	0.96	$F(1,421) = 43.8$ ($p < 0.001$)
My being responsible for defibrillation will NOT increase the patients chances of survival.	2.25	1.81	1.29	0.92	$F(1,421) = 47.1$ ($p < 0.001$)

1 = extremely disagree 7 = extremely agree $F(10, 410) = 13.88$ ($p < 0.001$) note 14 missing

Learning Rhythms

When asked to indicate whether learning the rhythms associated with the skill of defibrillation was difficult, the majority of nurses (55 percent, 115/211) within the 'permitted to defibrillate' group did not believe this was difficult (M = 3.4, with a 95% confidence interval (CI) of 3.11-3.66). In contrast 49 percent (108/224) of the of the 'non-defibrillation' group believed that learning the rhythms associated with the skill of defibrillation was difficult (M = 4.18, with a 95% CI of 3.8-4.4). The difference in the two groups' beliefs about learning rhythms associated with defibrillation was significant ($F = 11.17$, $p < 0.001$).

Wanting Responsibility

To determine if nurses wanted the responsibility of initiating defibrillation, participants were asked to respond to the item 'Being responsible for defibrillation is a responsibility I do not want'. Not surprisingly responses from those permitted and those not permitted differed significantly ($F = 71.95$, $p < 0.001$). The majority of respondents (51.8%, 115/224) in the 'not permitted to defibrillate' group did not want to be responsible for defibrillation (M = 4.24, with a 95% CI of 3.92-4.53), whereas responses from the 'permitted to defibrillate' group were clear (M = 2.54, SD = 1.87, with a 95% CI of 2.24-2.75) that defibrillation was a responsibility they did want. Of interest, 22 percent (n = 45) of the nurses expected to initiate defibrillation did not want this responsibility. Conversely, of the 214 nurses 'not permitted to defibrillate' 38 percent (n = 84) wanted this responsibility.

Harming the Patient

The majority of nurses in the 'permitted to defibrillate' group (79%, n = 166) were less likely to be concerned about harming the patient (M = 2.33, with a 95% CI of 2.07-2.56) than those in the 'not permitted to defibrillate' group (M = 3.9, with a 95% CI of 3.6-4.19). The difference in belief about harming the patient was significant ($F = 66$, $p < 0.001$).

Harm to Self

The greater proportion of respondents (70.5%, n = 158) not permitted to defibrillate were not concerned that initiating defibrillation could result in harm to themselves (M = 2.46, with a 95% CI of 2.2-2.67). Similarly, there was limited concern (M = 1.77, with a 95% CI of 1.56-1.93) about self-harm among the majority (89.6%, n = 189) of those permitted to defibrillate ($F = 19.9$, $p < 0.001$).

Litigation

One hundred and fifteen (51.6 percent) of the respondents not permitted to defibrillate were concerned about incurring litigation (M = 4.14, 95% CI, 3.85-4.43). Conversely the majority of nurses (67.8%, n = 143) permitted to defibrillate were not concerned (2.73, with a 95% CI of 2.48-2.99) about potential litigation. The litigation beliefs and opinions of the two groups were significantly different ($F = 51.23$, $p < 0.001$).

Medical Responsibility

Most respondents (84.4%, n = 178) permitted to defibrillate clearly indicated (M = 2.12, with a 95% CI of 1.88-2.32) that defibrillation was not a medical responsibility. On the other hand, those not permitted to defibrillate were significantly less clear (M = 3.91. with a 95% CI of 3.6-4.2) about whether defibrillation was a medical responsibility or not ($F = 88.72$, $p < 0.001$).

Critical Care Skill

While nurses 'not permitted' to defibrillate were ambivalent (M = 3.91) about defibrillation as a medical responsibility, when asked if defibrillation was a critical care skill sixty nine percent (n = 154) of this group were decisive (M = 5.09, with a 95% CI of 4.8-5.4) that defibrillation was indeed a critical care skill. This belief (M = 4.38, with a 95% CI of 4.07-4.73) was supported by fifty-four percent (n = 112) of the nurses permitted to defibrillate. Again the beliefs of two groups were statistically different ($F = 43.8$, $p < 0.001$).

Not Enough Arrests

Seventy three percent (n = 154) of the nurses permitted to defibrillate disagreed (M = 2.62, with a 95% CI of 2.33-2.9) with the statement, "we don't have enough cardiac arrests to warrant all nurses being responsible for defibrillation". Those not permitted to defibrillate had mixed beliefs about whether there were enough cardiac arrests occurring for all nurses to be responsible for defibrillation (M = 4.15, with a 95% CI of 3.81-4.46). There was a significant difference between the beliefs of the two groups ($F = 49.79$, $p < 0.001$).

Reducing Time to Defibrillation

While the majority of respondents from both groups believed that their being able to defibrillate would reduce the time from collapse to defibrillation, those permitted to defibrillate held statistically stronger beliefs (M = 1.39, with a 95% CI of 1.25-1.51) than those not permitted to defibrillate (M = 2.32, with a 95% CI of 2.10-2.59; F = 43.8, $p < 0.001$).

Increasing Patient Survival

Likewise respondents from both groups believed that their ability to defibrillate would increase the patients' chances of survival. Nurses permitted to defibrillate had stronger beliefs (M = 1.28, with a 95% CI of 1.16-1.42) compared to those not permitted to defibrillate (M = 2.25, with a 95% CI of 2.02-2.51). The differences in beliefs were statistically significant ($F = 47.11$, $p < 0.001$).

Summary: Results Aim One

Generally, in terms of differentiating the beliefs of nurses permitted and those not permitted to initiate defibrillation, there were significant differences between the groups ($F = 13.88$, $p < 0.001$). Nurses permitted to initiate defibrillation were not concerned about the challenge of learning rhythms, incurring litigation, harming the patient or themselves should they initiate defibrillation. This group of nurses were very clear that defibrillation was not a medical responsibility and that their initiation of defibrillation would not only reduce the time from collapse to defibrillation but also increase the chances of survival of the patient. Both groups believed that defibrillation was a critical care skill.

Aim Two

The second aim was to study the efficacy of the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) as models for predicting nurse initiated defibrillation behaviour in registered nurses within the rural acute care hospital settings. In keeping with studies guided by the TRA and the TPB the focus of this study was the intention to initiate defibrillation unsupervised, should a cardiac arrest occur 'today'; actual behaviour was not examined. The total sample of 436 participants was delimited, only those permitted to initiate defibrillation completed the 'test of the theories' section of the questionnaire (Section C).

Data Transformation

Prior to analysis, variables were screened using SPSS for Macintosh version 10 for accuracy of data entry, missing values and normality. The variables were examined separately and reverse-scored items recoded. As there were less than five percent of missing variables in randomly pattern from the data set, groups mean substitution was used to estimate the missing variables. This was chosen as it is conservative and any procedure for handling missing values yields similar results if data are missing in a random pattern from a large data set (Tabachnik & Fidell 2001). Normality of data was examined graphically and statistically using Skewness and Kurtosis. One case was found to be a univariate outlier because of its extremely low z score on attitude toward defibrillation and was deleted. [1]

1. Case 385, female registered nurse with 12 years experience as a registered nurse in the rural setting had very unfavourable attitudes and intentions regarding defibrillation.

Dependent Variable

Overall participants identified a high degree of positive intention to initiate defibrillation as early as possible if a cardiac arrest was to occur on their ward on that day. The mean behavioural intention measure was 6.33 (SD = 0.99) on a seven-point intention scale of 'extremely disagree' to 'extremely agree'. Consistent with the theories, Behavioural Intention (BI) was entered as the independent variable and direct measures and external variables as the independent variables. Table 4.16 presents the descriptive data for the measures used to test the theories.

Table 4.16: Bivariate correlations of constructs of Theory of Planned Behaviour and Theory of Reasoned Action.

Theory variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Dependent measure															
1. Behavioural Intention	1.00														
Direct measures															
2. Attitude	0.33*	1.00													
3. Subjective Norm	0.68*	0.28*	1.00												
4. Perceived Behavioural Control	0.57*	0.25*	0.61*	1.00											
External measures															
5. Past behaviour	0.41*	0.13	0.51*	0.56*	1.00										
6. Difficulty learning rhythms	-0.27*	0.01	-0.25*	-0.21*	-0.19*	1.00									
7. Don't want the responsibility	-0.56*	-0.20*	-0.47*	-0.53*	-0.55*	0.42*	1.00								
8. Concerned may harm patient	-0.45*	-0.18*	-0.44*	-0.52*	-0.46*	0.36*	0.66*	1.00							
9. Concerned may harm self	-0.31*	-0.22*	-0.25*	-0.32*	-0.32*	0.28*	0.53*	0.62*	1.00						
10. Concerned about litigation	-0.35*	-0.15*	-0.38*	-0.39*	-0.38*	0.31*	0.57*	0.65*	0.43*	1.00					
11. Medical responsibility	-0.48*	-0.28*	-0.41*	-0.36*	-0.40*	0.29*	0.72*	0.55*	0.47*	0.53*	1.00				
12. Not enough cardiac arrests	-0.19*	-0.11	-0.28*	-0.28*	-0.27*	0.23*	0.49*	0.41*	0.29*	0.33*	0.42*	1.00			
13. Critical care skill	-0.08	0.04	-0.10	0.01	-0.06	0.06	0.17	0.13	0.12	0.13	0.25*	0.20*	1.00		
14. Will not reduce time	-0.38*	-0.20*	-0.29*	-0.28*	-0.24*	0.05	0.31*	0.18*	0.17*	0.16*	0.34*	0.20*	0.03	1.00	
15. Not increase patient survival	-0.39*	-0.19*	-0.32*	-0.28*	-0.22*	0.03	0.28*	0.19*	0.14*	0.12	0.24*	0.22*	0.02	0.77*	1.00
Mean	6.33	5.60	5.78	5.49	2.01	3.41	2.54	2.33	1.77	2.73	2.12	2.62	4.38	1.39	1.29
Standard Deviation	0.99	0.84	1.17	1.20	1.11	1.99	1.87	1.78	1.34	1.85	1.63	2.05	2.36	0.96	0.92
Range	1-7	1-7	1-7	1-7	1-4	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7
Alpha	0.88	0.84	0.81	0.71											

**Correlation is significant at the 0.05 level (1-tailed). Range extremely Disagree 1– 7 extremely Agree (n = 210)*

Past behaviour 1 = never; 2 = 1-3 times; 3 = 4-10 times; 4 ≥ 10 times

Independent Variables

Direct Measures

The majority of participants who held a positive attitude towards early defibrillation (M = 5.60, SD = 0.84), felt that important referents supported their initiating defibrillation (M = 5.78; SD = 1.17) and they believed that they had a high degree of perceived control towards the initiation of early defibrillation (M = 5.49, SD = 1.20).

Hypothesis 2.1

The preliminary step in testing the TRA and TPB was to establish that the proposed relationship between behavioural intention (BI) and the direct measures of attitude (ATT), subjective norm (SN) and perceived behavioural control (PBC) were valid. The TRA predicts that intention will correlate significantly with attitudes and subjective norm while the TPB includes the PBC as the third significant correlate with intention. Hypothesis 2.1, stating the direct measures of the theories will positively correlate with behavioural intention, was confirmed. Correlations will be significant when the observed relation between two variables is unlikely to be due to chance alone $p < 0.05$ (Ajzen & Fishbein 1980). The intercorrelations between the variables of the theories were examined using Pearsons' correlation coefficient. Results of correlation analyses are shown in Table 4.16.

Consistent with the theories, behavioural intentions were significantly correlated with ATT, SN and PBC. The strongest relationship was between behavioural intention and subjective norm ($r = 0.68$, $p < 005$). As well, SN was highly

correlated with perceived behavioural control (r = 0.61, p < 005). The strong correlation between intention and subjective norm implies that when participants believed significant others supported their initiation of defibrillation, their intentions to initiate defibrillation were higher. The weakest relationships were between attitude and all three variables, attitude and BI (r = 0.33, p < 005), attitude and subjective norm (r = 0.28, p < 005) and lastly attitude and PBC (r = 0.25, p < 005). As the direct measures of attitude, subjective norm and PBC had significant bivariate correlations with intention, all were included in the testing of the effectiveness of the theories.

Hypothesis 2.2

Hypothesis 2.2 that predicted behavioural intention from attitude toward the behaviour, subjective norm and perceived behavioural control should be significant, was tested using standard (simultaneous) regression analysis. To examine the relationship between the dependent variable (BI) and the three independent variables (ATT, SN and PBC), all independent variables were entered at once. Table 4.17 presents the results of regression analysis conducted to test this hypothesis.

Table 4.17: Predicting defibrillation intentions from the direct measures of TRA and TPB: Hierarchical regression.

Variables Entered	*r*	β	R	R^2	*F*	F_{inc}
Theory of Reasoned Behaviour						
Step 1			**0.70**	**0.49****	***F* = (2, 206)**	
Attitude	0.33*	0.16**			96.82***	
Subjective norms	0.68*	0.63***				
Theory of Planned Behaviour						
Step 2			**0.72**	**0.52****	***F* = (3, 205)**	
Attitude	0.33*	0.14**			72.62***	12.97***
Subjective norms	0.68*	0.51***				
PBC	0.57*	0.22***				

****p < 0.001, **0.001 < p < 0.01, *0 .01 < p < 0.05, PBC = Perceived behavioural control, β standardised regression, n = 209*

An examination of Table 4.17 reveals the hypothesis was supported. Attitude, SN and PBC together explained 52 percent (R^2) of the variance in BI, which was highly significant as indicated by an F (3, 205) = 72.61 ($p < 0.001$). Examination of the beta weights indicate that all three direct measures of attitude toward early defibrillation ($\beta = 0.14$, $p < 0.01$), subjective norm ($\beta = 0.51$, $p < 0.001$) and perceived behavioural control ($\beta = 0.22$, $p < 0.001$) made significant independent contributions to the prediction of early defibrillation intention. With regard to Subjective Norm, these results indicated that the more the nurse believes that significant others support them initiating defibrillation the stronger is their behavioural intention to initiate defibrillation. The perceived behavioural control results indicate that the more the nurse participant perceived that they had control over the initiation of defibrillation at the next cardiac arrest and the more they perceived that it would be easy to perform this behaviour, the greater was the behavioural intention to initiate defibrillation. Similar to attitudes toward defibrillation, these results indicate the more the nurse thought that defibrillation

was good, important, beneficial, valuable, exciting, pleasant, empowering, rewarding or enjoyable, the greater the behavioural intention to initiate defibrillation at the next cardiac arrest.

Hypothesis 2.3

Hypothesis 2.3 posed the inclusion of the measure of perceived behavioural control with the direct measures of attitude and subjective norm would significantly add to the prediction of behavioural intention when compared to the predictive ability of the measures of attitude and subjective norm alone (Levin 1999; Sideridis et al. 1998; Ajzen 1991; Ajzen 1988). To test this hypothesis variables were measured within the context of the TRA and TPB from which the concepts were originally developed. The guidelines as outlined by the models were followed where possible (Ajzen & Fishbein 1980). Therefore, a series of hierarchical multiple regression analyses were computed in order to determine the ability of the variables to predict intentions. To test the overall effect of the TRA, attitude and SN were entered as the initial step of the hierarchical regression analysis. Overall the TRA was statistically significant, $R = 0.70$, $F\ (2, 206) = 96.82$, $p < 0.001$, accounting for 49 percent of the variance in behavioural intention. Results are presented in Table 4.17. Both the direct measures of attitude toward early defibrillation ($\beta = 0.16$, $p < 0.01$) and subjective norm ($\beta = 0.63$, $p < 0.001$) made significant contribution to the prediction of early defibrillation intention on the first step.

Next, perceived behavioural control was entered as the second step of the analysis. This step examined whether PBC explained a significant unique proportion of the variance in intention to initiate early defibrillation beyond that accounted

for by the direct measures attitude and subjective norm of the TRA. Hypothesis 2.3 was confirmed, in that the addition of PBC at step 2 made a significant improvement, F_{change} (1, 205) = 12.97 p < 0.01, to the predictive ability of the model. The addition of the PBC increased the multiple correlations to 0.72, indicating that in combination the three direct measures of the TPB accounted for 52 percent of the variance in early defibrillation intention. Further the addition of PBC made a significant unique contribution of three percent to the variance of behavioural intention after attitude and SN (R^2_{change} = 0 .03, F_{change} p < 0.001). When examining the standardised regression coefficients on the second step, subjective norm (β = 0.51, p < 0.001) made the greatest contribution to the prediction of defibrillation intentions followed by PBC (β = 0.22, p < 0.001) and attitudes (β = 0.14, p < 0.01). Thus, when the direct measures of the constructs were used, the data provided evidence in support of the TPB. This indicates that when the TPB is defined with its direct constructs, it confirmed that rural nurses who had favourable attitudes towards their initiating defibrillation, had a belief that significant others approved of their initiating defibrillation and perceived they had control over initiating defibrillation they were more likely to intend to initiate defibrillation than their peers who did not hold these beliefs.

The TPB argues that external measures have an impact on behaviour and behavioural intention only indirectly by influencing some of the factors more closely linked to the behaviour in question (that is the direct measures) (Ajzen 1991).

External Variables

Past Defibrillation Behaviour

One item was used to measure past defibrillation behaviour. Of those who were permitted to defibrillate, participants were asked to identify the number of times they had actually defibrillated a person. Overall, just over half (n = 119, 56.4%) had used a defibrillator at some time in the past, half of these (n = 60) on more than four occasions. 43.6 percent (n = 92) had never used a defibrillator. These findings were presented in Table 4.16.

Belief Factors

The two hundred and eleven participants who were permitted to defibrillate completed the ten item beliefs and opinions section of the questionnaire. Descriptive statistics for the beliefs and opinions items were presented earlier in this section (Table 4.16). The findings found that generally participants had positive beliefs about nurse-initiated defibrillation.

Hypothesis 3.1

Consistent with the theory, this hypothesis held that the external variables should correlate with behavioural intention. The correlations between the direct measures and the external measures were examined using Pearsons' product-moment correlation coefficient for parametric measures. Preliminary analyses were performed to ensure no violations of the assumptions of normality, linearity and homoscedasticity. The external measure of past behaviour ($r = 0.41$, $p < 0.05$)

was significantly and positively correlated with the dependent variable of BI. That is, the greater the number of times the participant had defibrillated a person the greater the association with positive intentions to initiate defibrillation.

The dependent variable of BI was negatively correlated with all ten beliefs and opinions variables. All variables had a significance level of $p < 0.05$ with the exception of 'defibrillation is a critical care skill' (see Table 4.16). Three variables 'Learning the rhythms associated with defibrillation is difficult' ($r = -0.27$, $p < 0.05$), 'there are not enough cardiac arrests' ($r = -0.19$, $p < 0.05$) and 'defibrillation is a critical care skill' ($r = -0.08$, $p < 0.05$) had correlations less than 0.30 and were eliminated as external variables. There were strong significant negative correlations between BI and participants not wanting the responsibility for defibrillation ($r = -0.56$, $p < 0.05$), being concerned about harming the patient ($r = -0.45$, $p < 0.05$), concern about harming themselves ($r = -0.31$, $p < 0.05$), concern about litigation ($r = -0.35$, $p < 0.05$), and that defibrillation was a medical responsibility ($r = -0.48$, $p < 0.05$). That is, the more participants wanted the responsibility of defibrillation, believed defibrillation was not a medical responsibility, that their initiating defibrillation would not harm either the patient or themselves and not concerned about litigation, the greater their intentions to initiate defibrillation. Likewise, there was a strong negative correlation between BI and participants disagreeing with the statements 'my initiating defibrillation will not reduce the time from collapse to defibrillation' ($r = -0.38$, $p < 0.05$) and 'defibrillation will not increase the patients chances of survival' ($r = -0.39$, $p < 0.05$). Again the more the participant believed their initiation of defibrillation would increase the patient's chances of survival or reduce the time from collapse

to defibrillation, the greater the relationship with positive intentions to initiate defibrillation. Following the elimination of the three beliefs and opinions measures, a total of eleven independent variables were examined in this study. A summary of independent variables to be included in the tests of the theories are presented in Table 4.11. The hypothesis posing that the external variables should correlate with behavioural intention was somewhat confirmed.

Table 4.18: Dependent and Independent variables for Phase Two.

	Mean	SD
Dependent variable		
Behavioural Intention	6.33	0.99
Independent variables		
Direct measures		
1. Attitude	5.60	0.84
2. Subjective Norm	5.78	1.17
3. Perceived Behavioural Control	5.49	1.20
External measures		
4. Past behaviour	2.01	1.11
5. Don't want the responsibility	2.54	1.87
6. Concerned may harm patient	2.33	1.78
7. Concerned may harm self	1.77	1.34
8. Concerned about litigation	2.73	1.85
8. Medical responsibility	2.12	1.63
10. Not reduce time	1.39	0.96
11. Not increase patient survival	1.29	0.92

Note: Three beliefs and opinion questions were eliminated.
Past behaviour: 1 = never; 2 = 1-3 times; 3 = 4-10 times; 4 ≥ 10 times

Hypothesis 3.2

A hierarchical regression was employed to determine if the inclusion of the measure of past defibrillation behaviour (the number of times a nurse had defibrillated a person) in the TPB would account for a significant portion of additional variance in behavioural intention (Ajzen 1998). The variables were entered into the hierarchical regression analysis in two steps: (1) Attitude,

Subjective Norm and Perceived Behavioural Control and (2) Past Behaviour. In this way it was possible to assess the predictive utility of TPB and the additional predictive utility of past behaviour. Table 4.19 displays the correlations (*r*) between the variables, the standardised regression coefficients (β), the R square change and R, R^2 and adjusted R^2 after entry of all eleven independent variables.

On the first step the TPB explained 52 percent of the variance in intentions (F (3, 205) = 72.62, p < 0.001), with all direct measures emerging as significant predictors. The addition of past behaviour at step two did not increase in the amount of variance explained by the Theory of Planned Behaviour (F_{change} (1,204) = 0.08, p = 0.77). Hypothesis 3.2 that suggested the inclusion of the measure of past defibrillation behaviour (the number times a nurse had defibrillated a person) in the TPB would not account for a significant portion of additional variance in behavioural intention was supported (Ajzen 1998).

Table 4.19: Hierarchical regression analysis of TPB variables and external variables on Behavioural Intention.

Variable	*r*	β	R	R^2	ΔR^2	*F*	F_{inc}
Step 1			**0.72**	**0.52**	**0.52*** **	***F* (3,205) = 72.62 *** **	
Attitude	0.33*	0.12**					
SN	0.68*	0.48***					
PBC	0.57*	0.25***					
Step 2			**0.72**	**0.52**	**0.00**	***F* (4,204) = 54.24 *** **	***F* (1,204) = 0.08 (NS)**
Attitude	0.33*	0.14**					
SN	0.68*	0.51***					
PBC	0.57*	0.22***					
Past behaviour	0.41*	0.17 NS					
Step 3			**0.76**	**0.57**	**0.06**	***F* (11,197) = 23.96*** **	***F* (7,197) = 3.77*** **
				0.55 Adjusted			
Attitude	0.33*	0.10*					
SN	0.68*	0.44***					
PBC	0.57*	0.15*					
Past behaviour	0.41*	-0.61					
Don't want the responsibility	-0.56*	-0.13					
Concerned may harm patient	-0.45*	-0.06					
Concerned may harm self	-0.31*	-0.01					
Concerned about litigation	-0.35*	-0.05					
Medical responsibility	-0.48*	-0.09					
Not reduce time	-0.38*	-0.08					
Not increase patient survival	-0.39*	-0.07					

****p < 0.001, **0.001 < p < 0.01, *0.01 < p < 0.05, SN = subjective norm*
PBC = Perceived Behavioural Control

Hypothesis 3.3

The combination of the seven beliefs and opinion measures and past defibrillation behaviour constituted the external variables as operationalised by the TPB and should not produce a significant increment in the proportion of the variance accounted for in intention by the more proximal measures of the model (Ajzen 1991). To test this hypothesis, a hierarchical regression analysis was conducted with the strength of all the external variables being compared to the TPB (the results are presented in Table 4.19). R was significantly different from zero at the end of each step. After step three, with all 11 independent variables in the equation, R = 0.76 *F* (11,197) 23.96, $p < 0.001$.

On the first step of the analysis the direct measures of the TPB were entered. The addition of the combined external variables on step three made a significant improvement in the prediction of intention (F_{inc} (7,197) = 3.77, $p < 0.01$). Further the addition of external measures made a significant, unique contribution of six percent to the variance of behavioural intention after TPB are controlled for (R^2_{change} = 0 .57, F_{change} $p < 0.001$; adjusted $R^2 = 0.55$). Hence, the prediction of behavioural intention was improved by the information gathered from the external measures. Only the direct measures of attitude ($\beta = 0.10$, $p < 0.05$), subjective norm ($\beta = 0.43$, $p < 0.01$) and PBC ($\beta = 0.15$, $p < 0.05$) made significant, unique contributions to the prediction of intentions to initiate early defibrillation. Thus the data shows that when it comes to the defibrillation intentions of the nurses in this study, the most important factors were (a) positive attitudes towards defibrillation; (b) a belief that significant others approve of their initiating defibrillation; and (c) that they have control initiating defibrillation.

The hypothesis 3.3 stating that the direct measures of the TPB would predict a significantly larger portion of the population's behavioural intention than the combined external measures was supported (Ajzen 1998, 1991, 1988; Ajzen & Madden 1986; Ajzen & Fishbein 1980).

Hypothesis 3.4

The hypothesis posed that the direct measures of the TPB would mediate the relationship between behavioural intentions and the combined external measures (Ajzen 1991, 1988; Ajzen & Fishbein 1980). Baron and Kenny (1986:1173) state "the mediator function of a third variable… represents the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest". According to Baron and Kenny (1986) the first step in establishing mediation is to show that the independent variables are related to the mediator (Baron & Kenny 1986). As all the direct measures exhibited significant relationships with the external measures, the possibility of the direct measures mediating a relationship between external measures and behavioural intention existed (Hypothesis 3.1).

In order to demonstrate that the direct measures toward defibrillation mediate the relationship between the combined external measures, a regression analysis was undertaken. Firstly, the hypothesised mediating variables (attitude, subjective norm and perceived behavioural control) were regressed on the independent variables (combined external variables). Examination of Table 4.20 demonstrates that all mediating variables exhibited a significant relationship with the external variables.

The external variables together explained 11 percent of the variance of the attitude measure ($R = 0.33$, $F(8,200) = 3.05$, $p < 0.005$). Participant belief that defibrillation was a medical responsibility ($r = -0.28$; $\beta = -0.24$, $p < 0.05$) was the only variable that made a significant contribution to the direct measure of attitude. Significant paths are presented on Figure 4.2. Attitude was shown to be directly and significantly related to the participants' negative beliefs that defibrillation was a medical responsibility.

Table 4.20: Prediction of direct measures using external variables.

Variable	Attitude				Subjective Norm				Perceived Behavioural Control			
	r	β	R	R^2	*r*	β	R	R^2	*r*	β	R	R^2
			0.33	0.11			0.61	0.38			0.66	0.44
Past behaviour	0.13	0.01			0.51*	0.32***			0.56*	0.33***		
Don't want the responsibility	-0.20*	0.08			-0.47*	-0.07			-0.53*	-0.23*		
Concerned may harm patient	-0.18*	0.02			-0.44*	-0.18*			-0.52*	-0.27**		
Concerned may harm self	-0.22*	-0.14			-0.25*	0.10			-0.32*	0.05		
Concerned about litigation	-0.15*	0.00			-0.38*	-0.07			-0.39*	-0.01		
Medical responsibility	-0.28*	-0.24*			-0.41*	-0.11			-0.36*	0.11		
Not reduce time	-0.20*	-0.05			-0.29*	0.01			-0.28*	-0.09		
Not increase survival	-0.19*	-0.10			-0.32*	-0.20*			-0.28*	-0.06		
	$F(8,200) = 3.05^{**}$				$F(8,200) = 15.11^{***}$				$F(8,200) = 19.47^{***}$			

$^{***}p < 0.001$, $^{**}0.001 < p < 0.01$, $^{*}0.01 < p < 0.05$.

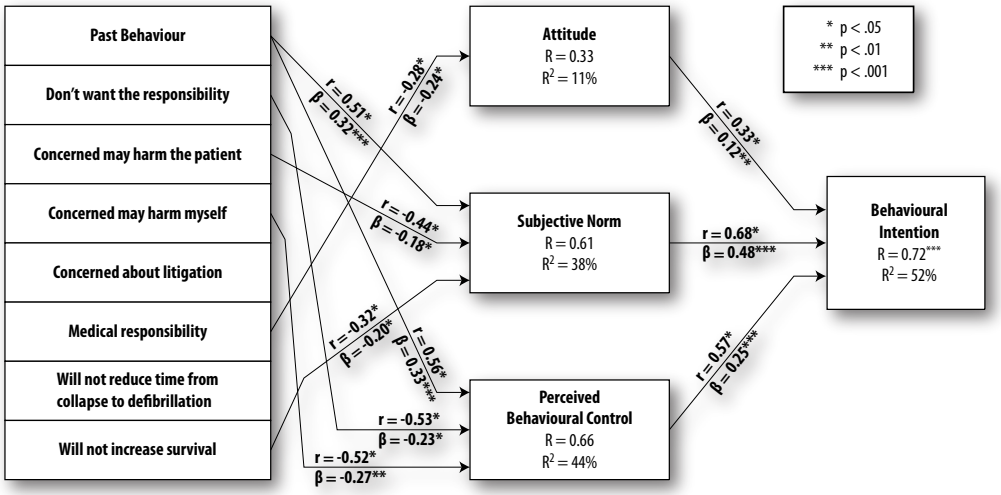

Figure 4.2: A Summary of the Relationships Between External Measures, Variables of the Theory of Planned Behaviour.

All external variables together explained 38 percent of the variance of the subjective norm measure (R = 0.61, F (8,200) = 15.11, p < 0.001). Past defibrillation behaviour (r = 0.51; β = 0.32, p < 0.001), concerns about harming the patient (r = -0.44; β = -0.18, p < 0.001) and the belief that defibrillation did not increase the patients' chances of survival (r = -0.32; β = -0.20, p < 0.001) all made significant contributions to the direct measure of subjective norm.

Combined external variables together explained 44 percent of the variance of the perceived behavioural control measure (R = 0.66, F (8,200) = 19.47, p < 0.001). External variables of past defibrillation behaviour (r = 0.56; β = 0.33, p < 0.001), not wanting the responsibility for defibrillation (r = -0.53, β = -0.23; p < 0.005) and concerns about harming the patient (r = -0.52; β = -0.27, p < 0.01) all made significant contributions to the direct measure of perceived behavioural control. That is PBC and subjective norm were both directly and significantly related to the participants' negative concerns that their initiation of defibrillation could

potentially harm the patient. Further, the more times a participant had initiated defibrillation directly and significantly related to both subjective norm and perceived behavioural control.

Next, a relationship between the mediator measures (attitude, subjective norm and perceived behavioural control) and dependent variable of behavioural intention must be demonstrated. A highly significant proportion of the variance accounted for in behavioural intention by the three direct measures demonstrated this. This relationship was demonstrated in hypothesis 2.2.

Finally, if the direct measures mediate the relationship between the external measures and behavioural intention, this relationship should be substantially attenuated when the individual mediating measures are controlled for in a regression analysis. Examination of Table 4.19 reveals the proportion of variance accounted for in intention by the independent external measures was substantially smaller when the external measures were controlled for, than when intention was regressed directly on the external measures. These findings support the hypothesis that the effects of the combined external variables on behavioural intention are mediated through the direct measures of attitude, subjective norm and perceived behavioural control. That is, the prediction of participants' intention to initiate defibrillation at the next cardiac arrest was not improved by the information gathered from the combined external variables.

Conclusion

The findings of the two phases were presented and the defibrillation beliefs and practices of registered nurses working in rural acute care hospitals described. A comparison was made between the defibrillation beliefs and opinions of rural registered nurses permitted and not permitted to initiate defibrillation. The Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) were utilised as models to predict the nurse-initiated defibrillation behaviour of registered nurses within the setting of rural acute care hospitals.

Although the research methods of the two phases may be dichotomous, the findings of qualitative and quantitative research tend to blend into each other. The significance of these findings are considered in comparison to previous studies in the subsequent chapter.

CHAPTER 5

Discussion

In this chapter the findings in relation to the purpose of this study to use an established framework to describe the defibrillation beliefs and practices of rural registered nurses, thereby to identify the variables that are of greatest importance in understanding, explaining and predicting their intentions to use a defibrillator are discussed. This study identified that defibrillation practices in Queensland's rural hospitals are not consistent with the empirical evidence where reducing the time from collapse to defibrillation is the single most important determinant of cardiac outcome. In rural hospitals the concept of first-responder defibrillation by nurses is not being embraced with over half of the nurses in this study not being permitted to initiate defibrillation. The study provides strong support for the use of TRA and TPB as theoretical frameworks to understand and promote early defibrillation behaviour in rural nurses. The implications arising from the findings, areas for future research and limitations of the study precede the conclusion of the study.

Overview of Results

Nurses permitted to defibrillate held significantly more positive beliefs about nurse-initiated defibrillation when compared to nurses not permitted to defibrillate. The current study provides strong support for using the Theories of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) as a conceptual approach for understanding, explaining and predicting defibrillation behaviour in registered nurses within the setting of rural acute care hospitals. The hypothesised relationship between the TRA and TPB variables and their predictive power for intention are consistent with previous research. Rural nurses in this study generally had strong intentions towards initiating defibrillation at the next cardiac arrest on their ward. The findings reveal that rural nurses who intend to initiate defibrillation at the next cardiac arrest were more likely to hold positive attitudes towards defibrillation, to believe that their peers approve of the behaviour and to perceive defibrillation to be 'easy'. Further, defibrillation intentions are best predicted by the nurses' perceived level of support from peers (SN), that is, participants were influenced by their perceptions of approval from their peers. Given that less than 50 percent of rural nurses in this study were permitted to initiate defibrillation and that doctors or specially trained nurses currently seem to be responsible for defibrillation, these findings have important implications for planning interventions to increase the levels of defibrillator use by nurses.

Defibrillation Practices of Registered Nurses in Rural Queensland

The study findings confirm and extend previously published studies on the defibrillation practices of registered nurses (Finn & Jacobs 2003; O'Higgins et al. 2001; Pascoe 2000). The study found that only 48 percent (n = 211) of registered nurses in rural Queensland were permitted to initiate defibrillation. The larger the rural setting the less likely the nurse was to be permitted to initiate defibrillation. Reasons why fewer nurses may be permitted to initiate defibrillation in 'large rural' areas may be because of the availability of doctors or a reliance on established cardiac arrest teams within these hospitals. The findings of this study are similar to Pascoe's study where only 41 percent (n = 39) of rural or remote sites across Queensland permitted registered nurses to initiate defibrillation (Pascoe 2000). Similarly, Finn and Jacobs (2003) in a recent study to describe the defibrillation practices nurses in Australian hospitals found that of the 644 hospitals in the study with defibrillators, 16 percent (n = 101) indicated that nurses were not permitted to defibrillate. In both Pascoe and Finn and Jacobs' studies, questionnaires were distributed to the Directors of Nursing (DONs) asking them to identify if nurses were permitted to initiate defibrillation. In areas where there was a mix of staff permitted and not permitted, the DONs responded positively. Clearly the actual number of nurses permitted to defibrillate in the hospitals included in Pascoe, and Finn and Jacobs' studies would be less than recorded.

The findings of the study concur with previous studies that have found typically doctors were on site for less than 24 hours a day in rural Queensland hospitals (Finn & Jacobs 2003; Pascoe 2000; Jones & Cooke 1996). Further, the smaller the rural hospital, the likelihood of a doctor being onsite for more than 12 hours a day decreased. Indeed in 'other rural' areas 83 percent of the participants noted the doctor was onsite for less than 12 hours a day. Consistent with this finding was that nurses in rural settings are often the first person on the scene at a cardiac arrest. Further, within these smaller rural settings generally it was the doctor who actually initiated defibrillation. These findings reinforce the observations of previous researchers that precious minutes are lost as nurses continue to wait for persons with defibrillation skills to arrive (Stewart 1996b; Kaye, Mancini, Richards et al. 1995). Clearly within the rural context early defibrillation is a weak link in the acknowledged 'chain of survival.'

Participants in the current study were more likely to be permitted to initiate defibrillation if they were male, Level Two or above in the career structure, held postgraduate qualifications or were employed in 'other rural' areas. In addition, those nurses permitted and not permitted both concurred that defibrillation was a critical care skill. These findings support the observations of previous authors who noted that despite the advances in medical technology, defibrillation continues to be considered an 'advanced' skill that should be restricted to a select few of the hospital staff (Stewart 1996b). For first responder programs to be successful in hospitals there must be a transfer of what is perceived to be a medical act – initiation of defibrillation – into the hands of persons not traditionally responsible for the act (Weisfeldt & Kerber 1996).

Indeed Phase One of the current study revealed nurses would initiate defibrillation only if ordered to do so by the doctor. Of the nurses not permitted to initiate defibrillation in Phase Two (n = 224) a surprising 37 percent (n = 160) did not want this role. Reasons why the majority of nurses not permitted to defibrillate did not want the responsibility may be drawn from the comparisons of this group's beliefs about nurse-initiated defibrillation and nurses permitted to defibrillate.

As hypothesised, nurses not currently permitted to initiate defibrillation held significantly different beliefs about defibrillation than nurses permitted to initiate defibrillation. Nurses not permitted to initiate defibrillation were more likely to believe that:

- learning the rhythms associated with defibrillation was difficult
- there were insufficient cardiac arrests to warrant all nurses being responsible for defibrillation
- they may harm the patient and risk litigation
- defibrillation was both a critical care skill and a medical responsibility.

While nurses not permitted to defibrillate were concerned that they may harm the patient and risk litigation should they be responsible for defibrillation, they did not believe there was any potential risk of harming themselves. Surprisingly both groups believed that nurse-initiated defibrillation would reduce the time from collapse to defibrillation and increase the patient's chances of survival. One would anticipate that nurses having noted the potential for increasing the patient's chances of survival would welcome the responsibility for initiating defibrillation.

The role of the nurse in the last decade has undergone many changes to keep pace with changing technology. Hence the expansion of the nursing role to include additional tasks is considered implicit within a nurse's role (Bowler & Mallik 1998). For the nurses not permitted to initiate defibrillation, initiating defibrillation, was viewed as a role that possibly intruded upon medical 'territory' and involved carrying out tasks that are traditionally performed by either doctors or critical care nurses. Despite the impetus for change advocated by both the nursing profession and policy pressure, nurses are still uncertain about the legal and educational issues surrounding changes in role (Bowler & Mallik 1998).

The reasons why such a large percentage of the nurses not permitted to initiate defibrillation do not want this responsibility may be that any perceived benefits for increasing patient survival may be outweighed by beliefs associated with the potential burdens of nurse-initiated defibrillation, such as the perceived risk of harming the patient and incurring litigation. Consistent with these anxieties, the participants not permitted to initiate defibrillation were reluctant to accept the responsibility for defibrillation. Conversely, there were positive correlations between nurses wanting the responsibility for defibrillation, the belief that defibrillation was not a sole medical responsibility and not being concerned about possible litigation. The implications of these observations will be further explored.

Theoretical Implications

The results of this study provide support for the utility of the TRA and TPB in the prediction of rural nurses' intentions to initiate defibrillation. The constructs had Cronbachs alpha coefficients of 0.71 to 0.88 for the direct constructs of the both

the TRA and TPB are similar to findings reported in previous studies (Blanchard, Courneya, Rodgers, Daub & Knapik 2002; Jurgens 1996). Blanchard, Courneya, Rodgers, Daub and Knapik (2002) in a study to evaluate the TPB as a framework for understanding exercise motivation during and after cardiac rehabilitation, reported Chronbach's alpha coefficients ranging from 0.69 to 0.86. Also, Jurgens (1996) reported alpha coefficients between 0.69 and 0.93 in their study of nurses' intention to administer morphine for post-operative pain.

Numerous studies have reported that the direct measures of attitude, subjective norm and perceived behaviour control have accounted for a highly significant proportion of variance in behavioural intention (Fazekas et al. 2001; Richardson et al. 1997; Baker et al. 1996; Chan & Fishbein 1993). Overall, the models were highly and significantly predictive of defibrillation intentions of rural registered nurses. All three direct variables positively correlated with each other and significantly predicted behavioural intention. The direct measures in this study obtained an R^2 of 49 percent ($p < 0.01$) for the TRA and 52 percent ($p < 0.01$) for the TPB. The significant contribution of PBC to the proportion of variance demonstrated that initiating defibrillation, for these participants was not under their volitional control. Subjective norm ($\beta = 0.477$, $p < 0.001$) and perceived behavioural control ($\beta = 0.249$, $p < 0.001$) emerged as the stronger predictors of intention relative to attitudes ($\beta = 0.122$, $p < 0.05$). These findings are inconsistent with Ajzen's original assertion that attitude and PBC are generally the stronger predictors of intention (Ajzen 1991; Ajzen & Timko 1986). The following discussion expands on these findings.

In this study the Theory of Reasoned Action (TRA) supported a positive attitude towards defibrillation use and perceptions of stronger support to use a defibrillator (SN) were associated with greater intentions to use a defibrillator should a cardiac arrest occur on the ward area 'today'. The multiple regression of behavioural intention on attitude toward the behaviour and subjective norm were highly significant with over 49 percent of the variance in behavioural intention being accounted for by these two variables. Reviews of the literature demonstrate these findings to be consistent with previous studies that support and show that attitudes and subjective norms typically account for 40 to 50 percent of the variance in the behavioural intentions (Armitage & Conner 2001; McKinlay et al. 2001; Sheeran et al. 2001; Werner & Mendelsson 2001; Ajzen 1991).

Within the study both attitude towards the behaviour and subjective norm emerged as significant independent predictors of the behavioural intention. Subjective norm ($\beta = 0.63$, $p < 0.001$) predominated over attitude ($\beta = 0.16$, $p < 0.01$). While no similar study has been reported in the literature, the findings are somewhat consistent with other nursing related studies that have empirically tested the TRA (McKinlay et al. 2001; Werner & Mendelsson 2001; Laschinger & Goldenberg 1993). McKinlay, Couston and Cowan (2001) when examining nurses' ($n = 74$) behavioural intentions towards self-poisoning patients found that attitudes ($\beta = 0.784$, $p < 0.01$) predominated over subjective norm ($\beta = 0.144$, $p < 0.05$). Werner and Mendelsson (2001) found that the TRA explained 48 percent of the variance in nurses' ($n = 303$) intentions to use physical restraints with older people. Both attitudes ($\beta = 0.65$, $p < 0.001$) and subjective norm

($\beta = 0.46$, $p < 0.001$) made significant independent contributions to behavioural intention. Possible reasons why the subjective norm predicted the greater percentage of variance in the present study are discussed later in this chapter.

Overall the Theory of Planned Behaviour (TPB) model involving attitude, subjective norm and perceived behavioural control was highly significant ($R^2 = 0.52$, $p < 0.001$) and provided a better prediction of defibrillation intentions than did its predecessor, the TRA. The Theory of Reasoned Action was designed for behaviours that are under volitional control or behaviour over which the individual has a good deal of control (Ajzen & Fishbein 1980). In expanding the TRA into the TPB the issue of choice was accounted for through the inclusion of PBC (Ajzen 1991, 1988). The addition of PBC made a significant and unique contribution of three percent to the variance of behavioural intentions after attitudes and subjective norm. Review of the literature demonstrates these findings are consistent with previous studies that support and show that the direct measures of the TPB typically account for 18 to 55 percent of the variance in the behavioural intentions (McKinlay et al. 2003; Blanchard et al. 2002; Sheeran et al. 2001; Craig et al. 2000; Godin & Kok 1996; Jurgens 1996; Wankle & Mummery 1993). These findings indicate that defibrillation, like most behaviours requires resources, opportunities or cooperation of others, factors that diminish the predictive ability of the TRA (Sheeran, Trafimow, Finlay & Norman 2002).

A number of researchers have suggested that the predictive utility of the TPB may be augmented by the inclusion of a range of additional external variables (Evans & Norman 2003; Armitage & Conner 2001, 1999; Ajzen & Timko 1986; Ajzen & Fishbein 1980). In the present study eight such variables were considered,

these being past behaviour, not wanting the responsibility, concerns about litigation, harming the patient or themselves, that defibrillation is a medical responsibility and beliefs about patient survival or reducing the time from collapse to defibrillation. The addition of these variables to the TPB led to a significant six percent ($p < 0.001$) increment in the amount of variance explained in intention. While the amount of additional variance was highly significant, it is in fact typically modest and the additional predictive utility afforded by these variables should be weighed against the relative parsimony of the models (Evans & Norman 2003). Further, none of the eight variables made significant independent contributions to the regression equation. Controlling for the effects of the external variables, attitudes and perceived behavioural control, subjective norm was the dominant predictor of behaviour. The implication of the direct measures accounting for a greater proportion of the variance in defibrillation intention than the external belief variables is that the external belief variables are not direct predictors of intentions. But instead are proximal cues for the activation of those previously developed attitudes, SN and PBC regarding defibrillation intentions. In other words, an individual may have developed attitudes, perceptions of social pressures or perceptions of the ease or difficulty of performing defibrillation for a time when they have to initiate defibrillation unsupervised. For example when the feelings that defibrillation will or will not harm the patient reach a particular level, the defibrillation intention may be activated.

Attitudes are thought to measure an individual's affective beliefs regarding the level of 'enjoyment' and 'desirability' in engaging in a behaviour (Ajzen & Timko 1986). Attitudes can be assessed either directly or as a behaviourally based attitude

measure (Ajzen & Timko 1986). The direct measures of attitudes assess how positive or negative an individual's attitudes are toward performing the behaviour (Fazekas et al. 2001). While the participants in this study had positive attitudes towards nurse-initiated defibrillation, the direct measure of attitude towards nurse-initiated defibrillation was not the best predictor of intention in either the TRA or the TPB. This finding did not pose a threat to the models as the relative power of determinants of the behavioural intention depends on the specific behaviour being studied (Ajzen 1991; Ajzen & Madden 1986). Ajzen (1988) poses that while attitudes may be more relevant than SN in certain cases, the reverse may be found in other behaviours (Ajzen 1991; Ajzen 1988). For example, Jurgens (1996) in a study to examine nurses' intentions to administer morphine for post-operative pain found that both attitudes and PBC emerged as the significant independent predictors of BI (Jurgens 1996). The results of the present study suggest that with regard to rural nurses' defibrillation intentions, attitudes while significant, are the least important known determinants of intention.

To better understand the determinants of attitude, selected belief measures were regressed on attitude. Within this study, the belief that defibrillation was a medical responsibility ($\beta = -0.24$, $p < 0.05$) was the only variable that made a significant contribution to participants' attitudes. While nurses permitted to initiate defibrillation were clear that defibrillation was not a sole medical responsibility, nurses not permitted to initiate defibrillation held significantly less positive beliefs about whose role defibrillation was. Participants in this study may have formed these beliefs because doctors were not only the person generally responsible for defibrillation but also the person who initiated the defibrillation. This is

consistent with other studies that found in areas where nurses are authorised to initiate defibrillation, generally these nurses are not those initiating defibrillation (Skrifvars et al. 2002; Coady 1999). Coady believes that this is because the general perception remains that nurses should not be responsible for defibrillation (Coady 1999). Within Queensland only half (49%, n = 47) of the surveyed Directors of Nursing of rural and remote hospitals support nurses initiating defibrillation prior to the arrival of a doctor (Pascoe 2000). In contrast 65 percent (n = 30) of doctors from the same study supported nurses being responsible for defibrillation prior to their arrival at an arrest. Theoretically, if rural registered nurses believe that initiating defibrillation is a medical responsibility, their attitudes take on greater internal psychological significance and in turn contribute to negative defibrillation intentions.

The theory suggests that intentionally or unintentionally people act the way they think most of the time and that individuals consider the consequences of initiating behaviour prior to engaging in the act (Sideridis et al. 1998). Therefore if the nurse does not believe it is their role to defibrillate (as was the case with the nurses not permitted to initiate defibrillation) then they are not likely to engage in the behaviour.

According to the models, subjective norms (SN) are a function of beliefs that important others (referents) think that individuals should or should not perform the behaviour (Ajzen 1991). Findings from this study reveal high support for the relationship outlined by the TRA and TPB between subjective norm and intentions to initiate defibrillation. Further, subjective norm ($\beta = 0.51$, $p < 0.001$) was the dominant predictor of behavioural intention followed by PBC ($\beta = 0.22$,

$p < 0.001$) and lastly attitude ($\beta = 0.14$, $p < 0.01$). This means that in this sample, rural nurses perceived approval by important referents to have a significant impact on their intentions to initiate defibrillation.

Research into the TRA and TPB has generally shown that subjective norms are the weakest predictor of intentions to act (Armitage & Conner 2001; Jennings-Dozier 1999; Levin 1999; Godin & Kok 1996). Previous studies have indicated only a moderate role for the SN in the explanation of BI and behaviour in both the TRA and TPB (Godin 1993; Ajzen 1991). Godin (1993) in a review of the contribution of SN in exercise and physical activity found that SN failed to make a significant contribution to exercise behaviour in 17 of the 21 articles reviewed (Godin 1993). Further Ajzen (1991) in a review of 19 TPB studies found that only nine of the studies demonstrated a relationship between SN and intention (Ajzen 1991).

However it should be noted there are some studies that report SN was found to have a significant, unique influence on behaviour (McKinlay et al. 2003; Courneya, Blanchard & Laing 2001). Blanchard and others (2002) when comparing gender differences and subjective norm in a cardiac rehabilitation program, found SN and exercise intentions were significantly correlated only in women. The authors concluded the potential for gender differences should be considered in future research when examining the influence of SN, as SN may be more important in women compared with men in a cardiac rehabilitation context (Blanchard et al. 2002).

Given that the present findings contradict the majority of previous research testing the models, the most likely explanation is that this study reflects the unique population of rural nurses (Christian et al. 2002). The authors of the

theories note that while each of the three elements of the TPB may be important in predicting intentions in some domains and they may well be unimportant in others (Ajzen 1991, 1988). As Ajzen highlighted, the relative importance of SN will vary across behaviours, situations, populations and individuals (Ajzen 1991).

In the context of technology use, previous studies have demonstrated that subjective norm has manifested itself as peer influence (Taylor & Todd 1995; Mathieson 1991). Given that participants in this study believed that defibrillation was a critical care skill and the majority of participants permitted to initiate defibrillation preferred to use a manual or conventional defibrillator, one could argue using a defibrillator was viewed as using technology. Although technology is understood in terms of using equipment, nurses in this study discern technology to be a phenomenon that can both benefit and/or negatively affect the delivery of nursing care. Participants permitted to defibrillate embraced defibrillation and its perceived benefits for improving patient survival. Indeed, participants' beliefs about the impact on patient survival and not harming the patient were both significant contributors to the prediction of subjective norm.

Another explanation as to why subjective norm was the greatest determinant of behavioural intention may be drawn from beyond the TPB in the social identity theory (McKinlay et al. 2001; Terry & Hogg 1996). Subjective norm can be thought of as a form of social identity in which the salient group's norm exerts a social pressure upon people to act in a certain way (McKinlay et al. 2001; Terry & Hogg 1996). Nurses within the hospital setting carry out their duties within a rigidly hierarchical organisation setting and would then be sensitive to the views of their peers. This would impact on them through their subjective

norm (McKinlay et al. 2001). Further, within this hierarchical structure the 'team' attending a cardiac arrest is frequently made up of a variety of health care professionals with its own unique structure. In addition, defibrillation has traditionally had a strong association as a life saving intervention requiring specialised knowledge and advanced training. Hence for any change in protocol that directly affects the social order of the hospital environment to be successfully implemented, staff must be willing to allow such a situation to occur (Birnbaum, M. L. et al. 1994).

This study supports the findings of previous research that highlights that defibrillation traditionally and currently remains in the domain of medicine or specially trained nurses (Finn & Jacobs 2003; Pascoe 2000; Stewart 1996b). Given the tradition of responsibility for defibrillation in hospitals and the nature of support from Directors of Nursing, it is perhaps not surprising that the participants in this study were more strongly affected by perceived social pressure than by personal attitudes. Hence social norms may have predicted intention because aspects of the cardiac arrest teams' level of social identity and the roles within such teams may have affected the behavioural intentions of the participants. For early defibrillation programs to be accepted and functional in hospitals, nurses and doctors need to be convinced of the importance of challenging traditional roles that nurses have within the cardiac arrest team. It has been argued previously that traditional thinking may well be one of the greatest barriers to nurses being more actively involved with early defibrillation (Kenward et al. 2002; O'Higgins et al. 2001; Pascoe 2000; Green 1993).

The findings of this study support the literature in that there is an expectation for rural nurses to extend their scope of practice without clear evidence of the benefit for the patient, adequate endorsement from administration or policy to support such changes (Wynne et al. 2002; Hanna 2001; Pascoe 2000). For the rural nurses in this study, the expressed concerns about accepting new roles could be reduced with the implementation of highly visible policies that support nurse-initiated defibrillation as a routine skill within rural acute care hospitals. Ultimately this should achieve the objective of early defibrillation by all first responders and potentially improve patient survival in rural hospitals.

The Theory of Planned Behaviour proposes that persons currently responsible for initiating defibrillation should not marginalise those with limited experience from initiating defibrillation but instead empower them to expand their roles. Empowerment of others to undertake a new role through mutual support ensures the first responder initiated defibrillation at every opportunity. The results of this study demonstrate the importance of social influence and suggest that the cooperation of salient referents will need to be solicited to involve them when implementing defibrillation programs. Persons currently responsible for defibrillation within hospitals and all levels of nursing and medical staff should be made aware that nurse-initiated defibrillation is more likely to be successfully implemented if they demonstrate support and acceptance of all nurses using defibrillators. For the rural nurses in this study to assume primary responsibility for defibrillation, those currently responsible will have to relinquish sole control of defibrillation.

The presence of SN as a significant predictor of intention to use a defibrillator reinforces the need for education to shift their foci from nurses individually to nurses as part of a multidisciplinary team. Given the power of peer influence, programs delivered through multidisciplinary learning modes have been suggested to be an effective route to behavioural change (Fazekas et al. 2001). Indeed, skills training for activities that are situated at the nurse-doctor boarder should be a collaborative process (Greenhalgh Report 1994). A multidisciplinary approach to ALS training in rural community hospitals has demonstrated a positive change in attitudes of participants towards themselves and their roles as members of the ALS team and this change in attitude favourably affected the survival rate of patients (Birnbaum, M. L. et al. 1994). Establishing collaborative practice means synergistic alliances develop where initiation of defibrillation by both nurses and doctors is equally valued.

Participants in this study reported positive perceptions of control over the behaviour of initiating defibrillation. The degree to which the participants in this study believed they could control the initiation of early defibrillation at the next cardiac arrest added to the prediction of defibrillation use over and above the attitude and SN components of the TRA. The addition of PBC strengthened the prediction of behavioural intention by 3 percent ($p < 0.001$), a finding marginally smaller than previous studies. Meta analyses examining the contribution of PBC typically reveal that PCB contributes 5 to 6 percent in the variance in intentions after TRA variables had been taken into account (Armitage & Conner 2001; Sheeran et al. 1999). According to Ajzen (1991), PBC should have become less useful as volitional control over the behaviour increased, as when an individual

has complete control over the behaviour, PBC is not expected to impact on the prediction of BI (Ajzen 1991). While significantly adding to the prediction of intention (F_{inc} = 12.97 p < 0.001) PBC was the second strongest predictor of nurses' intention to initiate defibrillation after subjective norm. The strength of the subjective norm in this study and the type of behaviour under consideration may have contributed to the lower variance attributed by PBC. To better understand the determinants of PBC, the eight external belief measures were regressed on PBC.

Because defibrillation use is a goal that is not entirely under the volitional control of the nurses, in this study factors that may have enhanced the level of perceived control over initiation of defibrillation were explored. The external variables of past behaviour (β = 0.33, p < 0.001), not wanting responsibility for defibrillation (β = -0.23, p < 0.05), and concerns about harming the patient (β = -0.27, p < 0.01) all made significant contributions to PBC. Thus, those respondents who wanted the responsibility of initiating defibrillation, those who had more experience initiating defibrillation or believed defibrillation would not harm the person were more likely to perceive they had greater control over initiating defibrillation.

The hypothesis that the addition of past behaviour would fail to explain significantly more of the variance in behavioural intentions than TPB, was supported. While the majority of nurses in this study had initiated defibrillation, according to the theory this did not directly predict their defibrillation intentions. However past behaviour did emerge as a significant independent predictor of

rural nurses' perceptions of control (PBC) and subjective norm. This finding is consistent with the theories that assert the more a person performs a procedure the greater their perceived control over initiating the behaviour (Ajzen 1998).

Given perceived behavioural control is shaped by past behaviour it is not surprising that past behaviour contributed significantly to PBC (Sheeran et al. 2002; Ajzen 1991). As the majority of nurses in the current study permitted to initiate defibrillation had used a defibrillator in the past and were familiar with the procedure it is conceivable that nurses with more defibrillation experience held greater perceived control over their ability to engage in the behaviour and believed their peers supported them in their efforts to initiate defibrillation. A finding that is consistent with the theory that asserts that familiarity with the behaviour is important in the behavioural intention – PBC relationship (Sheeran et al. 2002). That is the more familiar the nurse is with defibrillation, the greater their perception of control over the behaviour.

Whenever the performance of behaviour is dependent on the actions of other people, for example functioning as a member of the 'arrest team', there exists the potential for incomplete control over the behaviour. Ajzen suggests a good example of behavioural interdependence is the case of cooperation (Ajzen 1988). If the nurse is not 'traditionally' part of an arrest team, the nurse can only cooperate as part of the team if reciprocation is offered from the team. Within rural settings, nurses in this study generally had less defibrillation experience and the social environment was one where doctors were generally those initiating defibrillation. There is limited opportunity for learning through observation of other nurses. While a nurse may be willing and competent to perform defibrillation, they

may be prevented from doing so because of the arrival of others traditionally responsible for initiating defibrillation. The arrival of the arrest team or the general practitioner may engender feelings in the nurse that their contribution is marginalised. Ultimately the nurse may experience limited control over initiating defibrillation and adopt a subservient role within the arrest team (Meerabeau & Page 1999; Crunden 1991). Nurses not usually responsible for initiating defibrillation must be encouraged to use a defibrillator at every opportunity and those 'responsible' for defibrillation should resist performing defibrillation if there is a nurse with the appropriate training present. These persons should support and guide nurses to undertake this role thus increasing the nurses confidence to undertake the skill unsupervised (Coady 1999). Empowerment of nurses to initiate defibrillation may reduce feelings of marginalisation and foster positive perceptions of control and ultimately strengthen intentions to initiate defibrillation unsupervised at the next arrest. Conversely, while a lack of opportunity and dependence on others may lead to temporary changes in intentions, when repeated efforts to perform the behaviour result in failure, more fundamental changes in intentions can be expected (Ajzen 1988).

The more resources and opportunities the nurse thinks they possess and the fewer obstacles or impediments they anticipate, the greater should be their perceptions of control over the behaviour (Ajzen 1988). Further, in order to hold efficacious beliefs regarding initiating defibrillation, Fazekas (2001) argues one must initially possess the skills to exercise that control. Early defibrillation programs for nurses in rural hospitals should therefore make it a priority to equip the nurse with the requisite skills. As PBC is closely related to Bandura's self-efficacy model (Ajzen

1991), utilising self–efficacy to enhance perceptions of control and ultimately defibrillation use by rural nurses may be extremely valuable. Self–efficacy strategies to increase defibrillation intention by enhancing the level of perceived control includes learning from peers about their use (vicarious experience), learning through personal mastery (performance attainment) and receiving positive feedback for participation in defibrillation workshops (verbal persuasion) (Bandura 1977). Nurses and doctors currently responsible for defibrillation play a vital role in fostering nurses' perceptions of control over defibrillation. Nurses may be able to learn how to exert control over initiating defibrillation by observing models who demonstrate how to effectively insist on using the defibrillator and how to deal with the potential ensuing resistance and pressures that may arise (Fazekas et al. 2001).

Summary

In summary, one of the frequently stated rationales for using the TRA and TPB for health–related problems and issues is that by identifying the variables that are of greatest importance in explaining and predicting behaviour, this may facilitate the development of educational programs and other strategies aimed at promoting behavioural change (Werner & Mendelsson 2001). Although previous studies (Mancini & Kaye 1998; Gray & Humphry 1997; Eastwick-Field 1996b; Jones & Cooke 1996; Kaye & Mancini 1996; Mancini et al. 1996; Kaye, Mancini & Richards 1995; Kaye, Mancini, Richards et al. 1995) have focused on implementing nurse-initiated defibrillation programs, none have been implemented within the context of a conceptual framework. The ultimate test of the utility of the TRA and TPB

is their ability to guide the development of effective behaviour (Matheson 2000). This study provides a framework for not only understanding and predicting defibrillation intentions but also for planning interventions that have the potential to increase the levels of defibrillation by all nurses. One application of this research would be to design a theory-based first responder defibrillation plan incorporating the TPB.

The findings of this study encourage first responder programs to be developed around identifying and addressing all three direct measures of the model. As subjective norm and PBC accounted for the greatest amount of variance in defibrillation intentions, these should be the primary focus of such programs. Further, the variables that significantly contributed to the direct measures were beliefs relating to responsibility for defibrillation, perceived benefit for the patient and experience should be explored and incorporated into the programs.

Despite the impetus for change advocated by both the Australian Resuscitation Council and the nursing profession that nurses should be responsible for defibrillation, many nurses in this study were either not permitted or did not want this role. Such uncertainty about taking on new roles can lead to inter-professional tension and potentially exacerbate resistance to change. Given rural nurses are more likely to take on new roles if they believe it will benefit the patient, by manipulating the benefit/burden scale so perceived benefits outweigh conceivable burdens, the decision to be responsible for defibrillation should become less difficult. This could be readily addressed by removing barriers to nurse-initiated

defibrillation such as consideration of the choice of defibrillator and providing visible policies to ensure defibrillation is clearly viewed as an important individual link within the chain of survival.

Implications and Recommendations for Practice

Nursing is a dynamic activity that is constantly evolving and nurses are challenged to adapt (Jones 2003). Some of these adaptations are due to the medico-technical environment in which nursing finds itself. Advances in technology have stimulated the need to acquire new skills necessary for contemporary nursing and have resulted in a blurring of professional boundaries. Nurse-initiated defibrillation in the past was a skill that because of the limitations of technology, was best performed by the doctor or specifically selected trained nurses. With advances in technology both nurses and doctors can now perform defibrillation equally appropriately in terms of safety and patient outcome. Despite the enthusiasm about the benefits for the patient, being responsible for defibrillation provoked uncertainty for many of the participants in this study.

Based on the findings of the current study, when introducing a nurse-initiated defibrillation program, it is suggested that intervention messages targeting nurses should attempt to strengthen the belief that defibrillation is not a sole medical responsibility. Rather the key issue should be to foster an ethos of defibrillation by first responders. Directing interventions at these beliefs should increase the potential for the successful implementation of such programs. This ethos could be enhanced with the implementation of highly visible policies supporting nurse-initiated defibrillation.

Rural nurses are less likely to assume extra roles if perceptions of the complexity of skill associated with the proposed role are likely to contribute to stress (Hanna 2001). Much of the anxiety associated with nurse-initiated defibrillation for this sample extended from issues related to the complexity of the skill, ensuring change does not harm the patient and perceived level of support from peers. For the participants not permitted, defibrillation was perceived as both a medical and critical care skill that may be required infrequently. This ultimately places limitations on both the development and maintenance of skill expertise and thus affects the confidence of nurses performing skill (Hanna 2001). Where the nurse may no longer feel confident to use these skills, communities and patients depending on these skills will be disadvantaged (Hanna 2001) and survival reduced.

To ensure early defibrillation occurs, hospitals should consider changing the way they respond to cardiac arrests and promote an ethos where defibrillation is a basic rather than an advanced life support skill. Observers have classically considered defibrillation as an integral role of advanced life support (Cummins et al. 1991). Defibrillation must stand alone as a vital intervention of resuscitation. One means of enhancing defibrillation confidence and competence is to tailor the teaching of defibrillation to meet the needs of the participants (Soar & McKay 1998).

Short resuscitation courses tailored specifically for rural nurses who are responsible for resuscitation but do not need nor wish to be trained to an advanced life support level is required (Soar, Perkins, Harris & Nolan 2003). Such courses should focus on skills that are most likely to improve outcomes from in-

hospital cardiac arrest. Skills included are basic life support, airway management (use of oxygen) and use of automated external defibrillators (AEDs). The AED may be most useful in first responder programs in-hospitals as a means of providing nurses with the confidence to actually use the equipment. The use of AEDs and changing the response to cardiac arrests in hospitals are the first steps towards ethos change where nurse led defibrillation is the norm rather than the exception. Proficiency in these skills would enable the first responder to manage patients in cardiac arrest until advanced life support teams arrive (Soar et al. 2003).

Future Research

This study has revealed a number of significant implications for future nursing research. The findings have extended previous nursing studies applying the theories. This study made no attempt to determine the extent to which rural registered nurses' behavioural intentions are translated into actually initiating defibrillation. Therefore there is a need for further research in this area that includes measures of actual behaviour. It is clear from the findings of this study the TRA and TPB have utility in predicting, explaining and understanding rural nurses' intentions to initiate defibrillation. However for practical purposes the use of the direct measures to examine participants' attitudes, subjective norm and perceived behavioural controls and the relative importance of these variables was sufficient. For a more complete understanding of the participants' intentions it is necessary for future research to explore why people hold certain attitudes, SN or different perceptions of control.

Researchers have suggested the TPB be extended to include not only SN (perceived social pressure) but also personal feelings of moral obligations to perform or refuse to perform the behaviour (Werner & Mendelsson 2001; Conner & Armitage 1998). Connor and Armitage (1998) describe moral obligation as the person's perception of the correctness or incorrectness of performing the behaviour. Given the participants' issues about not harming the patient and increasing survival and the independent contribution of these to the prediction of SN, future research could examine the role of moral obligations in improving the prediction of intentions.

It is important to note that this study did not identify if participants were members of established cardiac arrest teams. Future research could examine the influence of the established cardiac arrest team on rural nurses' actual initiation of defibrillation prior to the arrival of the 'team'. Consistent with the findings of this study, there is sufficient evidence to substantiate the importance of the influence of others and the social order of the hospital on behavioural intentions and subsequent behaviour. Further research is required to determine the specific peer groups to be targeted and to determine how such approval and acceptance can be demonstrated most effectively.

Limitations of the Study

Although this study successfully addressed the research questions there were some limitations of the findings.

No Actual Behaviour Measured

One limitation of this study is the lack of measurement of actual behaviour, that is the prediction of behavioural intention is not the same as actual behaviour. Because of the subject matter there was limited means to measure actual behaviour. However intentions have repeatedly been shown to be significantly correlated with actual behaviour in a number of domains. Although the intention measure may be a step removed from actual behaviour, it does appear to be a reasonable approximation.

Reflects Sample

In order to consider the generisability of the findings of the current study, it is important to initially consider the demographics of the participating population (LoBiobdo-Wood & Haber 1997). Half of the total population were not permitted to initiate defibrillation. Those not permitted to defibrillate held significantly more negative beliefs about nurse-initiated defibrillation. Therefore it cannot be claimed that the findings from the application of the theories will apply to the total population of Queensland nurses not permitted to initiate defibrillation. Further, while application of theories supports rural registered nurses within Queensland who are permitted to initiate defibrillation, it cannot be determined whether the extent to which the present findings could be generalised to the non-Queensland population of nurses permitted to initiate defibrillation.

Non Random Selection

The sample chosen in a non-random fashion with distribution of the questionnaires at a ward level occurred at the discretion of the nominated person distributing the questionnaires. Hence questionnaires may have been distributed to nurses who held strong opinions about defibrillation or to select nurses who may or may not be able to defibrillate.

Sample Bias

Such positive behavioural intentions, attitudes, SN and PBC in this sample may be attributed to the sample and their experience with defibrillation. Given first responder programs are not in all hospitals and that nurses in the 'permitted to defibrillate' category were more likely to be male, older, hold the higher positions in nursing and have more experience as an RN. Hence, nurses permitted to defibrillate may be more committed to nurse-initiated defibrillation.

Response Bias

Because participation was voluntary, response bias is possible. The internal motivation, (such as past experiences with defibrillation or whether participants are permitted to defibrillate or not) of those who chose to participate may differ those who declined to participate (Kuzma 1998).

Socially Desirable Response

Because only persons responsible for initiating defibrillation completed the theory component of the questionnaire, there was the potential for participants to respond to the measures in a socially desirable way. Because defibrillation for

this group would appear to be in the practice repertoire of a select few, those who do not intend to initiate defibrillation would be viewed as a 'lesser skilled nurses.' Thus participants may be disposed to give the answer they believed to be most acceptable to others. Although there are few real safeguards against participants responding in a socially desirable manner, the present survey instituted both anonymous and confidential responses. This is the standard method used to facilitate honest responses (Cozby 1993).

Wording of Attitudinal Scale

Wording of the attitudinal scales were adapted for local purpose and use, therefore were not exactly as outlined by Ajzen. Replication of the study would strengthen the validity of these modifications.

Process of Implementing Policy

Queensland Health is currently in the process of implementing SAEDs within all rural hospitals. If the study were conducted today findings may well be different. A point worth noting within this study is that of the 52 percent of nurses not permitted to initiate defibrillation, the majority did not want this responsibility. So while policies are being implemented to support nurse-initiated defibrillation, this may not guarantee the policy will be embraced by all.

While these identified limitations have implications both theoretically and practically, it seems unlikely that decisions made by participants would be systematically different to those made by other rural nurses. Therefore, it is considered most likely that the present study has constituted a fair test of the

applicability of the Theories of Reasoned Action and Planned Behaviour to rural registered nurses' intentions to initiate defibrillation unsupervised at the next cardiac arrest on their ward, where they are the first person on scene. Furthermore, it provides detailed information about the specific beliefs and predictors of rural registered nurses' defibrillation practices. In summary, although there are limitations to these findings, the outcomes of this study adds to what is currently known about the defibrillation practices of rural registered nurses.

Conclusion

In conclusion, this study highlighted that Queensland rural hospitals have travelled shorter distances down the path of first responder defibrillation programs than many commentators would like to think. Hospitals continue to respond to cardiac arrests in a conservative manner where defibrillation is the responsibility of a select few and where the doctor or specifically trained nursing staff are those generally initiating defibrillation. Exacerbating this is that many nurses currently not responsible for initiating defibrillation and do not want this responsibility. The application of the TRA and TPB provided direction for challenging these traditions so that all nurses can initiate the chain of survival expeditiously whenever the need arises.

The results of this study provide support for the utility of both the Theory of Reasoned Action and the Theory of Planned Behaviour in understanding, explaining and predicting rural registered nurses' intentions to initiate defibrillation unsupervised, should a cardiac arrest occur on their ward on that

day. The registered nurses permitted to defibrillate in this study had very positive intentions to initiate defibrillation at the next cardiac arrest. The direct measures of attitude, SN and PBC all correlated significantly with intentions to use a defibrillator and accounted for a large proportion of the variance in defibrillation intentions. Although the multiple correlations of intentions with attitudes and subjective norms were quite high, it increased significantly with the addition of perceived behavioural control. All three independent variables had significant regression coefficients, indicating that each made a significant independent contribution to the prediction of defibrillation intentions. SN predominated over PBC followed by attitudes. These findings highlight the need for educators to focus greater attention on nurses' perceptions of peer acceptance (subjective norm) in order to develop more effective nurse-initiated defibrillation programs. Perceived behavioural control was also seen to have motivational implications, past behaviours, wanting the responsibility and perception of not harming the patient all influenced behavioural intentions indirectly through the formation of PBC. A strong belief that defibrillation was not a medical responsibility contributed to a positive attitude toward initiating defibrillation.

As predicted, none of the defibrillation beliefs were significant independent predictors of behavioural intentions. Secondary analyses of data indicated that beliefs about patient survival, not harming the patient, role responsibility and past behaviour were all mediated through the direct measures of the model. Generally speaking, despite the strength of these beliefs, nurses intend to make a serious effort to initiate defibrillation if they experience strong social pressure to do so. Performing any skill in a cardiac arrest is emotionally challenging and initiating

defibrillation is no different. Rural nurses must feel confident that defibrillation is easy, safe and will influence survival and above all, they must feel supported in their efforts to do so. Where seconds count, promoting the role of the nurse in early defibrillation programs within a strong chain of survival will ensure early defibrillation by nurses occurs within hospitals; ultimately affording the person and their heart a second chance.

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APPENDIX A

Glossary of Terms

Advanced Life Support (ALS) or Advanced Cardiovascular Life Support (ACLS)

Medical interventions used to treat victims of respiratory and/or cardiac emergencies and stroke, including invasive techniques such as intubation and administration of drugs (AHA 2000a).

Asystole

Complete electrical silence, that is, no cardiac electrical activity can be detected with body surface electrodes (Cummins, Chamberlain et al. 1997).

Automatic External Defibrillator (AED)

An external defibrillator in which rhythm analysis and recognition are undertaken by the defibrillator which charges up automatically if a shockable rhythm is recognised. There are two types

i) Semiautomatic External Defibrillator (SAED)

ii) Fully Automatic External Defibrillator (FAED) (ARC 2002b).

Basic Life Support (BLS)

The preservation of life by the initial establishment of and/or maintenance of airway, breathing, circulation and related emergency care (ARC 2002b).

Cardiac Arrest

The cessation of cardiac mechanical activity confirmed by the absence of a detectable pulse, unresponsiveness, and apnea (or agonal respirations) or absence of a palpable pulse unresponsive due to any cause (Cummins, Chamberlain et al. 1997).

Cardiopulmonary Resuscitation (CPR)

Generally refers to non-invasive assessments and interventions used to treat victims of cardiovascular and/or respiratory emergencies and stroke. This term is synonymous with BLS (Cummins, Chamberlain et al. 1997).

Defibrillation

The application of controlled electrical shock to the victim's chest in order to terminate a life threatening cardiac rhythm (VF or pulseless VT) (ARC 2002b).

Early Access to Defibrillation

A system in which early defibrillation is performed by a first responder (ARC 2002b).

Early Defibrillation

A concept based on evidence that the period of time between the onset of ventricular fibrillation and defibrillation is a critical variable in the probability of a successful outcome i.e. the shorter the time to defibrillation the greater the chance of the victim's survival. For the purposes of this policy early defibrillation includes both early access to defibrillation and public access defibrillation as defined below (ARC 2002a).

First Responder

A person trained in basic and advanced first aid and use of a semiautomatic external defibrillator who is part of an organised medically controlled emergency response system (ARC 2002b).

Fully Automatic External Defibrillator (FAED)

An automatic external defibrillator which will proceed to deliver a series or cluster of defibrillatory shocks when it recognises a shockable rhythm and then go into a monitoring mode for a preset time period. Note: FAED's are not available in Australia at this time. For this reason the term automatic external defibrillator (AED) is often used instead of semiautomatic external defibrillator (SAED) (ARC 2002b).

Level One Registered Nurse

Level One registered nurse is the position held by the majority of registered nurses.

Level Two Registered Nurse

It is expected that the Level Two registered nurse will have advanced skills and qualifications, however the limited number of Level Two positions within the current Australian career structures ensures that very few experienced and qualified registered nurses are still in Level One positions.

Medical Profession

The term medical profession includes all health care professionals as defined by Health Care Professionals. Health Care Professional is a person who is a registered medical practitioner, registered nurse or qualified ambulance officer (Australian Resuscitation Council 1998).

First Responder

A person trained in basic and advanced first aid and use of a SAED who is part of an organized medically controlled emergency response team (ARC 2002b).

Non-VF/VT

Incorporates both asystole and pulseless electrical activity (Kloeck et al. 1997).

Paediatric Advanced Life Support (PALS)

Advanced medical assessment and interventions used to treat pediatric (child) victims of respiratory and/or cardiovascular emergencies and stroke, including invasive techniques such as intubation and drug administration (AHA 1992).

Pulseless Electrical Activity (PEA)

Any other VT/VF pulseless rhythm apart from asystole (Cummins, Sanders et al. 1997b).

Public Access Defibrillation

A situation where a member of the public is able to access and operate a semiautomatic external defibrillator (ARC 2002b).

Return of Spontaneous Circulation (ROSC)

Any return of spontaneous pulse, detectable by palpation of a central artery (carotid or femoral) (Cummins, Sanders et al. 1997b).

Rural

Those areas with a combined population of <75000 (Department of Primary Industries and Energy et al. 1994).

Semantic Differential Scales

Semantic scales ask respondents to give a judgment of something along an ordered dimension. Semantic differential scales consist of bipolar adjectives that specify two opposite ends of a continuum (Polit & Thomas 1995).

Semiautomatic External Defibrillators (SAED)

(Also called shock advisory external defibrillators) - an automatic external defibrillator which provides the operator with an audible or visible prompt to discharge the defibrillator to deliver a shock to the victim when it recognises a shockable rhythm. Note: Some SAED's can be reconfigured either by the manufacturer or users to permit these devices to be used as manual defibrillators.

Statistical Local Areas (SLA)

A category based primarily on population numbers and an index of remoteness (Strong et al. 1998).

Ventricular Fibrillation (VF)

Disorganized, irregular electrical activity that produces no appreciable cardiac pumping action, peak-to-trough deflection on the surface electrodes are >1mm in amplitude (at a calibration of 10mm/mV) and faster than 150 beats per minute (Cummins, Sanders et al. 1997b).

APPENDIX B

Ethical Approval

RM13

Central Queensland
UNIVERSITY

HUMAN ETHICS RESEARCH REVIEW PANEL

CERTIFICATION STATEMENT

The Human Ethics Research Review Panel is an approved institutional ethics committee constituted in accord with guidelines formulated by the National Health and Medical Research Council (NHMRC) and governed by policies and procedures consistent with principles as contained in publications such as the joint Australian Vice-Chancellors' Committee and NHMRC *Statement and Guidelines on Research Practice.*

The Panel has considered the project described in a Request for Ethical Clearance and as detailed in this Statement, and is pleased to grant ethical clearance for the nominated period of certification.

First-Named Chief Investigator:	Dr L Williams
Title:	Elicitation survey of nurses practices and beliefs about the use of external defibrillators.
Clearance Number:	**00/6-47**
Period of Certification (see note below):	**01.07.00 – 31.08.00**

NOTES:

(1) This statement remains current for the period of certification on the condition that the research techniques and procedures as described in the approved *Request for Ethical Clearance* and attendant documentation remain unchanged. Any revisions or amendments must be brought to the attention of the Panel which will determine whether ethical clearance should continue.

(2) A further *Request for Ethical Clearance* must be considered and approved by the Panel in order for the project to continue after the end-date noted above. Where research is conducted without a current certification statement, an investigator will be in breach of the University's *Code of Conduct for Research* and the subject of allegations of research misconduct.

- Please ensure that evidence of ethical clearance from the hospital is provided once received.
- Please include a plain English summary of findings to participants.

J. Roach
for **Assoc Prof Robert Ho**
Chair, Human Ethics Research Review Panel
Date: 22/6/00

Any written information provided to a participant or subject must contain the statement, "Please contact Central Queensland University's Research Services Office (tel 07 4930 9828) should there be any concerns about the nature and/or conduct of this research project."

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RM13

Central Queensland
UNIVERSITY

HUMAN ETHICS RESEARCH REVIEW PANEL

CERTIFICATION STATEMENT

The Human Ethics Research Review Panel is an approved institutional ethics committee constituted in accord with guidelines formulated by the National Health and Medical Research Council (NHMRC) and governed by policies and procedures consistent with principles as contained in publications such as the joint Australian Vice-Chancellors' Committee and NHMRC *Statement and Guidelines on Research Practice.*

The Panel has considered the project described in a Request for Ethical Clearance and as detailed in this Statement, and is pleased to grant ethical clearance for the nominated period of certification.

First-Named Chief Investigator:	Dr L Williams
Title:	Predicting and understanding rural registered nurses' use of external defibrillators: Beliefs, attitudes and intentions.
Clearance Number:	00/12-103
Period of Certification (see note below):	**14.12.00 – 30.06 03**

NOTES:

(1) This statement remains current for the period of certification on the condition that the research techniques and procedures as described in the approved *Request for Ethical Clearance* and attendant documentation remain unchanged. Any revisions or amendments must be brought to the attention of the Panel which will determine whether ethical clearance should continue.

(2) A further *Request for Ethical Clearance* must be considered and approved by the Panel in order for the project to continue after the end-date noted above. Where research is conducted without a current certification statement, an investigator will be in breach of the University's *Code of Conduct for Research* and the subject of allegations of research misconduct.

for J. Lock
Assoc Prof Robert Ho
Chair, Human Ethics Research Review Panel
Date: 10/1/01

Any written information provided to a participant or subject must contain the statement, "Please contact Central Queensland University's Research Services Office (tel 07 4930 9828) should there be any concerns about the nature and/or conduct of this research project."

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APPENDIX C

Queensland Health Access Letter

Queensland Government

Queensland **Health**

OFFICE OF THE CHIEF HEALTH OFFICER

Enquiries to: Sandra Darcy
Telephone: (07) 32341138
Facsimile: (07) 32217535
Email: Sandra_Darcy@health.qld.gov.au
File Number: 20-0-8.123
Our Ref.: DG030529
Your Ref.:

Ms T Dwyer
PhD Student
School of Nursing and Health Studies
Faculty of Arts, Health and Sciences
Central Queensland University
Bruce Highway
NORTH ROCKHAMPTON Q 4702

Dear Ms Dwyer

I refer to previous correspondence concerning your research study on predicting and understanding rural registered nurses' early defibrillation intentions which Queensland Health was unable to approve your utilisation of Queensland Health data to access the random sample of rural registered nurses.

However, as your research study has been already been considered by the Central Queensland University Human Ethics Research Review Panel and the Rockhampton Health Service District Human Research Ethics Committee, I advise that the ethical clearance for your research study is acceptable to Queensland Health.

Yours sincerely

Professor Bryan Campbell
Chief Health Officer
11/12/2001

Office
Office of the Chief Health Officer
Queensland Health Building
147-163 Charlotte Street
BRISBANE Q 4000

Postal
GPO Box 48
BRISBANE Q 4001

Phone
(07) 323 41138

Fax
(07) 322 17535

APPENDIX D

Phase One Questionnaire

Focus Group: Information letter

Dear Colleague

I am seeking your assistance with a research project that will form the basis of my studies leading to a PhD in Nursing.

I wish to undertake a project to elicit nurses, from small regional or rural hospitals, beliefs about the use of manual external defibrillators (MED) and semi-automatic external defibrillators (SAED). To complete this project I would like to conduct a series of focus group discussions, so nurses can talk about their beliefs. The outcomes of the focus group discussion will be used to develop a questionnaire that will then be distributed to a much larger sample of nurses from small regional or rural hospitals.

Should you agree to participate in the project, I can guarantee:
Confidentiality. While I will possibly know your name, only the transcription of the interviews and field notes of my observations, typed by some one from outside the hospital, will be used for analysis. Each participant will be coded as P1, P2 and so forth. Neither you nor the participating hospital will be identified in the report. Characteristics that may identify you will be changed or omitted. After the required period the tapes will be destroyed
Freedom of choice. While your contribution to this project would be greatly appreciated I also understand that you may not wish to participate. There is no obligation to participate in the focus group discussion, and you may withdraw your participation at any time and any information you have supplied will be destroyed at your request.

Because the information gained from these focus groups will become part of a larger research, results of this project will not be available until the completion of the larger research.

You may contact the Central Queensland University's Research Services Office (ph: 07 49309828) if you have any concerns at any stage about the nature and/or conduct of the research project.

I would greatly appreciate you participation in the project

Yours Sincerely

Trudy Dwyer

Consent from

I,
……..……...
of
(hospital) ……..
hereby consent to participate in a research program conducted by Trudy Dwyer and I understand that the purpose of the project is to elicit nurses beliefs about the use of manual external defibrillators (MED) and semi-automatic external defibrillators (SAED). I acknowledge that I have consented of my own free will. I further acknowledge that:
recorded interviews will be coded and relevant names omitted.
I am free to withdraw my consent at any time, in which event my participation in the study will immediately cease.
this information will then be used to develop a questionnaire

Date: ……..
Signature: ……..

Instructions

For each question please indicate the relevant details or circle the appropriate number.

1.	Gender	Female Male	1 2
2.	How long have you been a registered nurse/enrolled Nurse?		yrs
3.	Size of your hospital.	Number of beds 0-50 51-100 101-150 151-200 0ver 200 beds	1 2 3 4 5
4.	Present level on the career structure	Level Level Level Level Enrolled Nurse	1 2 3 4 5
5.	Employment status	Part time Full time Casual Not applicable	1 2 3 99
6.	Professional Qualifications	General Midwifery Mental Health Critical Care Other (please specify)…….. Not applicable	1 2 3 4 5 99
7.	Highest educational qualification completed	Hospital certificate Bachelor Degree Graduate Certificate Graduate Diploma Masters Other (please specify)…….. Not Applicable	1 2 3 4 5 6 99
8.	Are you currently assessed competent to perform basic life support (BLS) by the hospital	Yes No	1 2
9.	When were you last assessed competent in BLS by the hospital	Never 1-6 months 7-12 months 13-18 months 19-24 months over 25 months	1 2 3 4 5 6
10.	Do you have an ALS certificate	Yes No	1 2
11	When were you last assessed competent in ALS by the hospital	Never 1-6 months 7-12 months 13-18 months 19-24 months over 25 months Not Applicable	1 2 3 4 5 6 99
12	Are you expected to perform defibrillation on your ward	Yes No	1 2

13	When were you last assessed competent in defibrillation by the hospital	Never 1-6 months 6-12 months 12-18 months 18-24 months over 24 months Not Applicable	1 2 3 4 5 6 99
14	If you are responsible for defibrillation on you ward please identify the type of defibrillator used	Manual Semi Automatic Automatic Do not Know Not Applicable	1 2 3 4 99
15	Who is responsible for defibrillation on your ward?	Nursing staff on the ward Nursing staff from another ward/unit Medical staff from the ward/unit/ general hospital Medical staff from outside the hospital Other *(please specify)*……	1 2 3 4
16.	List in order of priority who **you** believe should be responsible for defibrillation when using MED. (That is 1 for the person most responsible for defibrillation, please complete all boxes)	Nursing staff on the ward Nursing staff from specialty areas (i.e. ICU) Medical staff from within the ward unit Medical staff from the hospital Medical staff from outside the hospital Other *(please specify)*……	__ __ __ __ __ __
17	List in order of priority who **you** believe should be responsible for defibrillation when using SAED. (That is 1 for the person most responsible for defibrillation, please complete all boxes)	Nursing staff on the ward Nursing staff from specialty areas (i.e.ICU,) Medical staff from within the ward unit Medical staff from the hospital Medical staff from outside the hospital Other *(please specify)*……	__ __ __ __ __ __
18.	Identify in order of priority reasons why **you** do not defibrillate	Fear of litigation Fear of harming yourself Fear of harming the patient Inability to recognise rhythms Not considered to be my role Not allowed Other *(please specify)*……	__ __ __ __ _____ _ ___
19	List in order of priority reasons why early defibrillation is delayed on your ward area.	Time taken for the defibrillator to arrive from another area of hospital Waiting for someone who can defibrillate Unsure of the rhythm Equipment failure Other *(please specify)*……	__ __ __ __ __

. Do you have other comments you would like to offer?

_____

_____

_____

_____

_____

_____

_____

Thank you for participating in this research project.

APPENDIX E

Pilot Study Questionnaire

Information letter

Dear Colleague

I am seeking your assistance with a research project that aims to examine early defibrillation attitudes from the perspective of the rural registered nurse, with a view to furthering the understanding of early defibrillation participation and adherence. To complete this project I have conducted a series of discussions, with registered nurses who talked about their beliefs and opinions in relation to defibrillation. The outcomes of these discussions were used to develop this questionnaire. I would like to test this questionnaire with nurses from the original discussion groups as well as others not involved with the original discussions.

While the questionnaire appears lengthy there are only 36 questions. Please don't be put off, when you can put 20 minutes aside, please use it to complete the questionnaire. Confidentiality is guaranteed as no names or identifying data are requested. All questionnaires remain the property of the researcher and will be used only by myself.

While your contribution to this project would be greatly appreciated, I understand that you may not wish to participate. There is no obligation to complete the questionnaire and you may withdraw your participation at any time by returning the questionnaire unanswered. If you have any concerns about the nature and/or conduct of this research project, please feel free to contact the Central Queensland University Research Services Office (Ph: 07 49309828) to express these concerns.

When you have completed the questionnaire, please place in the prepaid envelope provided and return to me before Wednesday 20th June. Once again thankyou for your time, your participation is greatly appreciated.

Yours Sincerely

Trudy Dwyer
PhD Candidate
School of Nursing and Health Studies
Central Queensland University
Ph: 07 49306538

Section A: General information

Instructions

*For each question please indicate the relevant details or **circle** the appropriate number. Please complete **all** questions.*

1	Gender	Female Male	1 2
2	How long have you been a registered nurse?		yrs
3	Present level on the career structure	Level Level Level 3 or above	1 2 3
4	**Highest** qualification completed.	TAFE / Hospital certificate Diploma Bachelor Degree Graduate Certificate/ Diploma Masters Other (please specify).....	1 2 3 4 5 6
5	How many hours a day on average is there a doctor in the premises?	1-6 hours/day 7-12 hours/day 13-18 hours/day 19-23 hours/day 24 hours/day	1 2 3 4 5
6	When were you last assessed as competent in basic life support (BLS)?	1-6 months 7-12 months 13-18 months 19-24 months over 25 months	1 2 3 4 5
7	How often do you believe registered nurses should be reassessed for BLS competency?	Never 6 monthly 12 monthly 18 monthly 24 monthly every three years	1 2 3 4 5 6
8	How many times have you been first person on scene at a cardiac arrest in your area?	Never 1 –3 times 4-10 times More than 10 times	1 2 3 4
9	How many times have you viewed a person being defibrillated in a cardiac arrest situation.	Never 1 –3 times 4-10 times More than 10 times	1 2 3 4
10	Generally, who performed the defibrillation?	The first registered nurse on scene Specially trained nurses Doctor on-site Doctor on-call from out-side the hospital Other (please specify).....	1 2 3 4 5
11	Who is responsible for defibrillation in your ward?	The first registered nurse on scene Only specially trained nurses Doctor onsite Doctor on-call from out-side the hospital Other (please specify).....	1 2 3 4 5
12	How close is the nearest defibrillator?	On the ward On another ward – same level Equal distance between two wards on same level On another ward – another level On another ward in another building	1 2 3 4 5

13	Do you believe you should be responsible for defibrillation?	Yes No Don't know	1 2 3

If you answered:
NO or don't know to Q:13 ➔ go to Q:14
Yes to Q:13 ➔ go to Q: 15

14 ***Instructions***

*Question 14 makes use of a seven point rating scale. Place an "X" in the place that **best** reflects your belief or opinion about that question or statement.*

***For example**: If you were asked to rate the importance of knowing the rate of compressions for an adult during CPR. If you strongly disagree with the statement, you should choose*

Strongly Agree : : : : : : X :Strongly Disagree

In making you choice, please remember the following points

1. *Place your "X" in the middle of the spaces, not on the boundaries.*
2. *Be sure to answer **ALL** questions – **Please** do not miss any questions*
3. *Always only place one "X" for each question*

Why do you believe **you** should **NOT** be responsible for defibrillation?

Too difficult to learn the rhythms.	Strongly Agree : : : : : : :	:Strongly Disagree
Extra responsibility you don't want.	Strongly Agree : : : : : : :	:Strongly Disagree
May harm the patient.	Strongly Agree : : : : : : :	:Strongly Disagree
May harm myself.	Strongly Agree : : : : : : :	:Strongly Disagree
Potential for litigation.	Strongly Agree : : : : : : :	:Strongly Disagree
Always been the role of others.	Strongly Agree : : : : : : :	:Strongly Disagree
Don't have enough arrest.	Strongly Agree : : : : : : :	:Strongly Disagree
It is a critical care skill.	Strongly Agree : : : : : : :	:Strongly Disagree

15	Are you expected to perform defibrillation at our hospital?	Yes No	1 2
16	Have you ever been assessed as competent to perform defibrillation?	Yes No	1 2

If you answered:
NO to Q:16 ➔ Congratulations you have COMPLETED the questionnaire, please feel free to provide comments at the end of the questionnaire.
Yes to Q:16 ➔ Please continue to Q: 17.

17	How often do you believe you should be reassessed for defibrillator competency?	Never 6 monthly 12 monthly 18 monthly 24 monthly every three years	1 2 3 4 5 6
18	How many times have you **had** to defibrillate a person in a cardiac arrest situation?	Never 1 –3 times 4-10 times Greater than 10 times	1 2 3 4

19	Which type of defibrillator do you prefer to use?	Conventional/Manual Semi-automatic What ever is available	1 2 3
20.	When were you last assessed competent to perform defibrillation by the hospital where you are currently employed?	Not applicable Never 1-6 months 6-12 months 12-18 months 18-24 months over 24 months	1 2 3 4 5 6 7

Thank you for completing this section please proceed to SECTION B.

Section B: Beliefs and opinions

The following section of the questionnaire is aimed at gathering information about your beliefs and opinions about early defibrillation. When completing the questionnaire, early defibrillation means **you** initiating defibrillation as early as possible at the next cardiac arrest in your area/ward of the hospital. This means as soon as the defibrillator is available and **not** waiting for someone to supervise you. As I want your beliefs and opinions, there are no right or wrong responses. Try to respond to **each** question as truthfully as possible. **Your responses are confidential.**

Instructions

*All the questions in this section make use of a seven point rating scale. Place an "X" in the place that **best** reflects your belief or opinion about that question or statement.*

***For example**: If you were asked to rate the importance of knowing the rate of compressions for an adult during CPR. If you strongly disagree with the statement, you should choose*

Agree : ____ : ____ : ____ : ____ : ____ : ____ : ____X__: Disagree

extremely quite slightly neither slightly quite extremely

In making you choice, please remember the following points

1. *Place your "X" in the middle of the spaces, not on the boundaries.*
2. *Be sure to answer **ALL** questions – **Please** do not miss any questions*
3. *Always only place one "X" for each question*

21. At the next cardiac arrest where I am responsible for initiation of defibrillation I intend to initiate defibrillation as early as possible.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree

extremely quite slightly neither slightly quite extremely

22. Most of my peers who are important to me think I should initiate defibrillation as soon as the defibrillator is available.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree

extremely quite slightly neither slightly quite extremely

23. I have very little power over my ability to successfully initiate early defibrillation at the next cardiac arrest.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree

extremely quite slightly neither slightly quite extremely

24. At the next cardiac arrest where I am responsible for initiation of defibrillation I am determined to, to initiate defibrillation as early as possible.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

25. Most of my peers who are important to me strongly approve of me initiating early defibrillation at the next cardiac arrest.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

26. Initiating early defibrillation at the next cardiac arrest by me will be very easy.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

27. I receive a great deal of support from my peers who are closed to me in my efforts to initiate early defibrillation at the next cardiac arrest.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

28. At the next cardiac arrest where I am responsible for initiation of defibrillation I want to initiate defibrillation as early as possible.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

29. It is entirely up to me to initiate early defibrillation at the next cardiac arrest.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

30. I will get a great deal of encouragement from my peers who are closed to me to initiate early defibrillation at the next cardiac arrest.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

31. At the next cardiac arrest where I am responsible for initiation of defibrillation I don't intend to initiate defibrillation as early as possible.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

32. At the next cardiac arrest where I am responsible for initiation of defibrillation I will try to initiate defibrillation as early as possible.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

33. All things considered I have complete control over whether I initiate early defibrillation at the next cardiac arrest.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

34. Most of my peers who are important to me don't really care if I initiate early defibrillation at the next cardiac arrest.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

35. If I wanted to, I could successfully initiate early defibrillation at the next cardiac arrest.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

36. At the next cardiac arrest where I am responsible for initiation of defibrillation I will not initiate defibrillation as early as possible.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : disagree
extremely quite slightly neither slightly quite extremely

This final question 36 deals with your feelings about initiating defibrillation at the next cardiac arrest.

Instructions

*All the questions in this section make use of a seven point rating scale. Place an "X" in the place that **best** reflects your belief or opinion about that question or statement.*

__For example__: If you were asked My initiating early defibrillation at the next cardiac arrest would:
__a) mean a promotion for me__ __not mean a promotion.__
If you strongly disagree with the statement, that is being able to defibrillate will make no difference to your chances of promoton, you should choose

Agree : ____ : ____ : ____ : ____ : ____ : ____ : ____X__: Disagree
extremely quite slightly neither slightly quite extremely

In making you choice, please remember the following points

4. *Place your "X" in the middle of the spaces, not on the boundaries.*
5. *Be sure to answer **ALL** questions – **Please** do not miss any questions*
6. *Always only place one "X" for each question*

36. My initiating early defibrillation at the next cardiac arrest would:

a be harmful for the patient be beneficial for the patient
agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*
extremely quite slightly neither slightly quite extremely

b be safe for me be dangerous for me
agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*
extremely quite slightly neither slightly quite extremely

c be safe for the patient be dangerous for the patient
agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*
extremely quite slightly neither slightly quite extremely

d enhance my confidence shake my confidence
agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*
extremely quite slightly neither slightly quite extremely

e be scary for me because I have little confidence in my rhythm recognition skills

not be scary for me because I have great confidence in my rhythm recognition skills

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*

extremely quite slightly neither slightly quite extremely

f mean litigation if I did something wrong

mean litigation if I waited for others to arrive

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*

extremely quite slightly neither slightly quite extremely

g be dis-empowering

be empowering

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*

extremely quite slightly neither slightly quite extremely

h increase the patients chances of survival

not influence the patient s chances of survival

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*

extremely quite slightly neither slightly quite extremely

i mean extra responsibility for me

be my responsibility

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*

extremely quite slightly neither slightly quite extremely

j. reduce the time from collapse to defibrillation

have no effect on the time from collapse to defibrillation.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*

extremely quite slightly neither slightly quite extremely

k. be a rewarding experience for me because have great confidence in my recognition skills.

be unpleasant experience for me because I have I little confidence in my rhythm recognition rhythm skills.

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*

extremely quite slightly neither slightly quite extremely

l. have no effect on early defibrillation

mean early defibrillation

agree : _____ : _____ : _____ : _____ : _____ : _____ : _____ : *disagree*

extremely quite slightly neither slightly quite extremely

Well done you have completed the questionnaire. Thank you very much for your time. Is there anything you would like to add? Please include any comments below.

APPENDIX F

Pilot Study Results

Introduction

In accordance with the directions of Ajzen on questionnaire development, an elicitation study was undertaken to identify the salient beliefs of the target population (Ajzen 1988). Consistent with the explicit guidelines of Ajzen and Fishbien (1980) once concepts and categories were identified through Phase One, elicitation beliefs were placed in question format and a questionnaire developed (Ajzen & Fishbein 1980).

Procedure

The pilot study involved the collection of data using the survey method and closely mirrored the guidelines provided by Ajzen and Fishbein (1980).

Pilot Study Setting and Sample

A purposive sample of registered nurses, from three Queensland rural hospitals representative of the study population was invited to participate in the pilot study. Participants from the elicitation study sites (Phase One) and a similar sample from a third site not involved in the elicitation study sites were invited to participate.

Participants eligible for the pilot study were subsequently disqualified from inclusion in the main study (Phase Two). Each of the participants were from either 'small rural' centres or 'other rural' areas (RRMA classification).

Data Collection

Following ethical approval from both the University and the Health Service District HRECs contact was made with the Directors of Nursing (DON) from each of the participating sites to ascertain their interest in participating in the study and to obtain access approval (as requested by the District Human Research Ethics Committee).

Questionnaires included a cover letter and pre-paid, addressed reply envelope (Appendix E). No names or identifying data were requested and completion of the questionnaire was considered as implied consent. Distribution of the questionnaire was via each sites' internal mail. Posters were displayed around the wards inviting all nurses to participate in the study and to remind them to return the completed questionnaires. Two weeks following distribution a second poster was placed on the notice boards prompting participants to return the completed questionnaires and offered means of obtaining a second questionnaire if required. Thirty questionnaires (Appendix E) were distributed and fourteen returned. Of these, one questionnaire was excluded because of incomplete data leaving a final response rate of 43 percent (n = 13). Participants completing the questionnaire also provided written suggestions for improving the instrument.

Instrument

The pilot questionnaire consisted of 36 items and was divided into two sections (Appendix E). Section A elicited general demographic and defibrillation practices of participants. Section B elicited participants' beliefs and opinions about early defibrillation and was designed to measure variables indicated by the theories.

Behavioural Intention

Behavioural intention was measured using six items. Participants were asked to indicate how likely it was that they would initiate defibrillation should a cardiac arrest occur on their ward 'today'. Participants responded to statements such as: "At the next cardiac arrest where I am responsible for initiating defibrillation I intend to initiate defibrillation as soon as possible" on a 7 point Likert scale from extremely agree (1) to extremely disagree (7). The mean of these items were used as a measure of behavioural intention (a = 0.74). The internal consistency and mean for behavioural intention are displayed in Table F1.

Table F1: Internal consistency of the pilot study.

Scale	# items	n	Range	Mean (SD)	α
Dependent variable					
Behavioural Intention	6	7	1-7	2.04 (0.57)	0.74
Independent variables					
Direct measures					
1. Attitude	12	7	1-7	3.25 (1.01)	0.85
2. Subjective Norm	5	7	1-7	3.46 (1.15)	0.76
3. PBC	5	7	1-7	3.57 (1.41)	0.87

Note: 1 Strongly agree – 7 strongly disagree

Attitude (ATT)

Attitude, the feeling of favourableness or unfavourableness towards initiating defibrillation, was measured by asking participants to rate the target belief on twelve, 7-point semantic differential scales: for example 'My initiating defibrillation at the next cardiac arrest would be… harmful (1) –beneficial (7), safe (1) –dangerous (7) or empowering (1) – dis-empowering (7)'. The mean (M = 3.25, SD = 1.01) of these twelve items were used as the direct measure of attitude. Overall, the attitude measure displayed a high degree of reliability with a Cronbach's alpha coefficient of 0.85 (see Table F1).

Subjective Norm (SN)

Subjective norm identified an individuals' personal judgment of whether important others support them initiating defibrillation. Subjective norm was measured using five statements that were each rated on a 7 point scale from extremely agree (1) to extremely disagree (7). For example, one statement asked; "Most of my peers who are important to me don't really care if I initiate early defibrillation at the next cardiac arrest". The mean (M = 3.46, SD = 1.15) of these five items was used as the direct measure of SN. The Cronbach's alpha coefficient for the direct measure of SN was 0.76 (see Table F1).

Perceived Behavioural Control (PBC)

Perceived behavioural control measured participants' perceptions of the ease or difficulty of initiating defibrillation at the next arrest. Five statements such as "It is entirely up to me to initiate early defibrillation at the next cardiac arrest"

were used to measure the PBC. As with SN items used a 7-point scale from extremely agree (1) to extremely disagree (7). The mean of the PBC scale was 3.57 (SD = 1.41) with a Cronbach's alpha of 0.87 (see Table F1).

Data Analysis

The data from the pilot study were analysed with the aid of Statistical Package for Social Scientists (SPSS) version 10 for Macintosh. Descriptive statistics were used to summarise the characteristics of the sample. With all three direct measures some were reverse scored. The item internal consistency for the direct measures were measured by Cronbach's alphas with scores ranging from 0.74 to 0.87 across the behavioural intention, subjective norm, perceived behavioural control and attitude measures indicating that the pilot questionnaire demonstrated moderate to high internal consistency. An alpha coefficient of at 0.7 is adequate for an instrument in the early stages of development (LoBiobdo-Wood & Haber 1997). The means, standard deviations and Cronbach's alphas for the study variables of the TRA and TPB are presented in Table F2.

Hierarchical linear regression was used to examine the ability of the models to predict intention and the relative contribution of attitude, subjective norm (SN) and perceived behavioural control (PBC). Hierarchical linear regression was chosen because it allowed the researcher determine whether adding one or more predictors as a set to another set, or a collection of sets of predictors, can increase the explained variance. In the hierarchical analysis, behavioural intention was regressed on the direct measures of the models (Ajzen & Fishbein 1980).

Results

The pilot study questionnaire was used to test the clarity, face and content validity of the developed questionnaire. Participants were all females with experience as a registered nurse ranging from 2 to 39 years (M = 14.9; SD = 13.0) with eight (61.5%) having greater than 5 years experience. The majority of participants were Level 2 or above (61.5%, n = 8) and held a tertiary qualification (61.5%, n = 8).

Table F2: Characteristics of participants in the Pilot study.

	n (%)	M	SD
Gender			
Female	13		
Career length			
Years	13	15	13
Present level in the career structure			
• Level 1	5 (38.5)		
• Level 2	6 (46)		
• Level 3 or above	2 (15.5)		
Highest Qualification			
• Hospital Certificate	5 (38.5)		
• Bachelor Degree	6 (46)		
• Graduate Cert/Diploma	2 (15.5)		

Characteristically, a doctor was not on-site for more than 12 hours a day at any of the participants' worksites (Table F3).

Table F3: Pilot Study: Hours a day, on average, where there is a doctor on the premises (n = 13).

Hours a day doctor on the premises	n (%)
1-6 hours/day	2 (15.4)
7-12	11 (84.6)
13-18	0
19-23	0
24	0

Having noted this, a doctor was generally responsible for the initiation of defibrillation, with a doctor on-site or persons from outside the hospital (ambulance officers) performing the majority of defibrillations (74.9%; n = 9). Typically the person from 'outside' the hospital was a Queensland Ambulance Service (QAS) officer. Table F4 shows the majority of participants (69.3%, n = 9) had experienced being the first person on scene at a cardiac arrest or had viewed a person being defibrillated (n = 12, 92.5%). Within the sample the majority of participants (84.6%; n = 11) believed they should be responsible for defibrillation, yet just over half of the participants (54%; n = 7) were expected to initiate defibrillation.

Table F4: Pilot Study: Participants experience with cardiac arrests (n = 13).

	First on scene n (%)	Viewed defibrillation n (%)
Never	4 (31)	1 (7.5)
1-3 times	4 (31)	4 (31)
4-10 times	2 (15)	2 (15.5)
> 10 times	3 (23)	6 (46)

Of the nurses permitted to defibrillate, 23 percent (n = 3) had never defibrillated a person, 23 percent (n = 3) had used a defibrillator on one to three occasions and one participant had used a defibrillator more than four times. Two of the participants expected to initiate defibrillation but had never been assessed competent to perform defibrillation by the hospital where they were currently working.

Generally participants had positive intentions to initiate defibrillation unsupervised at the next cardiac arrest. When testing the theory, subjective norm made the greatest contribution to behavioural intention (BI) followed by perceived behavioural control and lastly attitude. Subjective norm accounted

for 59 percent ($p < 0.05$) of the variability on BI. Neither Attitude nor PBC were significant predictors of BI. Registered nurses with positive attitudes are more likely to intent to initiate early defibrillation at the next cardiac arrest. These tests of the theory suggest the influential nature of subjective norms on registered nurses intentions to initiate defibrillation. Persons responsible for initiating first responder defibrillation programs should identify the salient social influences and target key leaders responsible for current CPR/defibrillation programs as well as the registered nurses themselves. Because of the sample size these findings were viewed with caution.

Discussion

While a sample size of 13 for the pilot study was less than ideal the quality of feedback provided by participants was beneficial and provided valuable information on the structure and detail of the questionnaire. As a result of the feedback some questions were re-worded and areas of repetition removed. Four items in the demographic section related to basic life support and physical location of the defibrillator were deleted (Appendix E, Questions 6, 7, 12, 13) and a further item was added to identify how long participants had been working in their current rural setting. Participants had difficulty completing item 14, hence this item was modified in accordance with feedback. The direct measures of attitude (items 36a to 36l) while demonstrating high internal consistency, presented some level of confusion for the participants. Hence minor changes to the presentation of the direct measures of attitude were made to enhance

the clarity of question. The final instrument was shorter. The findings from the Pilot study were presented at World Congress on Intensive Care Conference (Appendix H).

APPENDIX G

Phase Two Questionnaire

Main Study: Information letter

Dear Colleague

Hello and thank you for taking the time to read this introductory letter and hopefully completing the attached questionnaire. Let me start by introducing my self. I am a full time PhD student and part time Registered Nurse in intensive care at the Rockhampton Hospital. Because of my background in Critical Care nursing I have developed a strong interest in advanced cardiac life support, in particular early defibrillation. Hence I am looking to examine the early defibrillation attitudes of rural registered nurses through out Queensland, with a view to furthering our understanding of early defibrillation participation and adherence. That is I would like to know **your** opinion and **your** intentions to initiate early defibrillation. By early defibrillation I mean *you* initiating defibrillation, should a cardiac arrest occur today, as soon as a defibrillator is available and NOT waiting for backup support. **If you are not permitted to defibrillate by your hospital**, I would still like to hear your opinions on defibrillation. To complete this project I have conducted a series of discussion groups with registered nurses who talked about their beliefs and opinions in relation to early defibrillation. The outcomes of these discussions were used to develop this questionnaire, which was then pilot tested.

Confidentiality is guaranteed as no names or identifying data are requested on the questionnaire. Upon return of the completed questionnaire, a research assistant will remove and destroy this front page. All questionnaires will remain the property of the researcher and will only be used by myself. While your contribution to this project would be greatly appreciated I understand that you may not wish to participate. There is no obligation to complete the questionnaire and you may withdraw your participation at any time by returning the questionnaire unanswered. If you have any concerns about the nature and/or conduct of this research project, please feel free to contact the Central Queensland University's Research Services Office (ph: 07 49309828) to express these concerns.

When you have completed the questionnaire, please place it in the prepaid envelope provided and return **within two weeks** of receiving the questionnaire. Upon receipt of the completed questionnaire this front page will be removed by a research assistant and placed in a draw for one of three book prizes and then destroyed. Once again thank you for your time and participation is greatly appreciated.

Yours Sincerely

Trudy Dwyer
RN, PhD Candidate
N&HS, CQU, Bruce Highway ROCKHAMPTON. QLD 4702 Ph: 0749306538
Email: t.dwyer@cqu.edu.au

Please complete this section so you name can be entered into the lucky book prize. (*Note: a research assistant will remove this page enter your name in the draw then destroy this page)*

Name: _____
Address:_____
_____Phone number:_____

Section A: General information

Instructions

For each question please indicate the relevant details or **circle** the appropriate number. Please complete **all** questions.

1.	Gender	Female Male	1 2
2.	How long have you been a registered nurse?		yrs
3.	Present level on the career structure	Level 1 Level 2 Level 3 or above	1 2 3
4.	How long have you been employed in the rural setting?		yrs
5.	**Highest** qualification completed.	TAFE/Hospital certificate Diploma Bachelor Degree Graduate Certificate/ Diploma Masters Other (please specify)……..	1 2 3 4 5 6
6.	How many hours a day, on average, is there a doctor on the premises?	1-6 hours/day 7 – 12 hours/day 13- 18 hours/day 19 – 23 hours/day 24 hours/day	1 2 3 4 5
7.	How many times have you been first person on scene at a cardiac arrest?	Never 1 –3 times 4-10 times Greater than 10 times	1 2 3 4
8.	How many times have you viewed a person being defibrillated in a cardiac arrest situation.	Never 1 –3 times 4-10 times Greater than 10 times	1 2 3 4
9.	Generally, who was the person to initiate the defibrillation?	The first person on scene Specially trained nurses Doctor onsite Doctor on call from outside the hospital Other (please specify)…….	1 2 3 4 5
10.	Who is responsible for defibrillation on your ward?	The first person on scene Specially trained nurses Doctor onsite Doctor on call from outside the hospital Other (please specify)…….	1 2 3 4 5
11.	When were you last assessed as competent to perform defibrillation by the hospital?	Never Currently being assessed - 6 months 6-12 months 12-18 months 18-24 months over 24 months Not Applicable	1 2 3 4 5 6 99

Section B: **Beliefs and opinions**

Question 12a – 12 j are aimed at gathering information about your beliefs on early defibrillation

Instructions

All the questions in this section make use of a seven point rating scale. Circle the number that ***best*** *reflects your belief or opinion about that question or statement.* ***For example****: If you were asked to rate the importance of knowing the rate of compressions for an adult during CPR. If you slightly disagree with the statement, you should choose*

Disagree	**1**	**2**	**3**	**4**	⑤	**6**	**7**	Agree
	extremely	quite	slightly	neither	slightly	quite	extremely	

Please answer all questions and only place one circle for each question.

12a. Learning the rhythms associated with the skill of defibrillation is difficult.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12b. Being responsible for defibrillation is a responsibility I don't want.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12c. I am concerned I may harm the patient if I had to defibrillate a patient.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12d. I am concerned I may harm my self if I had to defibrillate a person.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12e. I am concerned I may incur litigation if I had to defibrillate a person.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12f. I believe defibrillation is a medical responsibility.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12g. We don't have enough cardiac arrests to warrant all nurses being responsible for defibrillation.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12h. Defibrillation is a critical care skill.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12i. My being able to defibrillate will NOT reduce the time from collapse to defibrillation.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
12j. My being able to defibrillate will NOT increase the patients chances of survival.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*

13. Are you expected to perform defibrillation at your hospital	Yes	1
	No	2

If you answered
NO TO QUESTION 13 → CONGRATULATIONS you have completed the questionnaire, please feel free to provide comments at the end of the questionnaire

YES TO QUESTION 13 → Please continue

14. How many times have you had to defibrillate a person in a cardiac arrest situation?	Never 1 –3 times 4-10 times Greater than 10 times	1 2 3 4
15. Which type of defibrillator do you prefer to use?	Conventional/Manual Semi-automatic	1 2
16. When were you last assessed competent to perform defibrillation.	Never Currently being assessed -6 months ago 7 –12 months ago 13-24 months ago over 24 months ago	1 2 3 4 5

Question 17– 32 are aimed at gathering information about your beliefs on early defibrillation, hence there are no right or wrong answers. Remember your responses are confidential.

When completing this section – EARLY DEFIBRILLATION MEANS – you initiating defibrillation as early as possible, if a cardiac arrest were to occur today in your ward/area. This means as soon as the defibrillator is available and NOT waiting for someone to supervise you.

Instructions

Again all the questions in this section make use of a seven point rating scale. Circle the number that ***best*** *reflects your belief or opinion.*

Disagree	1	2	3	4	5	6	7	Agree
	extremely	quite	slightly	neither	slightly	quite	extremely	

Please answer all questions and only place one circle for each question.

17.	If a cardiac arrest occurred today I intend to initiate defibrillation as soon as possible.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
18.	Most of my peers who a re important to me think I should initiate defibrillation as soon as the defibrillator is available.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
19.	I have very little power over my ability to successfully initiate early defibrillation.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
20.	At the next cardiac arrest, where I am responsible for initiating defibrillation I am determined to, initiate defibrillation as soon as possible.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
21.	Most of my peers who are important to me strongly approve of me initiating early defibrillation.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
22.	Initiating early defibrillation at the next cardiac arrest by me will be very easy.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
23.	I receive a great deal of support, from my peers who are important to me, in my efforts to initiate early defibrillation as soon as possible.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*

24. At the next cardiac arrest where I am responsible for initiating defibrillation, I want to initiate early defibrillation as early as possible.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
25. It is entirely up to me to initiate early defibrillation.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
26. My peers who are important to me expect me to initiate early defibrillation	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
27. At the next cardiac arrest where I am responsible for initiating defibrillation I don't intend to initiate defibrillation as soon as possible.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
28. At the next cardiac arrest where I am responsible for initiating defibrillation I will try to initiate defibrillation as soon as possible.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
29. All things considered I have complete control over whether I initiate early defibrillation at the next cardiac arrest.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
30. Most of my peers who are important to me would **not** initiate early defibrillation at the next arrest where they are responsible for defibrillation.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
31. If I wanted to, I could successfully initiate early defibrillation at the next cardiac arrest.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*
32. At the next cardiac arrest where I am responsible for initiation of defibrillation I will not initiate defibrillation as early as possible.	*Disagree* 1 : 2 : 3 : 4 : 5 : 6 : 7 *Agree*

This final question 33 deals with your feelings about initiating defibrillation at the next cardiac arrest.

INSTRUCTIONS

As with the previous section, this question makes use of a seven point rating scale. Place an "X" in the place that ***best*** *reflects your belief or opinion about that question or statement: My initiating early defibrillation at the next cardiac arrest would be…*

For example*: If you believe your initiating early defibrillation at then next cardiac arrest would be slightly beneficial place an* ***X on the line below slightly but towards the beneficial end of the scale.***

	extremely	quite	slightly	neither	slightly	quite	extremely	
Harmful	: _____ :	_____	: _____ :	_____:	___X___:	_____	:_____ :	Beneficial

In making you choice, please remember the following points
Place your "X" in the middle of the spaces, not on the boundaries (:).
Be sure to answer ***ALL*** *questions –* ***Please*** *do not miss any questions*
Always only place one "X" for each question

My initiating early defibrillation at the next cardiac arrest would be…

	extremely	quite	slightly	neither	slightly	quite	extremely	
Good	: _____ :	_____	: _____ :	_____:	_____:	_____	:_____ :	Bad
Important	: _____ :	_____	: _____ :	_____:	_____:	_____	:_____ :	Unimportant
Beneficial	: _____ :	_____	: _____ :	_____:	_____:	_____	:_____ :	Harmful
Worthless	: _____ :	_____	: _____ :	_____:	_____:	_____	:_____ :	Valuable
Dull	: _____ :	_____	: _____ :	_____:	_____:	_____	:_____ :	Exciting
Pleasant	: _____ :	_____	: _____ :	_____:	_____:	_____	:_____ :	Unpleasant
Empowering	: _____ :	_____	: _____ :	_____:	_____:	_____	:_____ :	Dis-Empowering
Rewarding	: _____ :	_____	_____ :	_____:	_____:	_____	:_____ :	Punishing
Enjoyable	: _____ :	_____	: _____ :	_____:	_____:	_____	:_____ :	Not enjoyable

Well done you have completed the questionnaire. Thank you very much for your time.
Is there anything you would like to add?

_____
_____
_____

APPENDIX H

Publications and Presentations Arising from the Research

C1: Refereed Articles in International Scholarly Journals

Dwyer, T, Mosel Williams, L & Jacobs, I 2004, 'Benefits and use of shock advisory defibrillators in-hospitals', *International Journal of Nursing Practice*, vol. 10, no. 2, pp. 86-92.

Dwyer, T & Mosel Williams, L 2002, 'Nurses' behaviour regarding CPR and the theories of reasoned action and planned behaviour', *Resuscitation*, vol. 52, pp. 85-90.

C2: Other Referred Contribution to a Scholarly Journal

Dwyer, T & Mosel Williams, L 2004, 'Defibrillation beliefs of rural registered nurses' who are not expected to defibrillate', *Nursing Review: Australia's independent voice of nursing*, Feb. pp. 22-23.

E1: Refereed Conference Publications

Dwyer, T, Mosel Williams, L & Mummery, K 2003, 'Nurse-initiated defibrillation: Do nurses who cannot defibrillate want this responsibility?' in *Women in Research Conference: Discovery*, 13 – 14 November 2003, Rockhampton Queensland, Australia, Central Queensland Publishing Unit.

E4: Edited Volume of Conference Proceedings

(Note I have included conference presentations here where the abstracts have been published in conference proceedings)

Dwyer, T, Mosel Williams, L & Mummery, K 2003, Are Queensland rural RN's permitted to initiate defibrillation?, Paper presented at the Queensland Health and Medical Scientific Meeting 2003: Making it Better; Encouraging health research and innovation, 25-26 November, Brisbane, Queensland, Australia. CD

Dwyer, T, Mosel Williams, L & Mummery, K 2003, Defibrillation beliefs of rural registered nurses' who are not permitted to defibrillate, Paper presented at the Royal College of Nursing Australia, National Conference and the 37th Patricia Chomley Oration: Present trends and future realities, 24–25July, Gold Coast, Queensland Australia.

Dwyer, T, Mosel Williams, L & Mummery, K 200, Is a tradition standing in the way of early defibrillation in-hospitals? Paper presented at the 4th International Spark of Life Conference, 12-13April, Melbourne, Victoria, Australia.

Dwyer, T, Mosel Williams, L & Mummery, K 2002, A Pilot Study: Theory of Planned Behaviour predicts early defibrillation intentions of rural registered nurses, Paper presented at the 4th International Spark of Life Conference, 12 –13 April, Melbourne, Victoria, Australia. Poster presentation.

Dwyer, T, Mosel Williams, L & Mummery, K 2001, Use of the Theory of reasoned Action and Planned Behaviour to understand and predict nurses' early defibrillation intentions, Paper presented at the 8th World Congress of Intensive & Critical Care Medicine, 28-31 October, Sydney, New South Wales, Australia.

Dwyer, T 2000, Use of a theoretical framework to take the puzzle out of the research puzzle, Paper presented at the CQU Postgraduate symposium 2000, November, Central Queensland University, Rockhampton, Queensland, Australia.

Work in Progress

Dwyer, T, Mosel Williams, L & Mummery, K 2004 'Defibrillation beliefs of rural nurses: Focus group discussions guided by the Theory of Planned Behaviour', Submitted to *The International Electronic Journal of Rural and Remote Health* July 2004