Initiation of In-hospital CPR: An Examination of Nursing Behaviour within their Scope of Practice

Thesis

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Abstract

Cardiopulmonary resuscitation (CPR) and defibrillation are the interventions performed by health care professionals in order to preserve the life of a patient suffering cardiac arrest. These tasks are important to the role of nurses because they are the most common first responders to in-hospital cardiac arrest scenarios. The early initiation of CPR and defibrillation is essential in increasing the likelihood of a patient surviving cardiac arrest. Despite possessing the knowledge, skills, training, and professional obligation to deploy CPR and defibrillation independently, nurses may hesitate to perform the appropriate actions in a timely manner. This topic has been studied previously; however, there have been no studies directly examining this issue in the Ontario context. This thesis explored the factors that influence the behaviour of nurses in the first responder role by employing a mixed-methods research design. The quantitative portion of the study consisted of a series of scales on an online survey that examined teamwork factors and nurses' experience with CPR events. The qualitative part of the study consisted of open-ended questions on the survey as well as individual interviews with nurses to understand the barriers and enablers to the role of nurses in the enactment of basic life support (BLS). The qualitative data were analyzed with a modified grounded theory approach. The qualitative data analysis followed the guidelines developed by Charmaz (2006) and employed the conceptual framework on optimizing scopes of practice developed by the Canadian Academy of Health Sciences (2014) to extrapolate findings on the influence of nurses' scope of practice on their behaviour. This study revealed a number of contextual factors in Ontario influencing nurses' deployment of CPR and defibrillation including variations in hospital unit types, geography, workload, the availability and quality of technology, legislation and regulation, accountability, as well as economic constraints.

Introduction

Cardiopulmonary resuscitation (CPR) and defibrillation include the delivery of chest compressions and electrical shocks, respectively, and is important to the role of nurses because they are the most common first responders to in-hospital cardiac arrest situations (Coady, 1999; Finn, 1996; Gombotz, Weh, Mitterndorfer, & Rehak, 2005; Hunziker et al., 2011). Despite possessing the knowledge, skills, training, and ethical obligation to initiate CPR, nurses may hesitate to perform CPR and defibrillation in a timely manner when they are the first responder to a cardiac arrest scenario (Coady, 1999; Finn, 1996; Gilligan et al. 2005; Gombotz, Weh, Mitterndorfer, & Rehak, 2005; Hunziker et al., 2011; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Marsch et al., 2005; Murphy & Fitzsimons, 2004). This study concerns nursing behaviour related to the deployment of in-hospital CPR and defibrillation and seeks to understand the factors that influence their decision to begin these emergency procedures.

There are two distinct classes of nurses in Ontario: registered nurses (RNs) and registered practical nurses (RPNs). This research project focuses exclusively on RNs because although CPR is considered a basic skill, the decision to start CPR is influenced by a nurse's abilities with clinical decision making, leadership, and critical thinking (CNO, 2009). RNs are educated and trained for a longer period of time than RPNs, which provides them with a greater capacity to meet these competencies (CNO, 2009). The term "nurse" will hereafter refer to registered nurses.

The behaviour of nurses as in-hospital first responders has been explored in previous studies; however, this topic has been understudied and the issue of nurses hesitating to enact CPR and defibrillation remains relevant (Hunziker et al., 2011; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016). There continues to be little information on the initial phases of resuscitation (Hunziker et al., 2011) and I aim to reveal factors that may impact the role of nurses in their initiation of in-hospital resuscitation. In addition, the majority of the research studies on this subject originate from the United Kingdom, the United States, Australia, and various European countries. There are no studies directly exploring the initiation of CPR and defibrillation by registered nurses from Canada nor from Ontario. It is important to examine this topic in the Ontario context because this province is a different jurisdiction and has contextual factors that are unique to its health system. By drawing upon the complementary strengths of a descriptive multi-method approach, I intend to offer a comprehensive perspective on the issue and elucidate the dynamics involved in a nurse's decision to begin CPR and defibrillation on a patient in cardiac arrest within the Ontario context.

The relevant literature on this topic highlights important factors that influence nurses in their decision to initiate CPR prior to the arrival of a physician or emergency resuscitation team to the scenario. The literature highlights the following key barriers affecting this role: lack of training and skill retention (Crunden, 1991; Dwyer & Williams, 2002; Gass & Curry, 1983; Gilligan et al., 2005; Kaye et al., 1995; Soar & McKay, 1998; Wynne et al., 1987); lack of confidence (Coady, 1999; Dwyer & Williams, 2002; Dwyer, Williams, & Mummery, 2007; Mäkinen, Niemi-

Murola, Kaila, & Castrén, 2009; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Mancini & Kaye, 1998; Murphy & Fitzsimons, 2004); attitudes and beliefs surrounding CPR and defibrillation (Crunden, 1991; Dwyer & Williams, 2002; Dwyer, Williams, & Mummery, 2007; Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009); and the presence of professional hierarchies (Crunden, 1991; Dwyer, Williams, & Mummery, 2007; Hunziker et al., 2011; Meerabeau & Page, 1999). The enablers to the role of nurses in resuscitation are: experience (Dwyer & Williams, 2002; Murphy & Fitzsimons, 2004); the availability of automated external defibrillators (Coady, 1999; Finn, 1996; Kaye et al., 1995; Kenward, Castle, & Hodgetts, 2002; Mancini & Kaye, 1998; O'Higgins, Ward, & Nolan, 2001; Soar & McKay, 1998; Warwick, Mackie, & Spencer, 1995); and improved formal training (Crunden, 1991; Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Murphy & Fitzsimons, 2004).

The research articles supporting these findings each attributed nursing behaviour to one or a small set of factors and did not provide a complete picture of the impacts on the role of nurses as in-hospital first responders. The overall goal of this research project was to gather a more thorough understanding of the factors that are inhibiting and encouraging the role of Ontario nurses in deploying resuscitation skills as well as how they interact. These factors included both facilitating and constraining elements that affect a nurse's decision to perform chest compressions and defibrillation prior to the arrival of a physician or in-hospital medical emergency team.

Research Question

The specific research question addressed in this research is:

- What factors support or hinder first-responder registered nurses in Ontario in their decision to initiate CPR prior to the arrival of a physician or emergency resuscitation team to a cardiac arrest scenario?

I explored this question through a mixed-methods research design. The quantitative aspect of the study consisted of an online survey that evaluated demographics, nurses' professional backgrounds, nurses' experience with the deployment of CPR, as well as teamwork factors. The qualitative part of the study involved individual interviews that examined nurses' perspectives and experiences with the initiation of CPR and defibrillation as well as data from the online survey on scope of practice factors and attitudes and perceptions towards CPR. Themes were developed through a modified grounded theory approach. These themes were developed both *a priori*, informed by a conceptual model of the influences on the optimization of health professionals' scopes of practice in Canada (Nelson et al., 2014), and embellished with emergent codes following the coding strategy put forth by Charmaz (2006). This process is detailed further in the "Methodological Approach" section.

The implications of this research include potential changes to hospital policies, formal training programs for CPR, as well as legislation and regulation that would increase the number of nurses initiating CPR and defibrillation in a timely manner. This in turn could increase the survival rate of patients experiencing in-hospital cardiac arrest. More broadly, by understanding nursing behaviour within the context of CPR initiation, it may be possible to implement changes that encourage these health care professionals to engage more effectively in their role as in-hospital first responders and reduce the impact of barriers to their scope of practice.

In Ontario, the scope of practice of nurses is legislated mainly through the *Nursing Act, 1991* (College of Nurses of Ontario, 2014a). This piece of legislation describes actions that nurses are able to perform in a health care setting (College of Nurses of Ontario, 2014a). Although this act does not permit nurses to complete all the tasks involved in advanced cardiac life support without the presence of a physician, nurses are able to initiate chest compressions and defibrillation—two essential parts of basic life support—prior to the involvement of a physician or emergency resuscitation team due to an exception in the *Regulated Health Professionals Act, 1991* (Cummins, Sanders, Mancini, & Hazinski, 1997; College of Nurses of Ontario, 2014b). This exception allows nurses and other health care professionals in Ontario to provide emergency care in-hospital. The *Health Care Consent Act, 1996* reinforces the ability of nurses to engage in CPR activities (College of Nurses of Ontario, 2015). This piece of legislation provides health care professionals with the ability to administer emergency treatment to clients without their explicit consent as long as the treatment is warranted and there are no previous orders contraindicating these actions (College of Nurses of Ontario, 2015). If nurses do not feel that they have the appropriate knowledge and skills to start emergency treatment, then they must not perform the associated actions; however, the Ethics Practice Standard from the College of Nurses of Ontario imposes an obligation for registered nurses in the province to maintain adequate skills, knowledge, and comfort level to engage in the first responder role (College of Nurses of Ontario, 2014b).

Background

Cardiopulmonary Resuscitation and Defibrillation

Cardiopulmonary resuscitation (CPR) and defibrillation are the interventions performed by health care professionals in order to preserve the life of a patient suffering cardiac arrest (Travers et al., 2010). According to Abella and colleagues (2008), cardiac arrest is defined as "…the sudden cessation of functional cardiac mechanical activity, as confirmed by the absence of signs of circulation, including absence of response to stimulation, absence of breathing, and absence of detectable pulse" (pp. 704-705). In order to correct the malfunctioning of a patient's heart, health care professionals provide basic life support as well as advanced cardiac life support (Smith, Gilcreast & Pierce, 2008). Basic life support includes identifying cardiac arrest,

coordinating the required activities, performing chest compressions, and delivering shocks via automated external defibrillator (AED) while advanced cardiac life support is more complex and provides algorithms for health care providers to follow (Smith et al., 2008).

The goal of CPR is to preserve blood flow to the patient's brain and heart until the return of spontaneous circulation (Travers et al., 2010; Castelao, Russo, Riethmüller & Boos, 2013). The return of spontaneous circulation marks the moment at which the patient's heart regains the ability to pump blood without the assistance of medical interventions (Adams, Zeiler, Jackson, & Hughes, 2005). The rate for in-hospital return of spontaneous circulation is 40 to 60 percent while the rate of survival to hospital discharge following cardiac arrest is 15 percent (Adams et al., 2005). According to Brindley, Markland, Mayers and Kutsogiannis (2002), these rates have remained unchanged for the past generation. Fortunately, there are actions that can be undertaken by health care providers to increase the likelihood of patient survival from in-hospital cardiac arrest including shorter pre-shock pauses and earlier initiation of CPR (Hunziker et al., 2011; Yeung, Ong, Davies, Gao, & Perkins, 2012). Shorter pre-shock pauses and the early initiation of CPR are two of the most important factors in determining the chances of patient survival following cardiac arrest (Edelson et al., 2006; Eftestøl, Sunde, & Steen, 2002; Yu et al., 2002; Bhanji et al., 2010; Mancini et al., 2010). In fact, for every minute that CPR and defibrillation are delayed, the risk of the patient dying from cardiac arrest increases by 10 percent (Ali & Zafari, 2007). Since cardiac arrest can be fatal in a short period of time, first-responder nurses play an important role in initiating prompt CPR and defibrillation. It is necessary to determine why nurses may hesitate to enact CPR and defibrillation and how to enable them in this essential nursing role.

Nursing Role and Initiation of CPR and Defibrillation

The available literature on nursing initiation of CPR and defibrillation cites lack of competence and skill retention (Crunden, 1991; Dwyer & Williams, 2002; Gass & Curry, 1983; Gilligan et al., 2005; Kaye et al., 1995; Soar & McKay, 1998; Wynne et al., 1987), lack of self-confidence (Coady, 1999; Dwyer & Williams, 2002; Dwyer, Williams, & Mummery, 2007; Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Mancini & Kaye, 1998; Murphy & Fitzsimons, 2004; Wynne et al., 1987), attitudes and beliefs surrounding the role of nurses in the deployment of CPR and defibrillation (Crunden, 1991; Dwyer & Williams, 2002; Dwyer, Williams, & Mummery, 2007; Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009, Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016), as well as the existence of hierarchies in health care teams (Crunden, 1991; Dwyer, Williams, & Mummery, 2007; Hunziker et al., 2011) as possible factors influencing the trend of nurses hesitating to initiate in-hospital CPR. In contrast, previous experience (Dwyer & Williams, 2002; Mancini & Kaye, 1998; Murphy & Fitzsimons, 2004), the availability of AEDs (Coady, 1999; Finn, 1996; Kaye et al., 1995; Kenward, Castle, & Hodgetts, 2002; Mancini & Kaye, 1998; O'Higgins, Ward, & Nolan, 2001; Soar

& McKay, 1998; Warwick, Mackie, & Spencer, 1995), and improved formal training (Crunden, 1991; Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Murphy & Fitzsimons, 2004; Soar & McKay, 1998) are potential facilitators to registered nurses deploying CPR and defibrillation. Most studies focus on the individual level of analysis and do not examine influential factors at the organizational and contextual level.

Table 1: Factors Influencing Nursing Deployment of CPR and Defibrillation

Study	Methodology and Objectives	Sample	Findings	Factors
Wynne et al. (1987)	Examined the performance of nurses with basic life support and compared these data with the participants' experience as well as their perceptions in their CPR skills.	53 nurses in the United Kingdom.	None of the nurses provided adequate CPR. Confidence increased with the number of cardiac arrest scenarios that nurses attended; however, the increased experience did not lead to adequate skill acquisition.	**Individual Level:** competence and skills retention; self-confidence.
Crunden (1991)	Two-stage mixed-methods study. Stage 1 consisted of quantifying nurses' skills as well as their perceived competence with CPR. Stage 2 involved semi-structured interviews to explore nursing attitudes towards their resuscitation skills. Interview transcript data were analyzed with grounded theory.	51 nurses were evaluated in Stage 1. 8 nurses participated in follow-up interviews for Stage 2. Study conducted in the United Kingdom.	Nurses wrongly self-appraise the quality of their CPR skills. Nurses may have negative attitudes towards CPR training because of the teaching methods employed, they may believe that their colleagues perceive them as lacking competence with CPR, and they may deem their role as secondary to that of physicians in cardiac arrest scenarios.	**Individual Level:** attitudes and beliefs surrounding CPR and defibrillation; competence and skills retention; previous experience. **Organizational Level:** team hierarchy.
Kaye et al. (1995)	The researchers employed a training program to test nurses' abilities with an AED.	141 nurses from two university teaching hospitals in the United States.	99% of nurses had successful posttests and the retention of knowledge and skills was high. Having AEDs available to nurses may	**Individual Level:** competence and skills retention. **Organizational Level:** availability of equipment.

			reduce the delay between recognition of cardiac arrest and the delivery of defibrillation.	
Warwick, Mackie, & Spencer (1995)	Examined the effect of a training program on the use of automated external defibrillators.	43 nurses and midwives at a small hospital in Cyprus.	The authors reported that nurses were able to rapidly attach the AED to a mannequin. AEDs simplified the defibrillation process and reduced nurses' fears of shocking a patient.	Organizational Level: availability of equipment.
Mancini & Kaye (1998)	The authors questioned previous beliefs surrounding CPR and defibrillation through a review of relevant literature.	Not applicable. Research conducted in the United States.	Greater exposure to cardiac arrest scenarios and greater self-confidence may encourage nurses to enact rapid CPR and defibrillation. Having AEDs available may lessen the time between recognition of cardiac arrest and shocking the patient.	Individual Level: previous experience; self-confidence. Organizational Level: availability of equipment.
Soar & McKay (1998)	Prospective study to determine the role of in-hospital cardiac arrest teams.	83 adult patients in the United Kingdom.	Knowledge retention of cardiac rhythm recognition for general ward nurses was poor. The availability of AEDs aided in avoiding this issue because this equipment automatically recognizes cardiac rhythms and advises defibrillation when it is necessary.	Individual Level: competence and skills retention. Organizational Level: availability of equipment.
Coady (1999)	Examined the effect of a course on cardiac rhythm recognition and the use of automated external defibrillators by nurses.	98 ward nurses in the United Kingdom.	Overall nurse-initiated defibrillations did not increase; however, there was a 46% increase in the number of patients defibrillated prior to the arrival of the code team. The author attributed this to	Individual Level: self-confidence. Organizational Level: availability of equipment.

			greater self-confidence with defibrillation.	
Dwyer & Williams (2002)	Explored factors that may affect nurses' participation in resuscitation by reviewing relevant literature and applying the *theory of planned behaviour*.	Not applicable. Research conducted in Australia.	Positive attitudes and confidence with CPR may enable nurses to deploy CPR more rapidly while negative attitudes acquired from poor experiences may deter these professionals from deploying CPR quickly. Social pressures may encourage nurses to deploy prompt CPR. The self-confidence of nurses facilitate them in enacting CPR.	Individual Level: attitudes and beliefs surrounding CPR and defibrillation; competence and skills retention; previous experience; self-confidence.
Kenward, Castle, & Hodgetts (2002)	Review of the primary literature to evaluate the use of AEDs on general ward units.	Not applicable. Research was conducted in the United Kingdom.	The implementation of AEDs on general ward units may enable more rapid defibrillation by nurses.	Organizational Level: availability of equipment.
Murphy & Fitzsimons (2004)	Two-phase mixed-methods study. Phase 1 consisted of evaluating nurses' deployment of CPR and Phase 2 consisted of interviews with nurses. The interview transcript data were analyzed with existential phenomenology.	162 cardiac arrests were analyzed before the implementation of a life support course and 177 cardiac arrests were analyzed after. 12 nurses were interviewed. Research conducted in the United Kingdom.	Training had no impact on the skill deployment of nurses and a lack of confidence restricted nurses from enacting CPR and defibrillation prior to the code team arriving. Experience with cardiac arrest scenarios may harbour self-confidence with initiating basic life support.	Individual Level: competence and skills retention; previous experience; self-confidence.
Dwyer, Williams, & Mummery (2007)	Survey administered to examine beliefs surrounding defibrillation.	436 registered nurses in rural Queensland, Australia.	48% of nurses were authorized to enact defibrillation. Nurses perceived this responsibility as a role of the doctor or emergency resuscitation team.	Individual Level: attitudes and beliefs surrounding CPR and defibrillation; self-confidence. Organizational Level: team hierarchy.

Mäkinen, Niemi-Murola, Kaila, & Castrén (2009)	Two 48-item questionnaires were administered—one in 2003 and one in 2007. These questionnaires evaluated the attitudes of Finnish nurses towards CPR-D as well as the Finnish resuscitation guidelines before and after the implementation of a training program.	297 nurses in 2003 and 199 in 2007 from a medium-sized secondary hospital in Finland.	61.2% of nurses felt confident following CPR education, but these professionals hesitated to initiate CPR and defibrillation due to the fear of harming the patient (41.4% in 2003; 27% in 2007). Nurses reported hesitating to initiate defibrillation due to anxiety (22.9% in 2003; 64% in 2007). 60% of the nurses did not feel competent in their basic life support skills.	Individual Level: attitudes and beliefs surrounding CPR and defibrillation; competence and skills retention; self-confidence.
Hunziker et al. (2011)	Researchers examined the impact of teamwork and leadership on the quality of resuscitation efforts through a review of the literature.	Not applicable. Project was conducted by researchers from Switzerland and the United States.	Nurses may be hesitant to initiate defibrillation before a physician arrives to the cardiac arrest scenario. The authors attribute this to team hierarchies and the perception that defibrillation is a physician-designated skill.	Organizational Level: team hierarchy.
Mäkinen, Castrén, Nurmi, & Niemi-Murola (2016)	Questionnaire sent to CPR trainers that examined their attitudes in regards to the initiation of CPR and defibrillation.	185 (64 of which were nurses) CPR trainers in Finland.	Adequate undergraduate education improved self-confidence with CPR and defibrillation. Continuing education courses for basic life support may be inadequate for imparting CPR and defibrillation skills to nurses and may leave nurses feeling uncertain as to their role in the initiation of CPR and defibrillation.	Individual Level: attitudes and beliefs surrounding CPR and defibrillation; competence and skills retention; self-confidence.

Table 1 outlines relevant studies reviewed and includes information regarding the methodology, objectives, sampling, and findings of the studies as well as the important factors in

the context of this research project. The factors affecting nursing behaviour during the enactment of CPR and defibrillation are organized and synthesized into the key categories of individual and organizational level influences in the sections below. Each of the categories incorporate both the barriers and facilitators to the role of in-hospital first responder nurses. It is important to note that these factors are not mutually exclusive and indeed overlap significantly.

Individual Level Influences

Competence & Skills Retention

Improved formal training is a factor that may encourage nurses to deploy their CPR skills because it would provide these professionals with greater competence (Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Murphy & Fitzsimons, 2004). Mäkinen and colleagues (2009) found that nurses were not confident in their CPR skills and recommended that training for CPR and defibrillation should occur less than every six months if basic or advanced cardiac life support was not initiated regularly by these professionals. They also advised that training programs focus on a strategy for reducing nurses' anxiety with CPR and defibrillation. Adopting these two recommendations into the planning of CPR courses may enable nurses to respond more quickly to cardiac arrest situations. In the study by Murphy and Fitzsimons (2004), the authors determined that nurses required more one-on-one coaching with enacting basic life support in order to have the confidence to initiate rapid CPR and defibrillation. Finally, in a study by Mäkinen and colleagues (2016), the authors discovered that CPR trainers' undergraduate education programs were poor at training them for CPR and leadership in cardiac arrest scenarios. The study revealed that CPR trainers need to focus more on rhythm recognition, defibrillation, and leadership because reinforcing and encouraging this education for nurses may enable nurses to act more rapidly with basic life support when deciding to initiate resuscitation.

A lack of competence and skills retention as well as regular training are well-documented barriers that constrain nurses and other health care professionals in their abilities to perform adequate resuscitation (Badger & Rawstorne, 1998; Broomfield, 1996; Cooper & Libby, 1997; Crunden, 1991; Devlin, 1999; Dwyer & Williams, 2002; Gass & Curry, 1983; Hamilton, 2005; Marsch et al., 2005; Nyman & Sihvonen, 2000; Sullivan, 2015; Wynne et al., 1987). Although initial CPR knowledge and skills are adequate following training, the retention of these elements deteriorates significantly within six months (Crunden, 1991; Gass & Curry, 1983; Kaye et al., 1995; Mancini et al., 2010). Nurses acquire CPR recertification usually once per year, which, according to Gass and Curry (1983), is not frequent enough to ensure the adequacy of nurses' CPR skills. This is concerning because without the delivery of proper CPR, the chances of the patient surviving cardiac arrest is lessened (Abella et al., 2008). This is an important aspect to consider for the time period following the initiation of basic life support.

Lack of competency and skills retention is relevant because nurses may have poor retention of cardiac rhythm recognition (Kaye et al., 1995; Soar & McKay, 1998) and this can

delay defibrillation if they are not recognizing the rhythms in a timely manner. What is particularly relevant to consider is nurses' attitudes and perceptions of their ability to deploy their CPR skills. The reason for this is that the likelihood of a nurse initiating CPR when they are an in-hospital first responder appears to be influenced by their perception and attitudes towards their ability to carry out basic life support (Dwyer & Williams, 2002). When nurses have a positive attitude in regards to their CPR abilities and are confident in their skills, then they feel comfortable enacting those actions (Dwyer & Williams, 2002). Although it is concerning that nurses wrongly self-appraise the quality of their CPR skills and, therefore, may not update their skills and knowledge more regularly than they should (Crunden, 1991; Nyman & Sihvonen, 2000; Wynne et al., 1987), it appears that what is important for this study is understanding what encourages the deployment of their skills and not the quality of their performance.

Crunden (1991) explored the reasons why nurses fail to appropriately self-appraise their basic life support skills and revealed nursing attitudes towards resuscitation. The researcher intended to investigate nursing behaviour and did so by initially evaluating the abilities and perceived competence of nurses with CPR and, subsequently, conducting semi-structured interviews with eight of the nurses. In order to analyze the qualitative data, the author employed grounded theory methodology. The author discovered that nurses had a negative attitude towards CPR training because of the teaching methods employed, because they may believe that their colleagues perceive them as lacking competence with CPR, and because they may deem their role as secondary to that of physicians and the medical emergency team in cardiac arrest scenarios. These negative attitudes and beliefs held by nurses regarding their participation and role in resuscitation may influence their propensity to initiate CPR and defibrillation. In addition, if nurses perceive themselves as playing a secondary role during basic life support, they may be less willing to enact all the necessary basic life support skills prior to the arrival of the physician or code team. This study employed a strategy similar to the one employed in my study; however, the goals of my study are different. Crunden sought to explore why nurses may wrongly evaluate the quality of their CPR skills and to describe why nurses may have negative attitudes towards their role as first responders. The study by Crunden did not address the contextual elements influencing the nurses' attitudes and perceptions towards their role in resuscitation, which is the primary aim of my study.

Previous Experience

Experience with cardiac arrest situations may enable nurses to engage in their role as in-hospital first responders because they acquire a greater sense of control and confidence with more exposure to these scenarios (Dwyer & Williams, 2002; Murphy & Fitzsimons, 2004). This may not hold true if these experiences are highly stressful and negative, however. If the experiences are educational and harbour self-confidence, then they may facilitate nurses enacting basic life support (Dwyer & Williams, 2002). According to the study by Dwyer and Williams (2002), perceived control—a tenet of the *theory of planned behaviour*—occurs when a

person determines whether or not they have the capacity to behave in a certain manner. If an individual intends to engage in a behaviour, they perceive that they are competent with the action and they perceive it as being easy, then it is likely that person will follow through with their intended behaviour. This is the case with CPR initiation and is influenced by a nurse's past experience with life support.

In the study by Murphy and Fitzsimons (2004), the authors identified that experience encourages confidence with CPR and likely harbours a greater willingness by nurses to deploy basic life support skills. The authors drew this conclusion because this was mentioned by nurses during the individual interviews. The author could not discern, however, if this perception of the benefit of experience was because of the good outcome they witnessed or if it was because they had simply deployed their CPR skills effectively. The authors advised being cautious with the findings since the participants were from a single hospital in the United Kingdom, it was a retrospective study, and the scope of the study was rather small.

Self-confidence

A lack of confidence pertains to nurses hesitating to initiate CPR procedures because they do not believe they have the competence to carry out the necessary related processes or they do not feel comfortable performing CPR or defibrillation (Coady, 1999; Dwyer & Williams, 2002; Dwyer, Williams, & Mummery, 2007; Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Mancini & Kaye, 1998; Murphy & Fitzsimons, 2004; Wynne et al., 1987). Murphy and Fitzsimons (2004) explored the use of CPR skills following the implementation of an immediate life support course. The authors discovered that the training had no impact on the skill deployment of nurses and that lack of confidence detracted nurses from initiating CPR and defibrillation skills prior to the arrival of the medical emergency team. Murphy and Fitzsimons (2004) attributed this lack of confidence to not feeling safe and comfortable with performing the airway insertion and defibrillation without a physician present, possibly due to having little or no opportunity to deploy and practice these skills during an actual cardiac arrest situation.

In a study by Dwyer, Williams, and Mummery (2007), a lack of confidence with initiating defibrillation was engendered by the perception that this action was the responsibility of a physician or cardiac arrest team. The researchers discovered that 48% of registered nurses were authorized to enact defibrillation and that nurses perceived this responsibility as a role of the doctor or emergency resuscitation team. As a result of this perception, nurses felt that their role with defibrillation was marginalized. This also reinforced the notion that nurses were to default to doctors and the cardiac arrest team during resuscitation scenarios, which limited their confidence with defibrillation. Without the encouragement of physicians and the resuscitation team, nurses felt that they had limited opportunity to deploy their defibrillation skills for patients in cardiac arrest.

In an earlier study by Coady (1999), a lack of confidence was identified as a key inhibitor to nurse-initiated defibrillation. This project examined the effect of introducing a short course intended to teach nurses cardiac rhythm recognition as well as defibrillation. Ninety-eight nurses received training over the course of one year and by the end of that year, ward nurses had defibrillated patients in 80% of the scenarios when it was warranted. Nurses remained hesitant to defibrillate unsupervised. They only shocked patients in 12% of the cases where defibrillation was required prior to the arrival of the medical emergency team. The authors attributed this hesitation to a lack of confidence. The author believed that the confidence of these providers performing unsupervised defibrillation would improve with more experience with defibrillating under supervision. The overall number of nurse-initiated defibrillations did not increase; however, the frequency of early initiation increased, which the author attributed to nurses having greater confidence with their skills as well as defibrillation being perceived as a routine activity of nurses at the facility. Nurses at the hospital were encouraged by members of the resuscitation team to initiate defibrillation at every opportunity, which, according to the author, improved confidence with this aspect of immediate life support.

In a study conducted by Wynne and colleagues (1987), the researchers examined the performance of nurses with basic life support and compared this information with the participants' experience as well as their perceptions in their CPR capabilities. The researchers discovered that none of the nurses in the study were able to provide adequate CPR. They also discovered that confidence increased with the number of cardiac arrest scenarios that nurses attended; however, the increased experience did not lead to adequate skill acquisition. This is important because there are multiple studies indicating that although confidence harbours greater willingness to deploy CPR and defibrillation skills, it does not necessarily correlate with competence in CPR skills, which suggests that skill retention and training are also barriers to the role of nurses as effective first responders (Crunden, 1991; Nyman & Sihvonen, 2000; Wynne et al., 1987).

Confidence with CPR and defibrillation was identified as relating to experience according to a study by Mancini and Kaye (1998). The authors asserted that nurses with more experience tended to have greater confidence with initiating CPR and defibrillation in a timely manner. For example, nurses working in coronary care units had greater self-confidence in being able to begin basic and advanced life support and demonstrated as high as nearly 90% survival rate for patients who suffered primary ventricular fibrillation—a type of cardiac arrest. Meanwhile, in other parts of the hospital when advanced cardiac life support was enacted, this survival rate dropped significantly. This was due to the fact that coronary care nurses were involved more frequently in CPR situations than ward nurses, they were more confident and able to deploy CPR and defibrillation, and they had more advanced training with cardiac rhythm interpretation, for example. In the study by Mancini and Kaye (1998), the researchers questioned three beliefs that had built the classic structure of in-hospital resuscitation efforts. These beliefs were that nurses should not leave a patient who is in cardiac arrest, CPR is the primary intervention for treating cardiac arrest, and that defibrillation should be a designated role of doctors and critical care

nurses. The aim of examining these assumptions was to determine how to limit the time between cardiac arrest and defibrillation by nurses in areas outside of critical care. The research study discovered, through reviewing relevant literature, that recognizing the signs of cardiac arrest, having automated external defibrillators available, and prioritizing defibrillation over CPR lessened the time between recognition of cardiac arrest and shocking the patient. The researchers, in a previous study (Kaye et al., 1995), employed a training program to test if nurses were able to successfully use AEDs. They determined that 99% of nurses had successful posttests and the retention of knowledge and skills remained high. This suggested that having AEDs available to nurses may reduce the delay between recognition of cardiac arrest and the delivery of defibrillation. The studies by Mancini and Kaye (1998) as well as Kaye and colleagues (1995) offer important insight into both individual and organizational level factors that may affect nurses in their decision to enact CPR and defibrillation; however, these studies were done in the United States and fail to address contextual elements other than how the availability of AEDs and variations in hospital unit type influence nursing initiation of life support. My study offers a more comprehensive understanding of how contextual factors may affect the behaviour of nurses during situations in which they are treating a patient suffering cardiac arrest.

Nurses' Attitudes & Beliefs

According to Dwyer and Williams (2002), nurses' hesitancy to conduct prompt basic life support may be explained in part by Ajzen's (1991) *theory of planned behaviour*. The researchers applied this theory in order to understand nursing attitudes and beliefs surrounding CPR and defibrillation and participation in resuscitation. The *theory of planned behaviour* helps to explain how actions are composed of three components: attitude, subjective norm, and perceived behaviour control and may help to understand the role of nurses in their decision to initiate CPR and defibrillation. The authors assert that a nurse's attitude may impact his or her propensity to begin basic life support in CPR scenarios because it is influenced greatly by past experiences. The authors go on to explain that CPR can be stressful and participating in these types of scenarios may support the perception that CPR is a negative experience, thus reducing the self-confidence of these professionals and potentially causing nurses to adopt negative attitudes and views towards their role as first responders. The attitude of a nurse towards the independent initiation of CPR does not fully determine his or her behaviour. Subjective norms help to explain the social pressures that impact the actions of these health care professionals. The expectations of the public, nursing students, other nurses, other health care professionals, as well as ethical obligations may impact how first-responder nurses behave in these scenarios (Crunden, 1991). Nurses may feel that they have an ethical and professional obligation to perform CPR since the public expects nurses to have an involved role in CPR initiation. In contrast, nurses may hesitate to perform basic life support prior to the emergency resuscitation team arriving because nurses may perceive themselves as having a limited role during resuscitation scenarios (Crunden, 1991; Dwyer, Williams, & Mummery, 2007). This influences how these health care providers act in these situations. Finally, perceived behaviour control is the third element in the *theory of*

planned behaviour. This aspect pertains to the degree to which individuals believe that they are capable of behaving in accordance with their intentions. This is relevant to nurses and their confidence in their ability to perform CPR and influences a first-responder nurse in their decision to initiate CPR procedures. Nurses' beliefs and attitudes surrounding CPR and defibrillation is important when considering the reasons for these professionals' delay in enacting resuscitation.

In the study by Mäkinen, Niemi-Murola, Kaila, and Castrén (2009), the authors discovered that the behaviour of nurses in regards to the enactment of CPR and defibrillation was influenced by personal and organizational attitudes towards resuscitation. The authors noted that nurses defibrillated in only 15% of ward areas and that only 67% of hospitals in Finland had rapid defibrillation programs in 2004 (Nurmi, Skrifvars, Rosenberg, & Castrén, 2006) and they intended to explore attitudes in regards to CPR and defibrillation as well as the Finnish resuscitation guidelines. The study reported that 61.2% of nurses felt confident following CPR education, but that these professionals hesitated to initiate CPR and defibrillation due to the fear of harming the patient (41.4% in 2003; 27% in 2007). Nurses also reported hesitating to initiate defibrillation due to anxiety (22.9% in 2003; 64% in 2007). The authors revealed that nurses were hesitant to initiate CPR and defibrillation due the worry that they would feel guilty if their patient died. In addition, 50% of the surveyed nurses believed that defibrillation was the job of the physicians and 60% of the nurses did not feel competent in their basic life support skills. Nurses' willingness to use a defibrillator was associated with knowledge of the cardiac rhythms relevant to defibrillation. The authors proposed that empowering nurses to execute rapid defibrillation and CPR as well as increasing their confidence with enacting these skills is pivotal in encouraging this important role of nurses. The negative attitudes towards CPR and defibrillation by nurses due to anxiety, guilt, and fear—a finding supported by other studies (Meerabeau & Page, 1999; Pups, Weyker, & Rodgers, 1997)—may influence the behaviour of nurses when confronted with a patient with cardiac arrest. It is important to note that this study was conducted in a hospital in Finland and it may be difficult to generalize the findings to settings outside this context. In addition, the study utilized surveys and this method of data collection has the weakness of response bias.

In sum, the individual level influences that have emerged from the literature include competence and skill retention, previous experience, self-confidence, as well as nurses' attitudes and beliefs surrounding CPR and defibrillation. Nurses require frequent and thorough training and these educational programs may need to focus more on increasing the self-confidence and reducing the anxieties of nurses in regards to CPR initiation. Previous experiences affect the willingness of a nurse to deploy prompt life support because they may adopt positive or negative attitudes towards these processes based on the quality of the resuscitations in which they have participated. It is not known whether nurses' perceptions and self-confidence improve from experiencing good outcomes from CPR or from simply enacting their skills. It is also not known if

self-confidence is generated from having a physician present at a code situation or if it's through thorough practice and experience with basic life support techniques.

Organizational Level Influences

Fewer studies look at broader organizational factors that help or hinder nurses in enacting their role in CPR and defibrillation for which they have been trained (see Table 1). Two key organizational influences that I identified from this smaller literature are team hierarchy and availability of equipment.

Team Hierarchy

Nurses' perceptions of their role in the enactment of basic life support may be limited due to perceived or actual hierarchies within their team (Hunziker et al., 2011). These hierarchies are power gradients between professionals and may arise due to structural or social factors such as professional occupation and gender (Hall, 2005). According to Hunziker and colleagues (2011), hierarchical tendencies in health care may provide additional understanding of why nurses delay the initiation of CPR. The internal and external expectations of nurses in their role as first responders impact their actions in cardiac arrest scenarios, which may be a result of professional hierarchies. Since some nurses may perceive themselves as having a secondary role to doctors during resuscitation scenarios, nurses may defer their role to these potentially more highly qualified professionals. This influences behaviour because nurses may feel that it is not their role or responsibility to initiate CPR processes. This may help to explain why nurses may delay chest compressions or defibrillation prior to the arrival of a physician or critical care response team during cardiac arrest situations.

Hunziker and colleagues (2011) proposed that the *expectation states theory*—a theory based in sociology—helps to understand the influence of teams on nurses' behaviour. This theory proposes that behaviour and action are influenced by the expectations of others during the accomplishment of a task and these expectations may be based on factors outside the control of these professionals such as age, gender, and race (Berger, Fisek, Norman, & Zelditch, 1977). Multiple authors attributed the potential secondary role of nurses in CPR and defibrillation enactment to the attitude of these professionals that these tasks are best accomplished by physicians and code teams (Coady, 1999; Crunden, 1991; Dwyer, Williams, & Mummery, 2007; Hunziker et al., 2011; Meerabeau & Page, 1999). It is important for nurses to feel empowered and confident in order to undertake the task of initiating CPR and defibrillation and for their organizations to support them in performing these actions in a timely manner (Mäkinen, Niemi-Murola, Kaila, and Castrén, 2009).

Availability of Equipment

Nurses may be facilitated in their function as first responders with the availability of AEDs (Coady, 1999; Finn, 1996; Kaye et al., 1995; Kenward, Castle, & Hodgetts, 2002; Mancini & Kaye, 1998; O'Higgins, Ward, & Nolan, 2001; Soar & McKay, 1998; Warwick, Mackie, & Spencer, 1995).

According to a review of the literature of primary research conducted by Kenward, Castle, and Hodgetts (2002), the introduction of AEDs onto general wards simplified the process of defibrillating patients in cardiac arrest and required less training time compared to training for manual defibrillators. The authors indicated that this may contribute to nurses deploying defibrillation more rapidly.

In a by study by Soar and McKay (1998), the researchers discovered that knowledge retention of cardiac rhythm recognition for general ward nurses was poor and the availability of AEDs avoided this issue. In addition, they determined that when patients in cardiac arrest were shocked by the first responder nurse, the chances of patient survival to hospital discharge were higher. In their study, the authors reported that all eight of the survivors that had return of spontaneous circulation from first responders survived to discharge while none of the five survivors that had return of spontaneous circulation from the cardiac arrest team survived to discharge.

Warwick, Mackie, and Spencer (1995) reinforced the importance of nursing defibrillation with AEDs. The study involved implementing a training program that included a section on rapid defibrillation with an AED. Although there were no cardiac arrests during the study period to test the deployment of the professionals' AED skills, the authors reported that during the training sessions all the nurses were able to rapidly attach the AED to a mannequin. This suggested that nurses may be able to successfully use an AED. The authors also supported the notion that AEDs simplified the defibrillation process and reduced nurses' fear that they would be shocking a patient who did not require it.

At the organizational level, team hierarchies and the availability of equipment affect the role of nurses as in-hospital first responders. If nurses do not feel supported or feel that they have a secondary role in the initiation of CPR and defibrillation, they may hesitate to enact the necessary processes in a timely manner. Their role is facilitated when there are automated external defibrillators available because these devices simplify their work with defibrillation.

Summary

There is a growing literature that has begun to outline the important enablers and barriers to the rapid deployment of CPR and defibrillation by nurses. Most of these studies focus on the more individual level influences, such as competency, experience, confidence and nurses' attitudes and beliefs more generally. Fewer studies focus on the organizational level and here the two key issues have been the team influences on nurses and the ready access and availability of AED equipment. This leaves many other organizational and structural level influences unexamined. Moreover, much of this research has been conducted outside of Ontario. The different context and organization of health care in this province may contribute to unique influences that help or hinder nurses' enactment of their role insofar as CPR is concerned.

Study Purpose

This study aimed to determine why nurses behave as they do in the initiation of CPR and defibrillation. Literature on this topic indicates that nurses hesitate to perform early CPR and defibrillation despite the known benefit of these actions. There have been research studies noting barriers and facilitators to the role of nurses as in-hospital first responders; however, there continues to be an issue (Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016) and these studies have not directly examined the behaviour of registered nurses in the context of Ontario. The legislation in Ontario supports nurses to initiate CPR and automated defibrillation when their patients are suffering cardiac arrest, but they may be affected in this role by contextual factors that influence their capacities to work to their optimal scope of practice. The primary goals of this research study are to understand what detracts and encourages nurses to begin basic life support, how influences on scope of practice may interplay with these factors, and how the conceptual framework can be augmented with the findings from this project. I approached this study with the intention of understanding why registered nurses may hesitate to deploy CPR and defibrillation skills; however, I am interested in translating this knowledge to a more broad conversation about nurses' scope of practice.

Conceptual Framework

Some previous researchers have employed different theories to help explain the behaviour of nurses in their enactment of CPR and defibrillation. This has included, at the individual level, the *theory of planned behaviour* and at the more organizational level of teams, the *expectation states theory*. Although these conceptual frameworks provide rationale for nursing behaviour in the initiation of immediate life support, they do not address the contextual elements that affects this behaviour. I opted to employ the conceptual framework developed by the Canadian Academy of Health Sciences (2014) to contribute to knowledge on the influences on nurses' scope of practice in the Ontario context. The conceptual framework outlines a strategy for addressing the health needs of the population through the development of scope of practice arrangements that would support innovative care models. The framework consists of three sections: *where we are*, *how we can get there*, and *where we want to be*. The framework begins with insufficiencies in the current Canadian health care system that need to be addressed such as accessibility to health care resources, appropriate use of health care providers and resources, as well as elderly and end-of-life care. The framework ends with the realization of a health care system that has been transformed and that truly addresses the health care needs of Canadians. This vision for a future health care system would move from supply to need focused, it would allow for teams to have more flexibility in the allocation of resources and responsibilities, and teams rather than individuals would be funded. Finally, the middle aspect of the framework identifies inputs that influence the optimal scope of practice of health care professionals. My research project employed these inputs to inform part of the qualitative data analysis. This process is described in the next section. The choice of this conceptual model

included that it was developed in a Canadian context, but also because it conveyed an appreciation of the multi-layered nature of the influences on nurses' scope enactment. This included the micro/individual and meso/organizational levels that emerged from the literature, it also incorporated the broader macro, policy level that is all but absent from the nursing CPR initiation literature.

The enactment of CPR and defibrillation are skills within the regulated scope of practice of registered nurses in Ontario, but these skills may be limited by contextual factors that strain the scope of practice of these professionals. A health professional's scope of practice determines what they are legally permitted to do and outlines the functions that they perform in their practice (Canadian Nurses Association, 2015). The scope of practice of health professionals is enshrined in legislation and provides guidance as to the roles and responsibilities of these individuals (Canadian Nurses Association, 2015). Despite being authorized to perform a variety of tasks, many of the roles of nurses can be hindered or enabled due to factors present in the health care system (Nelson et al., 2014). The factors affecting nurses' scope of practice in Canada are highlighted in the "Inputs" column of the conceptual model (Nelson et al., 2014). In the case of CPR initiation, nurses may be restrained in their behaviour despite possessing the competency and the task being included in their regulated scope of practice permitting them to perform the necessary treatments required in basic life support.

Methodological Approach

To best understand the range of factors affecting first responder nurses' initiative of CPR and defibrillation and to explain this behaviour, I employed a sequential mixed-methods research design. A mixed methods approach combines elements of both quantitative and qualitative research (Remler & Van Ryzin, 2015). The rationale for employing this strategy was to complement the qualitative findings of this study with quantitative data and to more clearly understand how various teamwork and scope of practice elements play into the role of nurses as first responders. The quantitative data were collected first, followed by the qualitative data. The qualitative data were analyzed after this and the final procedure was analyzing the quantitative data. The qualitative data from this study explored the behaviour of nurses while the quantitative data provided information on the psychological and teamwork elements that may influence the behaviour of registered nurses in their decision to initiate resuscitation. The analysis of the qualitative data consisted of a modified grounded theory approach and followed the processes developed by Charmaz (2006) as well as Hennink, Hutter, and Bailey (2011).

The qualitative data gathered in the individual interviews served as the backbone for this study while the qualitative and quantitative data from the survey complemented these findings. The primary goal of the online survey was to recruit participants for individual interviews and the secondary goal was to gather data on demographics, scope of practice information, as well as

teamwork factors. The online survey tool was initially envisioned as a short questionnaire that was intended to recruit nurses for interviews and obtain demographic information; however, I used this opportunity to gather further data on scope of practice and teamwork factors. Initially, it was not evident how the quantitative data would mesh with the qualitative data; however, I was interested in understanding how scope of practice and team dynamics articulated with the role of first-responder nurses in CPR initiation. This was the rationale for selecting the types of questions for the online survey. The analysis of the quantitative survey data occurred after the analysis of the qualitative data because it was until after developing qualitative themes that the relevance of the quantitative data was clear. The hospital unit type on which nurses worked, the number of times that nurses had deployed CPR, the time a nurse had spent working in their job, and the time a nurse had spent working in their profession were identified as potentially important factors in the context of this study. The quantitative data supplemented some of the developed themes because it offered statistics to corroborate the qualitative findings.

Quantitative design.

The online survey (Appendix A) had 58 nurses complete a series of eight scales that examined aspects of teamwork that influence their ability to provide team-based care. This was important to the study because these factors may influence a nurse's propensity to begin CPR. The questionnaires examined informational role self-efficacy, participation in decision making, shared leadership, collaborative work, role overload, role ambiguity, role clarity, and interprofessional conflict.

Instrument development.

The quantitative element of this study consisted of the collection of data through a number of scales that served to understand some of the behavioural and psychological processes that occur in the workplace of nurses. The scales administered in this study had been validated in previous research projects. This section describes the factors and the scales used to measure these factors as well as the strategies that have been employed to validate the scales. The survey was administered online and sent—with permission—through the listserv of the Ontario Nurses Association (ONA) and a link to the survey was posted on the ONA webpage. The survey was in the field for a period of five months from June to October 2016. 58 registered nurses completed the survey. In addition to gathering quantitative data, this survey collected information on participants' experience with CPR and how scope of practice factors influenced the role of nurses as in-hospital first responders (Appendix A). The survey was also employed as a screening process to recruit participants that were interested in participating in individual interviews.

The first portion of the questionnaire evaluated ***informational role self-efficacy***. This factor describes the extent to which nurses feel confident in delivering pertinent information to another health care professional (Chiocchio, Dubé, & Lebel, 2012). This was measured using Chiocchio et al.'s (2012) 5-item instrument. Consistent with Bandura's (2006) instructions for developing self-efficacy scales, participants were asked how confident they were in their ability to perform each of the activities or items (e.g., *Build on my area of expertise to enrich team discussions*) by associating each activity with any number between 0 % (i.e., I cannot do this activity) and 100 % (i.e., I am entirely certain I can do this activity). Internal consistency estimates in the original study range between 0.92 and 0.93.

The second part of the questionnaire examined ***participation in decision making*** and assessed the degree to which an individual believed they were capable of engaging in decision making processes within their team (Campion, Medsker, & Higgs, 1993). It was measured using the 3 items developed by Campion, Medsker, and Higgs (1993) using a 1-7 agreement response format. A sample item from this questionnaire is "*As a member of my team, I have a real say in how the team carries out its work*." Internal consistency in the developers' original study was $\alpha = 0.88$.

Thirdly, ***shared leadership***—an individual's belief in their ability to share leadership roles and tasks—was measured with Hiller's (2002) 25-item questionnaire. This scale covered topics such as planning and organizing (e.g., *How often do team members share in… planning how the work gets done*), problem solving (e.g. *…deciding on best course of action when problems arise*) support and consideration (e.g., *…providing support to team members who need help*), as well as development and mentoring (e.g., *...exchanging career-related advice among our team*). Internal consistency is 0.91 (Erkutlu, 2012).

The fourth scale evaluated ***collaboration*** and was measured using the 14-item collaborative work scale (Chiocchio, Grenier, O'Neill, Savaria, & Willms, 2012). The instrument employed four dimensions to describe and measure collaboration: communication (e.g., *In my team we share knowledge that promotes the progression of our work*), explicit coordination (e.g., *In my team we make sure our tasks are completed on time*), implicit coordination (e.g., *In my team we foresee each other's needs without having to express them*) and synchrony (e.g., *In my team we instinctively reorganize our tasks when changes are required*). A frequency answer format was used, where 1 is "Never" and 7 is "Always." Authors reported internal consistency of $\alpha = 0.91$.

The fifth, sixth, and seventh scales explored ***role overload***, ***role ambiguity***, and ***role clarity***, respectively. These were measured using Marrone, Tesluk, & Carson's (2007) questionnaire adapted from Beehr, Walsh, and Taber (1976). Role overload related to the pressures on an individual and the impact this had on their ability to complete work tasks, while role ambiguity

and clarity pertained to a nurse's understandings of their role (Marrone, Tesluk, & Carson, 2007). Participants answered items such as "*When it comes to my roles and responsibilities on this team it often seems like I have too much work for one person to do*" with a 1-7 agreement scale. Internal consistency is 0.83.

Finally, ***interprofessional conflict*** was measured using items adapted from Sicotte, D'Amour, and Moreault (2002) using a 1-7 agreement scale. This factor measured individuals' perceptions of their difficulties in collaborating with professionals from different disciplines (Sicotte, D'Amour, & Moreault, 2002). The 8-item measure included items such as "*In my team there are frequent conflicts over the division of responsibilities between members of different disciplines or professions*." Authors reported internal consistency of 0.83.

Internal consistency estimates for the sample are very good. They vary from $\alpha = 0.899$ to $\alpha = 0.981$ (as can be seen in Table 4 in the Findings section).

Quantitative data analysis.

The analysis of the quantitative data consisted of performing descriptive statistics for the demographic data as well as for the eight teamwork factors, correlations—using Pearson correlation for the eight factors measured by the questionnaire—as well as analysis of variances (ANOVAs) to measure differences between hospital unit types (i.e. high acuity and low acuity). The correlations that were analyzed were between the number of times that nurses had initiated CPR and the eight teamwork factors. The ANOVAs examined differences between hospital unit types because the individual interviews revealed that the acuity of a unit is important when considering the likelihood of a nurse deploying CPR and defibrillation. The acuity of a hospital unit is a function of the health care needs of the patients in that setting. I labeled high acuity units as emergency departments, intensive care units, as well as any unit that a nurse had considered "acute" in their response on the survey. The low acuity units were all floors outside of these health care settings including general wards, surgical floors, rehabilitation units, and other units where the likelihood of a patient suffering cardiac arrest are less likely compared to high acuity areas.

IBM SPSS version 23 was used to perform calculations. There was an insufficient number of participants to perform multivariate analyses. However, given that the quantitative data's function were to support the qualitative data, statistical significance is less of a factor than if the study were to rely on quantitative data for inferential purposes.

Qualitative design.

A qualitative research approach allows for interpretation and extensive description of specific research problems (Remler & Van Ryzin, 2015). The qualitative element of this study was appropriate for this topic because the aim was to understand the actions and processes that

impact a nurse's decision to initiate in-hospital CPR (Creswell, 2013). The goal was to delve into the experience of nurses in relation to cardiac arrest scenarios and this was best accomplished with qualitative research (Creswell, 2013). Creswell adds that qualitative studies provide the ability of a researcher to understand participants' interpretations of the world as well as to explore human and social phenomena. It was appropriate to conduct a study that explored the interpretations and perspectives of in-hospital first-responder nurses since the experience of these professionals in this role was not fully studied in the Ontario context and these individuals were the ones involved in the processes in question (Creswell, 2013). Modified grounded theory analysis was employed in this study in order to identify the factors that influence nursing behaviour when they are in-hospitals first responders. Grounded theory is employed for research topics for which there is an absence of literature (Charmaz, 2006). I used a modified grounded theory approach because although there was previous literature on the topic, there had been no studies done in Ontario. Ontario is a unique health system and, therefore, there could be different influences on their behaviour in the deployment of CPR and defibrillation.

Grounded theory analysis, as per Charmaz (2006), is intended to develop a theory that emerges from the data and provides an explanation for processes or actions. When researchers employ grounded theory to analyze data, such as the text from an interview transcript, they are required to abandon preconceived notions of the topic and to not impose extant theories onto the data. The theory or explanation must be grounded in the perspectives and understandings of the participants and the conclusions drawn by the researcher must fit and be relevant to what the participants view as truth. Despite researchers attempting to avoid imposing preconceived concepts and their own biases during data analysis, which may arise from their professional background or personal history, it is nearly impossible to ignore their prior experiences and knowledge. Researchers do not perceive the empirical world as it is, but rather as an interpretation of reality. There are many perspectives on a topic and it is necessary for researchers, when employing a constructivist approach, to acknowledge that they possess one or more of these perspectives. In the context of this study, there is my perspective as well as that of the Canadian Academy of Health Sciences conceptual framework. By recognizing potential biases and determining strategies for mitigating the effects that these biases may have on the interpretation of data, the conclusions of the researcher will be more robust and representative of the participants' views.

In this study, I employed a modified grounded theory approach. I followed the guidelines determined by Charmaz (2006) for grounded theory analysis and developed codes that emerged from the data. In addition, I expanded these findings by organizing and interpreting codes based on the conceptual framework on scopes of practice developed by Canadian Academy of Health Sciences.

Sampling and participants.

The participants were registered nurses from Ontario and the sampling procedure was one of convenience (Miles, Huberman, & Saldãna, 2014). I had a contact from the ONA post a link to the online survey on the ONA webpage and had this contact send a letter of invitation as well as a survey link via email to hospital leaders across the province. At the end of the survey, registered nurses had the opportunity to indicate if they were interested in participating in a follow-up individual interview. I invited all eight of the nurses who indicated that they were interested in an interview to participate. The interview aimed at understanding the perspectives of nurses. This was key in determining why they act as they do in situations where patients are in cardiac arrest or have a deteriorating cardiopulmonary status.

There were eight nurses total who participated in interviews—six were female and two were male. These participants had a variety of experience with CPR, backgrounds, and were from a variety of geographical locations across the province, including urban, rural, and remote regions. The experience with CPR initiation ranged from never having deployed CPR to having initiated CPR on 24 occasions. The backgrounds of the interviewed nurses were diverse. Nurses were working in emergency care, obstetrics, acute surgical, post-operation cardiac surgery, pediatrics, diabetes advanced wound care and advanced foot care, as well as general surgery. Five individual interviews with nurses were sufficient to achieve data saturation. According to Charmaz (2006), data saturation is the point at which no new themes emerge from the data. I conducted an additional three interviews after reaching data saturation in order to ensure that there were no additional themes that arose as well as to acquire more data to support my conclusions. Initially, I had planned on having twelve to fourteen interviews: six to eight with nurses who had experience initiating CPR and six to eight with nurses who had little experience with enacting CPR. This was not possible given the lack of participants who indicated they were interested in a follow-up interview; however, this did not seem to affect the breadth or quality of the qualitative results since data saturation was achieved after five interviews. The nurses who were interviewed had a variety of experiences with the initiation of CPR and defibrillation—as noted previously—and their perspectives offered a comprehensive understanding of the research topic.

Qualitative data collection.

Data for this research project were collected through the open-ended questions on the online survey as well as through conducting semi-structured telephone interviews with participants (Appendix B). The interviews were conducted over a period of three months from August to October 2016. The interviews were between 32 and 54 minutes in duration. The interview guide consisted of pre-established questions that were posed in a certain sequence in order for the discussion to progress from descriptive and practical examples towards more complex and theoretical understandings of the topic (Charmaz, 2006; Patton, 2002). The topics covered in the interviews included past experiences and background information, the barriers to nurses initiating CPR, the facilitators to nurses beginning CPR, and the possible changes that

could be made in the future that would encourage first-responder nurses to engage in CPR measures more regularly. The questions—aside from background information, which covered work experience, CPR training, and experience initiating CPR—were intended to explore the emotions, actions, thought processes, and opinions of the participants in regards to the nursing role for in-hospital CPR (Patton, 2002). Patton also suggests a number of procedures I also followed. For example, the open-ended format of the questions provided the opportunity for the participants to answer with minimal restriction. Also, probes were employed to maintain the focus on the specific barriers and facilitators mentioned by the participants to ensure that relevant and important information was gathered. Further, I attempted to maintain the flow of the interview by sequencing the questions from descriptive towards interpretive and from past experiences towards future directions in regards to the research problem. In addition, the content of the interview guide changed as data were collected and, subsequently, analyzed. Through analyzing the data, I identified gaps where information was missing to gain a fuller understanding of the specific code that I had analyzed. This is an integral part of grounded theory analysis (Charmaz, 2006) because it allowed me to refine questions in order to gain a more complete picture of the behaviour of nurses in the deployment of their resuscitation skills. Appendix B includes all the questions that I posed during the interviews as well as the rationale for adding and removing certain questions.

Qualitative data analysis.

The individual interviews were digitally recorded and transcribed for analysis using the software program NVivo 11. The analysis of my transcript data as well as the open-ended survey questions was based on a modified grounded theory analysis and followed the guidelines set out by Charmaz (2006) where themes were developed inductively and were grounded in the interview data (Hennink, Hutter, & Bailey, 2011). Some themes were developed deductively because the analysis generating these themes was informed by the conceptual framework. The conceptual framework arose from previous research on professionals' scopes of practice and, therefore, any information pertaining to the influence of scope of practice on nursing behaviour during CPR initiation was considered an *a priori* theme. Grounded theory analysis is an inductive approach to analyzing qualitative data and although I followed the procedures developed by Charmaz (2006), the qualitative aspect of the study was not fully inductive. The qualitative data analysis is better described as a *modified* grounded theory analysis. My perspective as well as that of the conceptual framework were two perspectives driving the analysis of the interview text data as well as the open-ended survey questions. During the focused coding stage—described in this section—I compared emerging data and codes, which arose from my own understanding of the data, to themes that were identified in the conceptual framework.

Charmaz (2006) proposes a more open and free data analysis for grounded theory compared to other researchers who have developed versions of this qualitative method.

Grounded theory involves the process of coding whereby data is labeled and defined by the researcher in order to summarize segments of the textual data. According to Charmaz (2006), grounded theory includes initial and focused coding. Initial coding consists of naming data, developing codes that remain close to the data, and being open to numerous theoretical interpretations of participants' statements. Focused coding consists of developing a more theoretical perspective of the data by further examining the parts of the data that are most frequent or relevant. This involves clustering the data into higher level categories.

The analysis of my data commenced by reading the transcript data and developing descriptive codes to summarize the relevant quotations of the participants within NVivo 11 (Creswell, 2013; Hennink et al., 2011). These codes were developed through line-by-line coding (Charmaz, 2006). This procedure involved naming each line or cluster of lines of my interview transcripts and extracting any information from the data that I deemed to be important. It was instrumental during this phase of initial coding that my codes remained close to the data and simply provided a synopsis of what the participant was describing (Charmaz, 2006). In order to avoid conceptualizing and prematurely imposing theories onto the data, I attempted to consistently summarize the data using verbs instead of nouns. Charmaz (2006) asserts that this permits the researcher to view the codes as actions rather than categories, which mitigates the potential for researchers to jump to more conceptualized interpretations of the data. Line-by-line coding is useful in recognizing potential theoretical directions that may not have been obvious with other methods of coding. According to Charmaz (2006), this method allows for an effective manner of identifying gaps in the dataset as well as comparing pieces of data.

The next procedure involved developing focused codes by condensing the descriptive codes into more abstract concepts (Charmaz, 2006). The relevant quotations for these codes were organized according to the participant, which allowed for comparison of the various codes (Charmaz, 2006; Hennink et al., 2011). I examined and scrutinized these data by searching for connections or contrasting elements in each of the relevant quotations, both within a single interview and across different interviews. This cross-case comparison allowed me to compare the perspectives of the participants in relation to a single topic. This process included comparing data with data, comparing data with the emerging codes, and, finally, comparing these data and codes with themes from the conceptual framework. These comparisons provided the opportunity for me to commence the condensing and expanding of certain codes (Hennink et al., 2011).

The initial and focused coding for the interviews did not occur in a fully sequential manner. This was a cyclical process whereby segments of data were recoded as new perspectives emerged from subsequent interviews and gaps in the data were filled. Grounded theory analysis is naturally a cyclical process that, according to Hennink and colleagues (2011), involves describing, comparing, categorizing, conceptualizing, and finally, developing a theory or

explanation for the behaviour being studied. I completed the describing and comparing exercises with the early stages of initial and focused coding. As interviews were completed and codes were defined and refined, I was able to categorize and conceptualize the codes (Hennink et al., 2011). This was accomplished by combining codes with similar features and deriving sub-codes when the code possessed more than one theme (Hennink et al., 2011; Charmaz, 2006). While categorizing and conceptualizing the data, I also used *a priori* codes from the conceptual framework. For example, I identified the availability of automated external defibrillators as an enabler to nurses deploying rapid defibrillation and I explained how this was akin to the meso theme of "Technology" from the conceptual framework. When data segments were similar or contrasted with themes from the conceptual framework, they were organized under that theme. The next procedure involved writing, which consisted of developing a document which captured a more thorough conceptualization of the data (Hennink et al., 2011). This process allowed me to work towards theory development since it required me to be concise with the codes, to examine both the emergent and *a priori* codes in detail, and to present the codes in a logical and coherent manner.

The analysis of my data was facilitated by two tools. The first tool, a contact summary form, was completed following each of my interviews. The contact summary forms allowed me to summarize the principal issues, themes, and missing information present in each of my interviews (Miles et al., 2014). This allowed me to reflect on what information I had gathered, how I would conduct future interviews for the project, and what data still needed to be collected (Miles et al., 2014). Appendix F contains a template of a contact summary form. The second tool, a codebook (Appendix C), allowed me to organize the major and minor codes in a logical manner (Hennink et al., 2011). The creation of the codebook began after the first interview and it was further refined through an iterative process in which the content of the document changed with the collection of more data (Hennink et al., 2011). The final codebook for this project consisted of the main facilitators and barriers to nurses beginning CPR autonomously, included relevant quotations as examples, and indicated whether or not the codes emerged from the data or were *a priori* codes (Hennink et al., 2011). This codebook was modified over the course of the research study and was used to code my interviews.

Data Integration

Employing both quantitative and qualitative data is beneficial to this study because the limitations of each method can be minimized with the inclusion of the other (Remler & Van Ryzin, 2015). Remler and Van Ryzin (2015) assert that quantitative data tend to provide answers to broad research questions and the findings can be generalized to other practical and research settings, while qualitative data allow for in-depth interpretation of highly specific research questions and may not yield generalizations that can be applied outside the research study. By employing quantitative data from validated scales, I was able to complement the qualitative

results with quantitative data on teamwork factors that affect nurses' behaviour in a clinical setting. The data gathered in this research project were integrated by relating the enablers and barriers influencing nursing engagement in in-hospital CPR and defibrillation—the qualitative findings from the survey and interviews—to the teamwork factors deemed relevant to the behaviour of nurses during cardiac arrest scenarios. I determined if the teamwork factors were important based on the qualitative results. I described, within my findings section, how the teamwork factors may affect the decision of nurses to initiate in-hospital CPR as well as how the qualitative data support these interpretations.

Ethics

Ethics approval for this thesis project was obtained from the Research Ethics Board at the University of Ottawa on March 30th, 2016. Appendix D includes a copy of the Ethics Approval Notice. This research project presented a risk for emotional or psychological discomfort and there were ethical considerations that had to be examined. These considerations included ensuring informed consent for participants, voluntary participation, confidentiality, and anonymity. Informed consent was ensured by sending every participant a letter of invitation (Appendix E) that outlined the research project, the potential emotional or psychological risks involved, and my contact information. These letters of invitation were emailed to potential participants by a contact from the Ontario Nurses Association. In addition, the letter encouraged potential participants to contact me with any questions or concerns regarding the project. All potential participants had at least an undergraduate education and their reading level was high. Finally, prior to beginning any of the individual interviews, I reiterated the goal of the research study as well as any potential risks involved. This provided participants with an additional opportunity to withdraw their participation from the project. The letter of invitation sent to potential participants described how participation in the study was voluntary. I highlighted in this letter that there were no consequences if they chose to not participate and that if they decided to participate, they had the opportunity to withdraw at any point without any repercussions. Confidentiality was ensured through a variety of strategies. The first strategy entailed storing the data from the questionnaires on a password-protected laptop computer and a backup of the data on a password-protected USB stick. I also did this for the recordings, transcripts, and NVivo documents of all the individual interviews. The second strategy to ensure confidentiality was labelling participants' questionnaires and transcripts by a pseudonym, instead of using their names. Finally, I ensured that the only individuals having access to the data were my thesis supervisors and the individuals that transcribed the interviews. The individuals that had access to the audio recordings and transcripts, outside the research team, signed confidentiality agreement forms. Anonymity was secured by not including participants' names in my thesis or any publications, but rather employing pseudonyms for any direct quotations I employed to support my conclusions. This ensured that individuals reading my thesis would not be able to identify any participants of the study.

Findings

Quantitative Findings

Figures 1 and 2 as well as Tables 2 and 3 provide an overview of the demographics of the survey participants. There was a clear preponderance of women (91%) and a noticeable absence of those in the 40-49 age category. There was a good balance between high and low acuity units—which helps to reveal a range of contextual factors influencing initiation of CPR rates. As mentioned in the "Methodological Approach" section, the acuity of a hospital unit was defined by the health care needs of patients on these different types of units and this affected the likelihood that patients on these units would suffer cardiac arrest. There was also a good distribution of respondents from community and teaching hospitals.

Figure 1: Gender Distribution

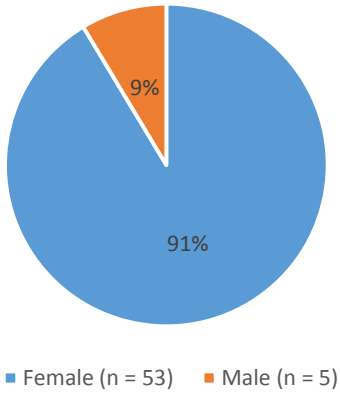

Figure 2: Age Distribution

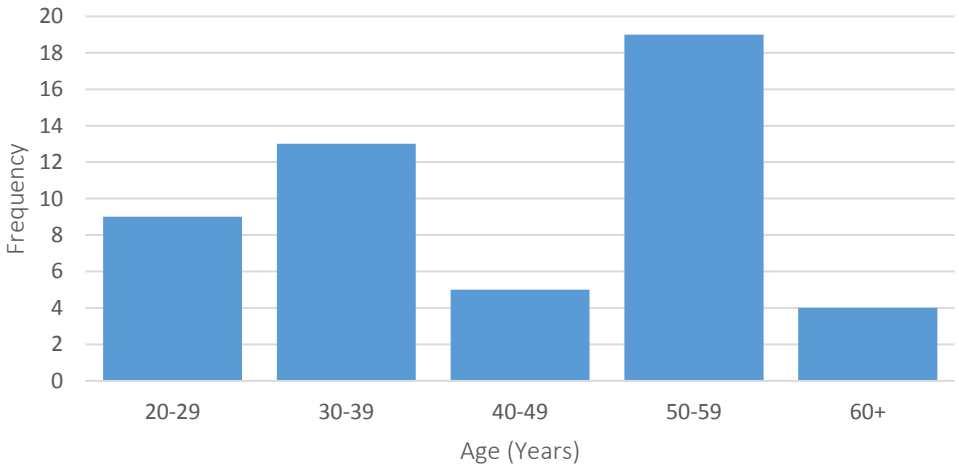

Table 2: Unit Type		
	Frequency	Percentage
High Acuity	23	46.9%
Non-high Acuity	22	44.9%
Other	4	8.2%
Missing Data	9	15.5%
Total	58	100.0%

Table 3: Hospital Type		
	Frequency	Percentage
Community	30	52.6%
Teaching	19	33.3%
Other	8	14.0%
Total	57	100.0%

The quantitative portion of the online survey (see Table 4) revealed that 58.6% (*n* = 34) of nurses who completed the questionnaire had initiated CPR and 36.2% (*n* = 21) had not. The mean for time in profession (*n* = 58) was 17.4 years (*SD* = 12.45) and the mean for time in job (*n* = 58) was 10.48 years (*SD* = 9.35). The average number of times that nurses had initiated CPR (*n* = 56) was 13.68 (*SD* = 33.07) while the average number of times that nurses had witnessed a CPR scenario (*n* = 56) was 9.59 (*SD* = 27.85). The mean for the informational role self-efficacy scale (*n* = 40) was 72.12% (*SD* = 24.78), for participation in decision making (*n* = 40) it was 4.39 (*SD* = 1.65), for shared leadership (*n* = 37) it was 4.60 (*SD* = 1.23), for collaborative work (*n* = 37) it was 5.41 (*SD* = 0.80), for role overload (*n* = 37) it was 4.76 (*SD* = 1.39), for role clarity (*n* = 37) it was 5.24 (*SD* = 1.26), for role ambiguity (*n* = 37) it was 3.90 (*SD* = 1.41), and for interprofessional conflict (*n* = 37) it was 3.77 (*SD* = 1.33). There were some interesting results that arose from the correlations between the number of times that nurses had initiated CPR and time in profession, informational role self-efficacy, as well as role overload. Table 4 shows a positive correlation between the number of times that a nurse initiated CPR and time in profession (*r* = 0.247) as well as with informational role self-efficacy (*r* = 0.266). Table 4 also demonstrates that there is a negative correlation between the number of times that a nurse initiated CPR and role overload (r = -0.453). The ANOVAs (Table 5) also revealed important results. The number of times that nurses had initiated CPR was affected by the acuity of the hospital unit on which they worked [$F_{(1)} = 4.423$, $p = 0.041$].

Table 4: Correlations													
Variable	***M***	***SD***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1. # times initiated CPR	13.68	33.07	--	--	--	--	--	--	--	--	--	--	--
2. Time in profession (years)	17.39	12.45	.247*	--	--	--	--	--	--	--	--	--	--
3. Time in job (years)	10.48	9.36	.084	.694*	--	--	--	--	--	--	--	--	--
4. Informational role self-efficacy	72.12	24.78	.266*	.374**	.363**	**.975**	--	--	--	--	--	--	--
5. Participation in decision making	4.39	1.65	.029	.022	.167	.358**	**.951**	--	--	--	--	--	--
6. Shared leadership	4.60	1.23	-.089	.125	.341**	.343**	.787**	**.981**	--	--	--	--	--
7. Collaborative work	5.41	0.80	.072	.286*	.275*	.492**	.670**	.787**	**.939**	--	--	--	--
8. Role overload	4.76	1.39	-.453*	-.241	-.326**	-.314*	-.253	-.295*	-.240	**.917**	--	--	--
9. Role clarity	5.24	1.26	.095	.029	.325**	.239	.586**	.750**	.646**	-.272	**.921**	--	--
10. Role ambiguity	3.90	1.41	-.209	-.137	-.301*	-.201	-.303	-.385**	-.348**	.510**	-.472**	**.899**	--
11. Interprofessional conflict	3.77	1.33	-.077	-.050	-.266	-.149	-.405**	-.418**	-.288	.292*	-.399**	.704**	**.943**

Notes

Diagonal shows Cronbach's alpha in bold.

N varies between 37 and 58 because of pairwise deletion.

** $p \leq 0.05$; * $p \leq 0.10$

Table 5: Hospital Unit Type (ANOVA)												
Unit Type		# times initiated CPR	Time in profession (years)	Time in job (years)	Informational role self-efficacy	Participation in decision making	Shared leadership	Collaborative work	Role overload	Role clarity	Role ambiguity	Interprofessional conflict
High Acuity Hospital Units	*M*	16.35	20.0616	11.8370	75.4444	4.4630	4.6965	5.5378	4.6863	5.2941	3.9804	3.6691
	SD	28.732	12.35081	9.18168	27.77935	1.76805	1.34462	.87995	1.40174	1.31700	1.24427	1.30873
Low Acuity Hospital Units	*M*	2.90	15.2917	12.6174	73.7200	4.1778	4.5000	5.2653	5.0238	5.1429	4.0000	3.9018
	SD	5.813	12.25549	10.43244	22.82678	1.56787	1.21323	.66266	1.28412	1.18187	1.37747	1.12466
Other	*M*	27.00	21.2917	6.5208	60.0000	5.0000	5.3600	5.9643	5.0000	6.3333	3.0000	3.6875
	SD	26.671	13.76010	4.34953	28.28427	2.82843	.96167	1.46472	.00000	.00000	2.82843	3.27037
	$F_{(1)}$	4.423	1.690	.071	.037	.236	.179	.914	.480	.111	.002	.275
	p	.041*	.201	.791	.849	.631	.676	.347	.494	.741	.967	.604

*=p<0.05

Qualitative Findings

The qualitative findings for this research project are presented in three sections: micro, meso, and macro following the alignment of the "Inputs" section of the orienting conceptual framework. This organization of the findings provides an understanding of how the behaviour of nurses as in-hospital first responders is affected by factors within each of these levels. This presentation of the qualitative results is not congruent with a purely grounded theory approach, which is part of the impetus for describing the qualitative data analysis as a *modified* grounded theory approach.

The micro level pertains to practical and individual elements, the meso level targets organizational and institutional factors, and the macro level examines structural characteristics influencing the deployment of CPR and defibrillation by registered nurses in Ontario. The correlations and ANOVAs extrapolated from the eight teamwork scales are presented within the sections that are relevant to each specific qualitative factor—primarily the micro and meso levels, as there were no measures for the macro level influences in the survey instrument. The rationale for presenting the main quantitative results within this section is because the intention of gathering these quantitative data were to complement and support the qualitative data.

Micro Level Influences

The micro level influences explored in this project include training, preparation, and knowledge; experience and self-efficacy; fear and doubt; as well as ethical considerations. These factors pertain to the individual level influences on the role of nurses in the enactment of immediate life support.

Training, Preparation, and Knowledge

Training and preparation to undertake cardiopulmonary resuscitation and defibrillation emerged as a critical factor in the interviews with nurses. Education imparts nurses with the knowledge and of skills for resuscitation as well as the rationale for performing CPR. The quality and frequency of this education may influence how quickly a registered nurse will initiate CPR and defibrillation on a patient in cardiac arrest. Education occurs during nursing school as well as in continuing education courses such as basic life support (BLS), advanced cardiac life support (ACLS), pediatric advanced life support (PALS), or other courses designed to provide learners with skills such as chest compressions, cardiac rhythm recognition, and defibrillation. There are less formal training methods, such as mock code blue scenarios, discussed later. Nurse Campbell perceives that part of the issue with nurses hesitating to deploy prompt life support is related to the curriculum in nursing school education:

> *And it seems to be a lack of something in their education in university. I find they seem to have a lot of classroom education more than clinical, which I think is a detriment to the nurse.*

> *I think they need to have it more balanced. I think they need to have more clinical hours and more hands-on than just shadowing somebody for eight hours.*

Some nurses may delay the initiation of basic life support if they are not aware of the potential consequences of not deploying their life support skills immediately after assessing that a patient is in cardiac arrest. Nurse Elliot describes how knowledge enables the nursing role in the delivery of CPR:

> *I know for me, when I know why something needs to be done, I understand it much better and I'm more willing to actually follow through and do whatever it needs to be done. So I think that if nurses knew more about CPR and more about the statistics behind when CPR is initiated promptly and all that stuff, I think nurses would be more willing to go start CPR as soon as it's needed rather than kind of wondering does this need to be done, does this not kind of thing.*

Nurse Elliot reinforces that knowing the time sensitivity of cardiac arrest situations is essential for patient survival following this type of critical event:

> *But knowing that for instance defibrillation will increase your mortality, but it's 7-10 per cent for each minute that you delay defibrillation. Those are good things for nurses to know. So those are concrete numbers. That's statistics that never seems to budge. The answer is the sooner you do it, the better your outcome will be. So as long as we know that, we can buy them time with CPR. You can circulate the blood and hopefully they get the AED to the scene or a defibrillator sooner rather than later. So that educational component needs to be stressed and re-stressed and re-emphasized every single time.*

The interview participants noted that training is beneficial to nurses in their abilities to readily perform CPR and defibrillation; however, this training must occur regularly. How often nurses acquire CPR training may impact their level of preparedness, comfort, and confidence with CPR. This may influence their likelihood of initiating life support on a patient in cardiac arrest. Nurse Browne notes an example of this:

> *I think it needs to be done more frequently in the hospital setting, on the unit with drills and reviews. I know the mental health nurses are terrible. Like I do CPR review with them and they don't do it that often and they're really not sure of what to do because it's something that won't doesn't necessarily occur that often, maybe not in their career.*

Continuing education is also useful because it can provide an imitated experience of resuscitation, but it is also important because it allows nurses to develop knowledge of the warning signs and symptoms of cardiac arrest. Recognizing the signs and symptoms of cardiac arrest does not only permit nurses to prevent a potentially life-threatening cardiac event from occurring, but it also facilitates them to enact their CPR skills in a timelier manner. A better

understanding and ability to recognize cardiac arrest may be helpful for newer nurses, according to Nurse Campbell:

> *Once they get some experience, yes. When they're first new, you try to educate them. If you see this, this means this. If you see this, this means this. But sometimes you don't always have it till it occurs, which is a good thing. Sometimes it takes you quite some time to get the junior staff up to recognizing so that they can intervene.*

Nurse Atkinson supports that additional training enables nurses to have increased competency in their abilities to effectively recognize the signs that a patient has a declining cardiopulmonary status:

> *There are a lot of subtle things that you can see happening in a patient that makes you realize that ooh, this patient is not doing well. And you sometimes see it in your day to day nursing job, but you don't always. So to have that extra education just kind of helps teach you what to look for but also to solidify this panicky feeling I have like this doesn't look good.*

Mock code blue scenarios are a promising practice in the continuing education of nurses. These are intended to replicate the conditions of an actual cardiac arrest situation and to assist in health professionals' understanding of the processes, roles, and algorithms involved. Nurse Browne notes the benefit of performing mock code blue scenarios for preparing for CPR:

> *I think that doing mocks, doing hands-on, knowing what to anticipate and participating is important. I know here at our organization we have mock code blue review every Thursday that the nurses and physicians go too and they go through all the steps and get themselves prepared or go through the different scenarios, so that's really helpful.*

Many of the other nurses interviewed describe how having regular mock code blue scenarios on their hospital units would enable nurses to enact CPR and defibrillation more rapidly. The establishment of mock code blue scenarios is not present at all institutions, however. Nurse Atkinson explains how she was advocating for such an initiative at her hospital:

> *So I really wanted to have mock code blues where they would call a code blue on a dummy and we would just kind of learn what needed to be done and when we should be calling these codes and when we should be doing all these interventions. I was fighting for that for a while.*

Nurse Atkinson's intention for a mock code blue program at her organization was to provide the novice nurses with experience with cardiac arrest scenarios. Experience is a relevant theme that emerged in all the interviews and is important for nurses' propensity to initiate prompt CPR and defibrillation because they have a greater capacity to recognize the warning signs of potential or actual cardiac arrest and comprehend what needs to be done.

Experience and Self-efficacy

Experience and self-efficacy are critical aspect determining nurses' abilities in initiating the necessary CPR and defibrillation with little or no delay. Experience originates from being present or involved with actual situations in which a patient requires life support interventions or, as noted previously, from mock code blue scenarios in which nurses are able to take part in training exercises that imitate real-life code blues. Data from the questionnaire, specifically the scales on informational role self-efficacy and role overload support the benefit of experience. Table 4 shows a positive correlation between the number of times that a nurse initiated CPR and time in profession (r = 0.247) as well as with informational role self-efficacy (r = 0.266).

Table 4 also revealed that there was a negative correlation between the number of times that a nurse initiated CPR and role overload (r = -0.453). These data suggest that as time progresses in their profession, nurses experience more scenarios in which they initiate CPR, they acquire a better ability to communicate knowledge regarding their role and abilities, and they feel that they are better able to manage the requirements of their role. As a result, it is reasonable to assume that with increased experience, nurses have a better capacity to fulfill the functions of their role. This is likely to be the case in the prompt initiation of life support procedures. Nurse Campbell notes the advantage of being experienced:

> *If they're a more seasoned nurse then I think they're prepared. Some of our newer nurses don't seem to be as prepared. Part of that is because of experience and part of it is that they did not receive critical care thinking skills.*

Novice nurses often have less experience than senior nurses with enacting CPR and defibrillation in real-life scenarios and this may play into the behaviour of nurses when it comes to the prompt enactment of CPR and defibrillation skills. Nurse Dennis supports this notion:

> *The current state, as I mentioned several times, I think the problem is lack of knowledge or lack of experience. For novice nurses, that would be the problem. And solving it is more experienced, more training and unfortunately hands-on as well.*

Experience with initiating basic life support processes breeds self-efficacy with the prompt enactment of the necessary procedures. When a nurse has the sense that they would be able to enact resuscitation procedures when confronted with a cardiac arrest scenario, she or he may be more likely to execute the appropriate judgement and skills. Strong self-efficacy with CPR knowledge and skills is important to the role of nurses as in-hospital first responders. Nurse Browne describes how nurses may be influenced by their self-efficacy with CPR initiation:

> *I think it would give them more confidence. If they've done it once, they can kind of do some self-reflection on how to go, how to improve it, what went well, what didn't go well, what the patient looked like. I think that can influence them.*

The increased experience of nurses may facilitate them to be comfortable and confident in their role as a first responder, but if their experiences are poor and the situations they have experienced are chaotic and stressful, then a nurse may adopt a negative perception of CPR initiation. Nurse Browne believes that having poor experiences may deter some nurses from deploying their resuscitation skills:

> *And if they have a bad experience and they have… If it was a poor outcome or if it was kind of traumatic or unexpected, it didn't go as well. It can be some hesitancy on that part as well, depending on the outcome and how it went.*

Poor experiences may restrict the promptness of nursing behavior during cardiac arrest situations, but nurses may acquire a greater sense of their role and responsibilities when they are involved more frequently in CPR. Nurse Atkinson perceives that a high level of experience may eventually transform into an intuition. She asserts that the experience internalizes a sense and understanding of what is normal and what is concerning in relation to a patient's health condition:

> *I think as a nurse, especially if you've seen it before, you develop this intuition that you can see when a patient is going downhill and when you need to start intervening and you need to start doing everything generally.*

This nursing intuition may be attributable to an enhanced ability to recognize the warning signs of cardiac arrest. Many of the interviewed nurses emphasized the importance of preventing cardiac arrest rather than actually having to provide CPR and defibrillation. Nurses' knowledge of the early signs and symptoms of cardiac arrest as well as the signs of an imminent or actual cardiac arrest impact their capacity to properly react to these situations. Nurse Campbell explains the importance of educating new nurses about recognizing cardiac arrest in order to intervene:

> *Once they get some experience, yes. When they're first new, you try to educate them. If you see this, this means this. If you see this, this means this. But sometimes you don't always have it till it occurs, which is a good thing. Sometimes it takes you quite some time to get the junior staff up to recognizing so that they can intervene.*

A nurse's ability to intervene promptly when they are a first responder to a cardiac arrest scenario may be partially dependent on their ability to identify the signs and symptoms of the condition as well as a strong understanding of the importance of initiating basic and advanced life support quickly.

Fear and Doubt

In contrast to experience and self-efficacy, fear and doubt inhibit a registered nursing from initiating prompt CPR and defibrillation because they may be uncertain as to the potential consequences of enacting or not enacting their skills. Fear may stem from a variety of causes, or it may simply be the feeling of being scared, as supported by this quote from Nurse Dennis:

> *When you see that [cardiac arrest], it's very scary. Well for me, I've been nursing 10 years, it's always scary. I don't care what anybody says or how experienced they are. For me, each one is scary because you pray for the best and you just don't know what's going to happen.*

Nurses may fear CPR scenarios for many reasons, namely the fear of causing harm to the patient and the feeling of being nervous or anxious. The feeling of being nervous or anxious may restrict nurses in their ability to perform CPR and defibrillation quickly. This feeling may stem from a lack of experience with cardiac arrest scenarios as well as a nurses not trusting their assessment skills. This may be a barrier to the role of nurses, specifically with novice nurses, as in-hospital first responders. The behaviour of nurses is affected by their emotions and the high-intensity and stress of these situations may cause anxiety and fear. Nurse Dennis speaks to the lack of experience of novice nurses with CPR initiation and how this may lead to nervousness for these young professionals:

> *Well, especially with novice nurses, I think once they understand the quicker we can start, it might be the better the outcome. And I think after their first experience of not starting the CPR or getting too nervous about—and sometimes they come and the patient is breathing. They learn that and so next time if they weren't or if you're unsure if they're breathing, start CPR. And I think that just comes with time.*

Nurses may fear that the initiation of CPR or defibrillation would cause unnecessary physical harm to the patient. Delivering chest compressions to a person may lead to the patient sustaining injuries during the process. This is an expected aspect to CPR if the chest compressions are performed at the correct depth and rate; however, if a patient is not experiencing cardiac arrest, this type of intervention would cause unwarranted harm. Nurse Elliot explains that the fear of hurting a patient and making their condition worse may deter some nurses from enacting prompt CPR:

> *But amongst the floor nurses, especially our doctors see a lot of level of hesitancy based on the misconceptions where we're going to do something worse, we're going to make it worse.*

Nurses may also hesitate to deploy basic life support in a timely manner due to doubt. This pertains to nurses delaying the initiation of basic life support because they do not know the appropriate actions upon discovering that a patient is in cardiac arrest, they are not confident in their assessment of a patient's condition and may be unable to identify if a patient is in cardiac arrest, or there are uncertainties surrounding the Do Not Resuscitate (DNR) order of the patient in question. These are barriers to nurses initiating prompt CPR and defibrillation. Nurse Atkinson, who is a nurse on a medical floor, describes her hesitation when identifying that a patient has a declining health status:

> *Whereas on the medical unit, it's kind of like do you start CPR? Do you not start CPR? What is happening to this patient? And it takes a little bit more time for us to start CPR because we're just not sure.*

Uncertainty with the algorithms and actions that need to be executed can deter nurses from beginning life support. This doubt may also arise when a nurse is assessing a patient's pulse and breathing to determine if they have a diminishing cardiopulmonary status. In these types of cases, the nurse may suspect that the patient is not doing well, but is second-guessing her assessment. Second-guessing involves nurses believing that the patient is in cardiac arrest, but are unable to fully judge this. If a nurse is not able to confirm that the patient is in cardiac arrest or they are not confident in their assessment of the situation, then it is possible that they will not enact the necessary skills in a timely manner. Nurse Browne provides an example of this hesitation:

> *Yes because you're like this person can't be arresting. Oh my God! And am I feeling that pulse? I don't think I feel the pulse. Oh my goodness, am I sure? And then it's that few seconds of hesitation.*

Nurse Dennis also highlights an example from her experience of a nurse delaying the deployment of CPR because they have second-guessed their assessment:

> *Just off the top of my head, like I said, I can think of one or two times the young nurse ran out of the room and it was like 'I don't think they're breathing, I don't think they're breathing.' You run back in there and they're not. And the nurse should have started CPR but they're just scared, they don't know. And I think sometimes there's that questioning their own assessment.*

Nurses may have the knowledge of what to do when a patient suffers cardiac arrest and they may have the confidence in their assessment skills to confirm when a patient is experiencing this type of event; however, there may be doubt pertaining to the advanced directives for patients. The qualitative data from the survey supports this. As per Nurse #15, doubt surrounding a patient's DNR status can cause disarray when determining the proper course of action for patients:

> *Families changing their minds on code status when POA is not available. E.g. pt [patient] starts as a DNR 2 and families changing them to a full code until POA is available and changes it back to a DNR 2, meanwhile we have broken the pt's sternum and ribs, put a tube down into the lungs to supply oxygen when in fact the pt didn't want any of that done.*

Ethical Considerations

At times there are moral dilemmas when the decision to initiate CPR and defibrillation arises. There may be a clinical need to begin CPR, but the contextual and patient factors may impact the morality of initiating resuscitation. This may cause nurses to hesitate to deploy CPR

and defibrillation skills. For example, Nurse Browne describes a potential hesitation to begin basic life support due to a patient being elderly:

> *I think the hesitation could be if it's like an ethical dilemma. So for example, if there's a 92-year-old, they're a full code, you know that in your heart that it will be a poor outcome. You still need to initiate it but that's probably one where that might occur.*

Ethical dilemmas occur when an individual must decide between two or more equally appealing courses of action, but these different choices have values that conflict (Braunack-Mayer, 2001). In the case of the initiation of resuscitation, nurses can have a conflict between their professional obligation to provide CPR and defibrillation and the value of beneficence. There can be an impetus for initiating resuscitation; however, considerations for the long-term welfare of the patient may deter nurses from deploying their skills. Knowing that the patient may have a poor outcome and or may have a poor quality of life following the resuscitation based on the patient's age or condition may influence their behaviour when the patient is in cardiac arrest. It should be noted that not performing CPR and defibrillation for some clients may be the best possible clinical decision; however, if the patient or family has requested the interventions be performed despite the risks and potentially poor outcomes, then timely CPR and defibrillation may be enacted. There is not always an ethical dilemma when deciding whether or not to start the necessary processes for a patient in cardiac arrest, but there is an ethical or professional obligation to provide the best care possible for the patient.

Summary

Nurses are influenced by a variety of factors at the micro level. Training, preparation, and knowledge are essential because nurses must have formal and continuing education in order to adopt the necessary skills and understandings of CPR and defibrillation. Following this, participants in the individual interviews noted that experience must be obtained in order to gain a sense of self-efficacy with their skills. The quantitative data from the survey corroborated this and indicated that the more times a nurse initiates CPR, the more they are able to communicate the functions of their role and the less they feel that their role is overloaded. Self-efficacy is a key enabler to nurses promptly initiating CPR and defibrillation and was identified as manner of overcoming the many fears and doubts attributed with the enactment of resuscitation. Fears may inhibit nurses from engaging in their role as first responders as well as doubts surrounding assessment and the DNR status of patients. Finally, ethical considerations may play into the role of nurses in their decision to deploy CPR and defibrillation. This decision may be influenced by family members of the patient as well as concerns for a patient's welfare considering the risks of CPR.

Meso Level Influences

Meso themes consist of factors at the organizational or institutional level that influence the behaviour of registered nurses in their decision to initiate CPR and defibrillation. In this study, team dynamics; workload; availability and quality of technology; hospital unit; as well as geography were identified as factors at the meso level.

Team Dynamics

Team dynamics include factors that arise from the interactions between members of a health care team. These factors pertain to the functioning of the group and how these aspects influence a nurse's behaviour in the deployment of CPR and defibrillation skills.

Leadership

Leadership is an essential component of team dynamics because it is necessary to have an individual present who is directing others in the event of a code situation. As noted previously, experience is an essential element determining how quickly a nurse applies their resuscitation knowledge and skills and, according to the quantitative results of the survey (Table 4), there is a positive correlation between the time that a nurse is in their job and shared leadership (r = 0.341). This implies that as nurses share experiences with other nurses in the same unit, they tend to be able to share the leadership among each other. Along the same lines, it is also interesting to see that shared leadership and collaboration are positively correlated (i.e., r = 0.787).

With an individual that is better able to share leadership roles as well as to plan, organize, problem solve, and support team members, comes an increased capacity to engage in their role. This may hold true for the effective engagement in the first responder role, but it this is not substantiated by the quantitative survey data. The data did not support a correlation between the number of times that a nurse initiated CPR and shared leadership. This may be due to a lack of sufficient participants for the online survey. Although the quantitative survey data did not identify shared leadership as relevant in the enactment of resuscitation, the interview data indicates that leadership adds to the quality of the life support. According to Nurse Dennis, leadership is one of the most important contributing factors to a successful resuscitation:

> *I think it's one of the things that can impact it the most. If you don't have a good leader, things I think can deteriorate quite quickly. And when I say deteriorate, it gets very confusing. People in each other's way, you need to have that one person. Whether it's the doctor or the nurse, there needs to be the definite leader. And with a nurse, it might not come to say 'okay we're going to give the epinephrine now', but at least to control the environment. Just to control everything that's going on within that room and it helps the doctor out as well.*

The leadership may arise from senior nurses or physicians. The designated leader is often a physician; however, this role may shift depending on the knowledge and experience of the

professionals present at the code blue. Nurses may be required to assume the leadership position when a patient goes into cardiac arrest due to their experience and understanding of the procedures involved. Strong leadership may not only lead to a more coordinated resuscitative effort and potentially a better outcome for the patient, but it may also encourage a more rapid deployment of CPR skills on the part of nurses. If nurses are supported in their role as team leaders, then they may feel that they have more of a responsibility and obligation to enact CPR and defibrillation quickly rather than wait for a physician to arrive to lead the scenario.

Senior Nursing Staff

Senior staff may facilitate the enactment of early CPR and defibrillation because they may have greater experience, knowledge, and self-efficacy with life support processes. Senior nurses may be perceived as informal leaders or mentors in their work setting and novice nurses rely on these more experienced individuals for guidance in their practice. Nurse Dennis notes an example of this at her job:

> *For the most part, the management try to ensure that there's one to two senior nurses on each shift and so that they can at least help to guide the novice nurses. But our main goal should be always just to prevent the code from happening in the first place.*

Senior nurses may be able to assist novice nurses with their assessment of patients as well as directing them in their clinical actions. This not only allows these younger nurses to develop greater knowledge, skills, and judgement, but it also ensures that they are making well-reasoned and timely decisions, which is essential in the case of cardiac arrest scenarios. Nurses do not always have the support of senior staff. Nurses may feel that their role in resuscitation is diminished due to a lack of support and leadership.

Physician Leadership

The presence of a physician at a code situation may reassure and comfort nurses when they deploy their resuscitation skills due to the medical professional's enhanced authority in clinical decision-making. Nurse Browne supports this notion:

> *I think this is maybe more reassurance, collaboration. I don't have any of the experts potentially there. Even they're not, but anyways. I get more reassurance and maybe I'm not saying power in the capital P power, like a small power physician can yay or nay things while a nurse can't. They can stop the CPR and they can initiate some other things while the nurse, if they start they can't stop but it's stopped by the physician.*

Having a physician present when a patient suffers cardiac arrest may assist in ensuring that a nurse is comfortable deploying their skills; however, if there are no physicians available, this may also encourage nurses to engage in their role as first responder. There may be less hesitation from nurses in hospitals that do not regularly have a doctor on-site, such as in rural or remote regions of the province, because they understand that they will not only have to begin the resuscitation,

but they may have to carry through with the entire procedure without a physician. If nurses know that they do not have back-up and must perform all the actions involved with CPR and defibrillation, then they may be more likely initiate timely life support. In addition, at hospitals where doctors are not always available to assist with resuscitation, then nurses may be able to perform additional components of advanced life support through advanced doctor's orders called medical directives. Medical directives allow nurses, and other licensed health care professionals, to perform tasks that are traditionally outside the scope of practice of these providers as long as a set of criteria are met. This enables nurses to have a greater role in their capacity to resuscitate patients in cardiac arrest. Nurse Dennis notes this occurrence at hospitals in her region:

> *No, I would have to say here at our hospital we're very fortunate that our hospital expects us to work to full scope. And anything we can basically do that may be above our scope, usually we have a medical directive. I would say especially in emerge they probably have to do a little bit more because they have the medical directives to do it. Because like I said we're a remote hospital and we're getting busier where there is usually a doctor in emerge all night long. But I can remember sometimes when there was no doctor in the hospital. So we needed the medical directives and stuff in place so that we can do better for the client because we might have to wait 10, 15 minutes for a doctor to get there.*

The presence of physicians, or the lack thereof, at a cardiac arrest situation may influence the behaviour of nurses. The reassurance and leadership of doctors may encourage nurses to enact CPR and defibrillation more readily, but so too can the absence of doctors because nurses may have to assume the lead role in resuscitation out of necessity.

Team Hierarchy

Teams may have perceived or real hierarchies imbedded into their structure. These power gradients between individuals may arise from interprofessional conflicts, such as between nurses and doctors, or they may manifest in intraprofessional conflicts, such as between senior nurses and novice nurses, as noted by Nurse Dennis:

> *But the nurses, that's where I find hierarchies where more senior nurses think that they know better. And unfortunately, nurses we're supposed to be very caring, mentoring novice nurses that sometimes, for whatever reason, we had one particular nurse they'd say everybody should learn the hard way. And so you're in a code and she wouldn't talk to them at all. And they'd be like, 'what do I need to do? What do I need to get?' and not say a word to her.*

Nurse Dennis also describes how she does not perceive the physician-nurse relationships as being a struggle:

> *In my experience if CPR is initiated and a code is called the nurses and physicians respond immediately. I [personally] have never felt I could not speak to any physician. The*

> *physicians do listen to a nurse's feedback. For the most part nurses and physicians are supportive if CPR is started but wasn't necessary. Nurses and physicians make it a learning opportunity.*

Hierarchies may limit nursing behaviour, but they may also be beneficial to team processes because the more "powerful" professionals are able to lead the group and provide direction to others. In addition, it may ensure that roles are clear and defines who is making the majority of decisions. Nurse #11, who completed the survey, describes the benefit of hierarchies in teamwork in terms of role clarity:

> *The hierarchies are well mapped out and each person involved in a CPR scenario has specific role. [It's] more of a team vs hierarchy culture as everyone has been trained for a certain role.*

Roles

The clarity of roles during a resuscitation is an important component of team dynamics because it ensures that members of the group understand each other's functions and responsibilities. Role ambiguity is also important as nurses may feel they are asked to perform contradictory procedures. Role overload is important as well as nurses may feel CPR is "in addition to" their regular tasks. Of these three roles, the only statistically significant association with the number of times nurses initiated CPR is with role overload and it is negative (i.e., -0.453). This suggests that as nurses initiate more and more CPR, they feel less overloaded with tasks. Table 4 also shows that role clarity is positively correlated with time in job (r = 0.325) whereas role ambiguity is negatively correlated with time in job (r = -0.301).

Role clarity, and the lack of role ambiguity, may improve the quality and coordination of a resuscitation as a nurse's time in their job progresses; however, this may be insignificant when considering the reasons why a nurse may or may not deploy CPR and defibrillation prior to the arrival of a physician or code team to the scene. Nurse Campbell describes the benefits of having clear, distinct roles during a cardiac arrest scenario:

> *With this last code, the team came and it was actually right at the change of a shift so that was good because we had four neonatal nurses there, which was better than just having two because we have worked in scenarios before so it's not assigned but we sort of know whose best at what role. So we have one who can start IV's and we have one that can do the epinephrine. We had one doing compressions. The doctor had the airway and then the other one was anticipating what the doctor might need next to continue on what was recording. The girl recording was actually a girl from the code team.*

The nurse demonstrates how role clarity can enhance a team's activities when providing cardiopulmonary resuscitation; however, this does not have an apparent link to a nurse's propensity to start the necessary processes.

Communication

Communication consists of the effectiveness of the exchange of information between providers and is an essential component of team dynamics. The quality of communication may impact how quickly a nurse enacts their CPR and defibrillation skills, as supported by a quote from Nurse Atkinson:

> *Depending on the information communicated between nurses, a nurse will decide whether or not to [initiate] CPR. If information is ineffectively communicated, the initiation of CPR may be delayed in order to gather the appropriate information (ex DNR order).*

Nurse Elliot notes the importance of having quality communication in all aspects of nursing and how he does not perceive this component impacting a nurse's choice to initiate early basic life support:

> *Good communications is key to anything in nursing. The assessment of when to initiate CPR is a core competency that should be mastered by any regulated health care professional (RHPA members). I believe that should not impact your decision to initiate CPR. This is also encouraged during BCLS [basic cardiac life support] for HCP [health care provider] classes.*

Workload

If a registered nurse feels busy or overwhelmed from the quantity of tasks that must be accomplished during a shift, they may not notice the declining cardiopulmonary status of a patient. Increased experience with CPR initiation improve a nurse's ability to manage their workload, as evidenced by the correlation between the two factors (Table 4). According to Table 4, the more times a nurse initiates CPR is negatively correlated with role overload (r = -.453).

Nurses emphasize the importance of preventing a code rather than having to perform resuscitation. A decreased workload, which may consist of having fewer patients to care for simultaneously, would permit nurses to potentially have a greater capacity of preventing these codes and to properly and promptly respond to these cardiac arrest scenarios. Nurse Dennis supports this notion:

> *Well, of course, I think the lesser patient load would be better and the nurses would have more time for each client. For myself, when I worked the nursing floor, sometimes it felt like we worked short more than we actually worked fully staffed. And of course there were times I'd come in and had 10 or more patients. And so you just have to kind of prioritize who really needs the deep assessment and who's not. You're going to get their meds and hope they don't die. And when I say that, meaning they're not supposed to die but it's just that sometimes that's the reality of it. So sometimes when you're working short, sometimes things do get missed so it has a lot of impact. So I think a lesser patient load, absolutely I think would be beneficial, especially to preventing a code.*

Nurse Ferguson provides additional evidence as to why a heavy workload may be detrimental to the role of nurses as effective in-hospital first responders:

> *The more the hospitals cut back on, and specifically on registered nurses who have that higher level of critical thinking, I think that puts patients at risk to have those warnings signs missed. I think the more patients you have to manage, the sicker those patients. And in our modern health care system, our patients are much sicker because if they're not, they're not in hospitals. And so yeah, some of those warning signs can be missed. Now, in our hospital we have a policy on a minimum of hourly rounding. So you have to see every patient at least every hour. So that, I'm sure it would help but even a lot can happen in an hour. Yeah, I think workload has a big influence on early detection of cardiac arrest.*

Availability and Quality of Technology

The quality and availability of technology is an important element to enabling rapid nurse-initiated CPR and defibrillation. Technology may include the use of cardiac monitors, the availability of automated external defibrillators, and the use electronic communication systems (i.e. electronic medical records). Nurse Campbell describes the use of cardiac monitors in her clinical setting:

> *Right, they put them on rather quickly. We have a resuscitation area in our unit and even if the baby codes in their normal room, they're all on monitors. So they're normally on a monitor so you could tell that something's going awry with the monitor and the monitor pattern, so you try to intervene before they actually arrest.*

Automated external defibrillators do not require users to interpret the cardiac rhythms of patients and determine whether or not an electrical shock is advised. AEDs eliminate some potentially difficult work, particularly for nurses on general wards, which facilitates their role when providing defibrillation. Not all hospital units have AEDs, however. Hospital units may have manual defibrillators, which require users to recognize the cardiac rhythm and determine the degree of Joules that need to be delivered for the shock. The availability of AEDs is an enabler to nurses enacting defibrillation in a timely manner. This is supported by Nurse Elliot. He describes the defibrillators he uses as well as the benefits:

> *They're manual with an automated function on it. Typically in Emerg we're using manual override so we can shock when we need to. But I have been promoting in my courses is if you're by yourself, then at least do the AED mode and I know the floor nurses are now going to be starting newer training when we get a new hospital here in [place]. Because the walk is too far when the whole team arrives from all floors, some take a little bit more time. So I've been pushing for this since 1998, since I started there that the floor nurses can actually use the AED option of their manual defibrillators because it really takes the thinking out of it. This machine makes a decision as to when to tell us when to shock and how much a*

> *shock... So that's something I've been pushing for. In future, we'll see a lot more of floor nurses applying AED pads because that's what we use exclusively these days.*

When nurses have AEDs available that provide feedback to users as to the quality of their chest compressions, this may enable them in their role in life support. Nurse Browne notes an example of this in her clinical practice:

> *But we've purchased a new Zoll defibrillator that helps with those compression rates. It tells you your rate, your depth, recoil, all those things that are essential for a good compression that would influence that to make sure you're doing the best you can at the moment. And if not, get somebody on the job that can do it.*

The availability of AEDs is a facilitator to the role of nurses during in-hospital CPR; however, simply having equipment that provides feedback as to the quality of chest compressions may not be important in the deployment of resuscitation.

Nurse Atkinson, when she completed the survey, mentioned that not having the DNR status of a patient marked on a physical or electronic medical record could lead to nurses hesitating to enact CPR:

> *If a DNR or full code order is not clearly marked in the patient's paper chart or online chart, CPR may be delayed.*

The DNR status of a patient provides an understanding of what level of interventions a patient is to receive upon experiencing a critical event such as cardiac arrest. This advanced directive is a medical order that needs to be followed by health care providers; however, the DNR status of an individual may not be known at the time that a patient requires resuscitation. This uncertainty surrounding a patient's DNR status may be a deterrent for some nurses beginning early CPR and defibrillation because they want to align their actions with the patient's desires as well as the physician's orders. If the DNR status is not known, however, nurses are still required to initiate CPR. This suggests that uncertainty as to the DNR status of a patient would not cause nurses to hesitate when deploying resuscitation skills, as evidenced by Nurse Browne:

> *Absolutely, if they're a full code, you need to start. If you have the patient and it's more of an ethical dilemma of their expressed wishes, it may be documented in the chart if the patient says I don't want anything done, or the families wishes, they want everything done, or as I said you don't know… you don't know what the code status is, so you have to initiate NNO [no new orders]. The new medical learners are starting to ask every patient what's their code status when they come in, when they're admitted. So it's all documented.*

The DNR status may need to be known in order to provide optimal care for a patient, but this may play an insignificant role in regards to hesitation to start CPR. As noted by Nurse Browne, the

ethical aspect involved with a patient's DNR status, however, is important to consider when deciding to enact CPR and defibrillation. Nurse survey respondent #20 supplemented the notion that having an electronic medical record system that clearly indicates the DNR status of a patient would improve response time when administering CPR and defibrillation:

> *We do not have electronic charting so often the nurse has to sift through a chart if unaware of code status.*

Hospital Unit

The hospital unit on which a cardiac arrest occurs influences the propensity of the nurses in that setting of deploying CPR and defibrillation in a timely manner. The location of the event matters because, in general, units care for a specific acuity of patients and this leads to different frequencies of code blue scenarios between these different sections of the hospital. This is supported by the quantitative data (Table 5), which demonstrates through an ANOVA test that variations in hospital unit type impact the frequency with which nurses initiate CPR [$F_{(1)} = 4.423$, $p = 0.041$]. This statistical analysis compared the frequencies of CPR initiation between high acuity hospital units, such as the emergency department and intensive care unit, and units outside of these high acuity floors, such as medicine, dialysis, and rehabilitation. The characteristics of these higher acuity hospital units, in terms of technology and the enhanced experience of the nurses, permits the nurses on these units to be more prepared than nurses on general wards and other units where cardiac arrest does not occur regularly. Nurse Atkinson describes this:

> *What I've been seeing is it depends on where you're responding to the codes. If it's in ICU, because the patients are all cardiac monitored, you know exactly when they go into V-tach or V-fib or whatever, so they know automatically to start doing everything.*

The nurses in an intensive care unit, for example, have the advantage of increased experience as well as having their patients attached to cardiac monitors, which provide an indication of the cardiac rhythms of their patients. Nurses working in high acuity settings have greater exposure to CPR and defibrillation and they may also have more training to prepare for situations in which patients are suffering cardiac arrest. The preparation of nurses for resuscitation, as noted previously, is essential in ensuring the quality of these situations as well as the promptness at which nursing professionals deploy their skills. On units where cardiac arrest is not as common, nurses may be less prepared for CPR and may subsequently be less prompt in the enactment of their skills. Nurse Browne notes an example of this:

> *I know the mental health nurses are terrible. Like I do CPR review with them and they don't do it that often and they're really not sure of what to do because it's something that won't doesn't necessarily occur that often, maybe not in their career.*

Geography

The geographical location of a hospital is important to consider in the context of rapid CPR and defibrillation initiation. Hospitals in urban areas may have greater resources compared to rural or remote hospitals. As a result of having less resources, which may be a lack of a resuscitation team or fewer physicians on-site, nurses may have medical directives that support them in their role as first responders. This advanced medical order allows nurses to perform many, if not all, of the necessary tasks required in life support that fall traditionally outside the scope of practice of these providers. Understanding that they play a vital role in the survival of a patient in cardiac arrest may make these nurses take on more of a leadership role in regards to the rapid enactment of CPR and defibrillation and not simply wait for a physician to arrive. Nurse Dennis speaks to this:

> *No, I would have to say here at our hospital we're very fortunate that our hospital expects us to work to full scope. And anything we can basically do that may be above our scope, usually we have a medical directive. I would say especially in emerge they probably have to do a little bit more because they have the medical directives to do it. Because like I said we're a remote hospital and we're getting busier where there is usually a doctor in emerge all night long. But I can remember sometimes when there was no doctor in the hospital. So we needed the medical directives and stuff in place so that we can do better for the client because we might have to wait 10, 15 minutes for a doctor to get there.*

Summary

At the organizational level, team dynamics, workload, the availability and quality of technology, hospital unit, and geography influence the behaviour of nurses in their deployment of CPR and defibrillation. Team dynamics are important because it is necessary for a nurse to work effectively with their coworkers. There are multiple factors in team dynamics that affect nursing behaviour including leadership, team hierarchy, roles, and communication. The workload of a nurse may detract a nurse from rapidly initiating CPR and defibrillation due to the quantity of tasks limiting their capacity to properly identify and, subsequently, respond to a patient with a declining cardiorespiratory status. The availability and quality of technology, such as automated external defibrillators, enables nurses in their role because it simplifies their work and provides crucial and timely information. The hospital unit on which a cardiac arrest occurs is important to consider because the nurses on higher acuity units are better prepared to enact CPR and defibrillation and these floors often have patients attached to cardiac monitors. Finally, geography is an essential consideration, especially for rural and remote areas, because it affects the availability and access to adequate health human resources.

Macro Level Influences

The macro themes that were identified in this project are legislation and regulation; accountability; as well as economic and financial constraints. The following examines how each of these factors impacts nursing behaviour in the enactment of life support procedures.

Legislation and Regulation

Legislation and regulation include the legal and regulatory components affecting the clinical practice of registered nurses in Ontario. This macro level factor that emerged from the data may enable or restrict nurses in their deployment of life support skills, depending on the subtheme. Legislation and regulation determine the clinical activities that nurses are permitted to perform, define the boundaries of the nursing profession, and provide competencies and standards that nurses must follow. The components of the legislative and regulatory frameworks that may facilitate or limit nurses in their enactment of CPR in Ontario are nursing competencies, practice standards, guidelines from the College of Nurses of Ontario, and the need for physician's orders.

Nursing Competencies

Nurses in Ontario must adhere to a set of competencies in order to gain entry into the profession as well as to continue working in nursing. These competencies are established by the College of Nurses of Ontario (CNO), the regulatory body for nurses in the province and outline important educational and knowledge requirements that nurses must acquire and maintain. Although not explicitly mentioned by the CNO, CPR and proficiency with an automated external defibrillator are basic competencies of nurses because it is expected of these professionals to maintain the desired health status of patients. If nurses do not have the competency to adequately perform CPR, then they must ensure that they complete the necessary training and follow their employer's guidelines for recertification. By incorporating a legal requirement for nurses to be proficient and timely with basic life support, they are encouraged in their role as in-hospital first responders. Nurse Browne supports this:

> *Yeah, that's like what you saw in your registration on a yearly basis, you met those criteria. That CPR is one of those criteria. You feel confident and competent in it. And if not, you need to seek the knowledge to get that except with any skill or competency in nursing, right?*

Practice Standards

Nurses in Ontario are expected to adhere to a set of practice standards. These standards provide a framework for nursing practice and are inherent to the nursing profession. Nurse Browne alludes to the fact that conducting CPR falls under the practice standards for nurses in the province:

> *…a nurse, that's part of our standards of practice and can initiate CPR so we don't need a doctor's order to start CPR unless it's a DNR.*

Nurse Dennis also support the concept that CPR is integral to her job as a nurse and even indicates that, legally, basic life support is to be deployed by nurses:

> *Well, I think it's our professional practice and that's also the law. You're supposed to start CPR and I don't know really another way to answer that, what would prompt the nurse. And we're not talking like advanced, we're talking just basic life, basic CPR. I don't know if I'm answering that right. There is nothing that I could think of that would prompt me more than that is my job. That is what I'm here for, and that's a life.*

The practice standards imply both an ethical and professional obligation for a nurse to provide optimal care in order to maintain a patient's desired health status. This obligation is a fundamental aspect of the nursing profession in general because the intention of this profession is to maintain or enhance the health of patients. One of the practice standards for nursing in Ontario, the Ethics Standard, describes how nurses must feel competent and comfortable providing care, which includes CPR and defibrillation, and to intervene during emergency situations; however, if they are not prepared to provide optimal care, then it is the nurse's responsibility to acquire more training and experience (CNO, 2015). Initiating prompt CPR and defibrillation is an important nursing role. To highlight this, Nurse Browne provides the following statement as to why a nurse would initiate CPR:

> *Because the nurse is the primary care provider, that's why. The doctors and stuff are never there. They're only there for a few minutes, but the nurse is the primary care provider to deal with the patient 24/7.*

College Guidelines

The College of Nurses of Ontario is responsible for regulating the nursing profession and protecting the interests and safety of the public. A number of my participants noted that it does not provide clear guidelines as to the initiation of CPR and defibrillation nor does it outline recommendations for the regularity of training. Nurse Campbell speaks to this:

> *Because we're governed by the College of Nurses, sometimes I think they're [nurses] afraid they're going to get in trouble with the College if they do something without an order. I don't think the college has any clear guidelines on initiation of CPR that I recall anyways. I mean I don't think they tell you, you have to wait for an order but that's just the way they program that they do nothing without an order. And it seems to be a lack of something in their education in university.*

Nurse Campbell perceives that novice nurses may be fearful of initiating CPR because they have been educated to believe that there are negative consequences for performing a task without a physician's order. This has caused nurses to not be prepared to initiate prompt CPR and defibrillation. This lack of preparedness may be solved, at least in part, if the College of Nurses of Ontario provided clear guidelines, as per Nurse Elliot:

> *I think nurses may be more available to step up to the plate. Because the College of Nurses will always say, barring any corporate policies… or your hospital policy, you can or may not do that, that kind of stuff, right? But if they made it an expectation that this is like a solid nursing skill to do, I think there might be less hesitancy as well.*

Nurses may be fearful that they will get into trouble with regulatory body as a result of their actions in a cardiac arrest scenario. They may believe that if they do something wrong or make an incorrect decision that they will incur negative consequences such as being litigated by family members of the patient, potential penalties or retribution from the CNO, or punishment from their manager. Nurse Dennis spoke to this fear of potential consequences that may result from improper actions during resuscitation:

> *Well, I would say one of the consequences, of course would be the trouble with the college or legal liabilities. So if they don't start it the patient because of lack of oxygen is now brain damaged or we can't bring them back, of course there could be legal actions.*

Need for Physician's Orders

The fundamental aspects of CPR and defibrillation are covered by the legislation governing nursing practice; however, nurses may be restricted in some tasks that are required in order to realize the full functioning of their role during resuscitation. One task that requires a physician, or a more highly trained nurse, is interpreting cardiac rhythms on a manual defibrillator and, subsequently, advising the number of Joules with which to shock the patient. Since not all nurses are trained or authorized to use a manual defibrillator, nurses are most likely not able to provide electrical shocks if this type of defibrillator is on their floor. If an automated external defibrillator is available, however, then nurses are able to use it. Nurse Browne describes the difference between the two types of defibrillators:

> *So a defibrillator, you need someone to interpret what you're seeing on the screen. And an AED is automatic that the machine says oh this looks like V-fib or V-tach and advises you to shock. With a defibrillator, you interpret what you see on the screen and act accordingly.*

Accountability

A number of participants noted that there is a lack of accountability in regards to nursing preparation and training for cardiac arrest scenarios. Nurses require regular training or experience to maintain their competence and confidence with the processes and tasks in resuscitation; however, this may not occur. In addition, there do not seem to be clear consequences if nurses do not retrain.

Organizational Responsibility

Organizational responsibility pertains to a nurse's employer ensuring that nurses perform CPR training on a regular basis. Nurses may not consistently update their competency with CPR and defibrillation, which may make these providers less comfortable, competent, and confident

with their skills. Registered nurses working in emergency, acute care, or other areas where patients are more likely to experience cardiac arrest may not need to retrain frequently; however, on hospital units where patients do not require resuscitation as often, regular training is important. Nurse Browne perceives that the health care organization should be responsible and accountable for ensuring that employees are certified in CPR and receive regular training:

> *I think the problem is organizationally, they need to hold the staff accountable for practice, so they need to offer a CPR review for all of their staff. At least on a yearly basis, I know that you have to do you BCLS, but then no outcome that they don't. Beforehand, maybe five or so years ago, you had to show your BLS card along with your registration and now that's gone. So, I could be saying yeah I'm competent but I haven't touched CPR for ten years, right?*

Maintaining regular and up-to-date CPR skills is necessary in ensuring that nurses are able to provide prompt and high-quality resuscitation. Health care institutions may need to take on a more involved role with ensuring that nurses are certified and competent with these skills. Nurse Browne notes that an alarming proportion of nurses do not possess a current basic life support certificate:

> *…it's [BLS] something that everybody should have but they don't. So if you poll nurses in many organizations, actually less than 50 per cent, half, they're BLS current.*

This trend may not be the case at all hospitals, however. Nurse Gabriel describes the policy at one hospital in Ontario that ensures that all nurses at the institution have yearly updating of their CPR proficiency:

> *Our managers are very adamant about enforcing our yearly recerts [recertification]. They're very on the ball in that regard and the hospital actually has a policy. The [hospital] has a policy, if you don't have your recertification done by February you don't work and you don't get paid.*

Lack of Consequences for Not Retraining

Currently, the College of Nurses of Ontario does not hold registered nurses accountable for maintaining their CPR training and there is a lack of consistency across health care organizations in regards to ensuring that nurses have current CPR certification. Due to this lack of accountability, nurses do not necessarily feel that they need to re-update their CPR competency. This had led to many nurses not obtaining up-to-date CPR training and skills, which may be a contributor to nurses hesitating to initiate in-hospital CPR. Nurse Browne speaks to this:

> *I think the problem is organizationally, they need to hold the staff accountable for practice, so they need to offer a CPR review for all of their staff. At least on a yearly basis, I know that you have to do your BCLS, but then no outcome that they don't. Beforehand, maybe*

> *five or so years ago, you had to show your BLS [basic life support] card along with your registration and now that's gone. So, I could be saying yeah I'm competent but I haven't touched CPR for ten years, right?*

In the past, nurses were required to present their basic life support card when they completed their yearly registration with the College of Nurses of Ontario, which proved that they were competent with CPR. This is no longer the process. Nurse Browne describes why this may have changed and how the situation may be improved with better tracking of nurses' certification with CPR:

> *Well I know for here, it went electronic for CNO. You didn't have to show your registration because it was all electronic. It went to the employer. If the… possibly Heart and Stroke or whoever can forward that to the employer and they can forward it to their employer that would be a good thing and to track and to guide it or to give it to their manager or their educator. So it can be tracked as something that needs to be the tough to be potentially a union issue because there's no piece to say no you can't work unless you have your current BLS [basic life support].*

With a better tracking mechanism for nurses' CPR certification, it is likely that there will be greater accountability for this training.

Economic and Financial Constraints

Economic and financial constraints pertain to the lack of funding for the training of nurses. The costs of life support courses, namely advanced cardiac life support or pediatric advanced life support programs, are expensive and require a fair amount of the nurse's time to complete the training. Nurses must incur the costs of these courses, unless their organization is able to cover the fees. Nurse Dennis describes how a lack of funding for these training programs restricts nurses from pursuing this additional education:

> *And I think funding would be one of the other. We do have an Orange paramedic, he's an advanced paramedic. And he is really, really good. And he is the one that comes in and teaches ACLS [advanced cardiac life support], but it's like $800.00 a pop for each person. And so sometimes that funding can be a barrier.*

Nurse Dennis also describes how her hospital may pay for a limited number of nurses to take the course, but since it may require these professionals to train on their days off, nurses may feel that their employer should pay them for this time:

> *We are fortunate, our hospital does pay for a lot of stuff, but sometimes they might only pay for five people. And then there's the 'are you going to pay for me to come there my days off to take this?'*

This lack of financial support for nurses to pursue advanced training with CPR may be particularly important for nurses working in rural or remote regions. In these geographical areas, the costs for these courses may be greater due to the additional costs to bring the educators to these communities. Nurse Atkinson notes an example of this:

> *Well, I think part of the issue is that because we're further up north and people have to travel up and we have to pay for a lot more, like hotel rooms and everything. It is more expensive for us... One of the pediatricians said it's only maybe say $100.00 but because we're paying for so much extra, it's a lot more for us.*

Summary

At the structural level, legislation and regulation, accountability, as well as economic and financial constraints are factors that affect nursing behaviour in the enactment of immediate life support skills. Legislation and regulation pertain to legal or regulatory frameworks limiting the capacity of nurses from effectively engaging in their role as in-hospital first responders. Accountability pertains to organizations, management, or regulatory bodies ensuring that nurses update their basic life support certification regularly. This enables the role of nurses because it is important for nurses to possess current CPR certification in order to provide effective life support. Finally, economic and financial constraints influence the continuing education of nurses with advanced cardiac life support. Nurses do not always have financial support for participating in training courses, and, therefore, may not have the full extent of training that they require.

Discussion

The aim of this research study was to determine the factors that enable or limit registered nurses in Ontario in deploying in-hospital cardiopulmonary resuscitation and defibrillation in a timely manner. This study also aimed to understand how various influences on scopes of practice, identified in the conceptual framework from the Canadian Academy of Health Sciences (CAHS), affected this vital role of nurses. By determining how these contextual factors interplayed with the influences on first-responder nurses' initiative of resuscitation, I intended to contribute to the "Inputs" section of the CAHS model. The findings of this study supported previous research done in health systems outside of Ontario, but there were also new themes that emerged as well as new insights into how the scope of practice of nurses is influenced at the micro, meso, and macro levels. It is the neglect of the meso and macro level influences in the specific literature on nurses' initiative of CPR that this research augments in particular.

Reflections on the Findings in the Literature

At the micro level, training, preparation, and knowledge; experience and self-efficacy; fear and doubt; as well as ethical considerations were identified as affecting nursing behaviour in the deployment of basic life support. Formal and continuing education provide nurses with the

knowledge and skills necessary to resuscitate a patient when they have suffered cardiac arrest. This training is obtained during nursing school as well as in continuing education programs such as basic life support courses. These training exercises may effectively provide nurses with the knowledge and skills they require; however, these providers may not recertify their skills as frequently as would be necessary to maintain proper competence, they may be ill-equipped to apply their skills, and may wrongly self-appraise the quality of their abilities. The necessity of thorough, regular, and effective training and preparation to support nurses in their role as first responders is corroborated by relevant literature (Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Murphy & Fitzsimons, 2004). The literature also notes how it is important for educational programs to address methods to decrease nurses' anxieties and fears of deploying CPR and boost their self-efficacy with the processes because this is a good predictor of their willingness to start timely life support (Crunden, 1991; Nyman & Sihvonen, 2000). The findings of this study support this previous research and emphasize the importance of appropriate continuing education that is performed regularly. Participants in this study described the benefit of having mock code blue scenarios in order to prepare for real-life resuscitations. This training improves the knowledge and skills of nurses and offers a method of providing nurses with experience with conducting CPR and defibrillation.

Previous experience, which was identified in the qualitative interviews and supported by the quantitative data, was also highlighted in the literature. Specifically, previous experience with actually deploying CPR and defibrillation is perceived by nurses as enhancing their abilities in responding rapidly to a patient who is in cardiac arrest. Participants identified hands-on experience as well as mock code blue scenarios, which are imitated experiences, as being methods by which nurses acquire experiential learning for resuscitation events. These experiences provide them with a stronger sense of self-efficacy with enacting their resuscitation skills. Nurses often mentioned that individuals working in high acuity hospital units, such as the emergency department where patients suffer cardiac arrest more frequently, were more prepared to perform immediate life support compared to other areas where nurses had fewer opportunities to deploy CPR and defibrillation. Previous studies contend that the self-confidence of nurses in regards to the prompt initiation of CPR is higher for nurses who deploy their life support skills more often. I employed the term "self-efficacy" to describe the belief of nurses in their ability to perform basic life support, while the relevant literature uses the broader term "self-confidence." According to the *theory of self-efficacy*, the more an individual believes that they are able to carry out an action, the better they will perform that action (Bandura, 1977; Stajkovic & Luthans, 1998).

Previous studies, such as by Mancini and Kaye (1998), detail the benefit of feeling self-confident with CPR initiation. The self-confidence of nurses working is higher in the coronary

care unit, for example, compared to that of nurses working in general units with more stable patients. These authors attributed this higher degree of self-confidence to a more consistent exposure to patients who went into cardiac arrest. Murphy and Fitzsimons (2004) also supported the notion that experience leads to confidence with the enactment of CPR and defibrillation. Dwyer and Williams (2002) attributed self-confidence with CPR initiation to an increased experience with life support processes. These authors attempted to explain nursing behaviour with Ajzen's (1991) *theory of planned behaviour*. One aspect of the theory, perceived control, explains how an individual's ability to engage in an intended behaviour is contingent on their perceived competency with performing a given task. If the individual believes that they are capable of doing a task effectively and they do not perceive the task as being difficult, then they are more likely to behave in line with their intentions. This project did not apply the *theory of planned behaviour* to explain the behaviour of nurses in their enactment of immediate life support, but merely to provide a partial explanation as to how previous experience, self-confidence, and attitudes influence the speed at which nurses deploy CPR and defibrillation.

Self-confidence allows nurses to engage more rapidly in their role as first responders, as supported by multiple studies (Coady, 1999; Dwyer & Williams, 2002; Dwyer, Williams, & Mummery, 2007; Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009; Mäkinen, Castrén, Nurmi, & Niemi-Murola, 2016; Nyman & Sihvonen, 2000; Mancini & Kaye, 1998; Murphy & Fitzsimons, 2004; Wynne et al., 1987). The common theme across the relevant studies that demonstrated the benefit of self-confidence on life support skill deployment was that with more practice and experience, nurses gain confidence with the processes required to resuscitate a patient in cardiac arrest. As noted previously, this finding can be explained by research that demonstrated a strong relationship between self-efficacy—an individual's perception of their ability to behave or act in a certain manner—and performance in work-related processes (Bandura, 1977; Stajkovic & Luthans, 1998). In regards to the enactment of immediate life support, it is recommended that educational programs for CPR focus on ensuring that nurses have a sense of self-efficacy with their skills with defibrillators (Mäkinen, Niemi-Murola, Kaila, & Castrén, 2009). One method of increasing self-efficacy is by holding regular mock code blue scenarios on a hospital unit in order to provide nurses with experiential learning. Mock code blue scenarios followed by a debriefing session help to enhance nurses' performance during resuscitation, as supported by previous research (Delac, Blazier, Daniel, & N-Wilfong, 2013).

Fear and doubt were two interrelated factors mentioned by nurses during the individual interviews. Fear and doubt play integral roles in shaping the attitudes and beliefs of nurses related to the deployment of life support. The fear of nurses originates from a variety of sources, including the fear of harming the patient, for example. This fear was noted in previous studies (Dwyer, Williams, & Mummery, 2007; Heng, Fong, Wee, & Anantharaman, 2011; Mäkinen, Niemi-Murola, Kaila, and Castrén, 2009). Doubt is another factor that emerged in the qualitative

interviews. Doubt on the part of nurses as to whether or not a patient is in cardiac arrest can deter nurses from enacting their skills with CPR and defibrillation. The lack of competence and skill retention of nurses has been noted in previous studies and this may lead to doubt. For example, in a study by Ochoa and colleagues (1998), nurses and doctors from the intensive care unit and emergency department were tested on their abilities to locate and assess the carotid pulse. The absence of a carotid pulse is indicative of cardiac arrest and if a nurse is not certain if they are detecting a pulse, this may delay the prompt deployment of CPR. It was discerned that the health care professionals could not detect the pulse rapidly. Uncertainty surrounding DNR status may also cause CPR to be postponed. A DNR order partially restricts or completely inhibits a nurse, or another health care provider, from applying basic or advanced cardiac life support (Lachman, 2010). Although the default is to start CPR if the DNR status is not known or has not been decided upon by the patient or the patient's family, it is important for nurses in their decision to initiate immediate life support (Lachman, 2010; Purvis et al., 1998). The lack of clarity, possibly due to patients or families not deciding on DNR status or the difficulty for health care professionals to discuss these types of orders with patients (Löfmark & Nilstun, 1997), can delay treatment if the nurse suspects that a DNR order should be present, but is not able to confirm this quickly. If the patient does not have a DNR order in place, then the nurse is required to enact CPR based on professional and moral obligations.

Ethical considerations emerged as an important theme in determining the likelihood of a nurse deploying rapid basic life support. In the context of CPR initiation, a patient may warrant life support, but based on the patient's condition, age, or both, the nurse may feel that it is unethical to have the patient go through the trauma of resuscitation or feels that it is the moral decision to not continue with life support measures. The influence of nurses' concerns for the patient's welfare on their behaviour has been noted in previous research (Kelner & Bourgeault, 1993) and may emerge when patients or their families are indecisive with end-of-life processes. The influence of family members is important in the ethics of CPR initiation for those that are elderly, very sick, or have a mental incapacity. There may be a mismatch between the desires of the patient and those of the family, which can lead to uncertainties when the decision to enact CPR and defibrillation arises. The importance for nurses, and other health care professionals, to discuss end-of-life decisions with patients and their families in order for the health care team to match their interventions, or lack thereof, with the wishes of the patient and the family has been noted by a number of studies (Adams, Bailey, Anderson, & Docherty, 2011; Hayes, 2012; Kelner & Bourgeault, 1993). Having a clear understanding of what should occur in the event that the patient suffers cardiac arrest will allow nurses to deploy their resuscitation skills in a timelier manner, if that is the desire of the patient, or will reduce uncertainty as to what actions to take.

At the meso level, team dynamics, workload, availability and quality of technology, hospital unit, and geography were factors that affected nursing behaviour in the initiation of

resuscitation. This study identified a number of subthemes that fall under the "team dynamics" category including leadership, team hierarchy, roles, as well as communication. Collaboration is an important aspect in team dynamics; however it was not included because it may be irrelevant when considering the prompt deployment of life support procedures by nurses. The effect of collaboration on CPR skill enactment requires further research. The scales on collaborative work as well as interprofessional conflict, a related theme, did not yield statistically significant correlations in relation to the initiation of CPR (Table 4). It is possible that the power was not great enough to produce statistically relevant data for these two scales. In future research projects, the factors of collaborative work and interprofessional conflict could be explored further with a larger sample size.

Leadership is essential in health care teams and the leadership and presence of senior nursing staff or physicians may enable nurses to deploy defibrillation more rapidly, as evidenced by a number of previous studies (Coady, 1999; Crunden, 1991; Dwyer, Williams, & Mummery, 2007; Hunziker et al., 2011; Meerabeau & Page, 1999; Murphy & Fitzsimons, 2004). Senior nursing staff are more experienced with deploying CPR and defibrillation and are more likely to have initiated CPR compared to novice nurses. Senior staff can provide guidance and support to novice nurses so that these less experienced individuals feel comfortable in deploying resuscitation in a timely manner. The leadership of physicians is also important. The presence of medical professionals at a resuscitation can improve the confidence of nurses in deploying their resuscitation skills. Previous studies have noted that nurses are especially empowered by the presence of physicians in their capacity to initiate defibrillation (Coady, 1999; Hunziker et al., 2011; Murphy & Fitzsimons, 2004).

Team hierarchy, which is acknowledged in the CAHS conceptual framework, influences team dynamics and may limit the role of nurses in resuscitation because nurses may perceive resuscitation as a designated role of physicians (Hunziker et al., 2011). Previous studies have shown that nurses may feel that they must take on a smaller role in CPR initiation and this may deter them from being prompt with enacting their basic life support skills (Coady, 1999; Crunden, 1991; Dwyer, Williams, & Mummery, 2007; Hunziker et al., 2011; Meerabeau & Page, 1999; Murphy & Fitzsimons, 2004). A team hierarchy was not always perceived by the interviewed nurses to be a limiting factor to their role as in-hospital first responders. Hierarchies may allow for team members' roles and responsibilities to be clearer and for a more rapid identification of the leader of the resuscitation.

Role clarity was another factor identified in the qualitative interviews. This factor was not explicitly mentioned in the literature and, in the context of this study, may not be relevant because it appears to be more important for the procedures after the initiation of life support. Quantitatively, there were no statistically significant associations between the number of CPR initiations and role clarity, nor was there one between the number of CPR initiations and role

ambiguity. There was, however, a negative correlation between the number of CPR initiations and role overload. This indicated that the more a nurse initiates CPR, the less they feel overloaded in their workload.

Communication facilitates the effective coordination of a resuscitation scenario. Proper communication encourages a high quality team atmosphere in which information is exchanged in a timely and effective manner, but it may have little influence on the willingness of nurse to deploy their resuscitation skills. Despite the importance of communication during the time after life support has been initiated, it is difficult to ascertain if this subtheme plays largely into the initial decision of nurses to deploy prompt resuscitation.

A heavy workload can limit nurses' capacities to promptly apply CPR and defibrillation because they may miss that a patient has warning signs of cardiac arrest. This theme emerged from the qualitative data and may warrant being added to the CAHS conceptual framework. When a nurse has too much work to do in too little time, then it is unlikely that they will be able to work to their optimal scope. This includes engaging effectively and quickly in their role as in-hospital first responders.

The availability and quality of technology, specifically cardiac monitors, automated external defibrillators, and electronic medical record systems were identified as being relevant to the prompt initiation of CPR and defibrillation. Cardiac monitors permit nurses to identify the declining health status of a patient more rapidly because this technology shows the cardiac rhythms of these individuals. By having access to this type of device, nurses are better able to assess, and, subsequently, intervene if a patient suffers cardiac arrest. The availability of AEDs encourages a prompter deployment of defibrillation because these devices simplify the process and eliminate certain tasks that are required with manual defibrillators, such as recognizing cardiac rhythms and determining the value of the electrical shock to deliver. Multiple studies support the need to have AEDs available to nurses outside of high acuity areas of the hospital (Coady, 1999; Finn, 1996; Kaye et al., 1995; Kenward, Castle, & Hodgetts, 2002; Mancini & Kaye, 1998; Murphy & Fitzsimons, 2004; O'Higgins, Ward, & Nolan, 2001; Soar & McKay, 1998; Warwick, Mackie, & Spencer, 1995). Finally, electronic medical record systems may make it easier for nurses to know the DNR status of patients. Knowing this information quickly will aid nurses in their decision as to whether or not life support procedures should be initiated.

The type of hospital unit on which cardiac arrest occurs is an important factor determining how prompt nurses deploy their resuscitation knowledge and skills. This is largely related to the fact that hospital units have varying frequencies at which patients suffer cardiac arrest and this leads to nurses on these floors having more experience with these types of crises as well as technology being implemented that facilitate a more quick assessment of these patients. For example, in a high acuity unit such as the intensive care unit, patients may be attached to a

cardiac monitor, which allows nurses to have a constant reading of patients' cardiac rhythms. If the rhythm changes and becomes a clinical concern, then nurses are able to respond more quickly compared to other units, such as general wards, where the heart rhythms of patients are not continuously monitored. Supplementary to this is the increased experience and training of the nurses on these units. Nurses working in areas where the patients are sicker may have improved experience delivering chest compressions and providing defibrillation because they witness and participate in cardiac arrest scenarios frequently. In addition, these nurses have more thorough continuing education, such as certification with advanced cardiac life support. The hospital unit theme emerged from the data but it is difficult to tease apart from the more micro level influence of experience, which is noted in previous studies (Dwyer & Williams, 2002; Mancini & Kaye, 1998; Murphy & Fitzsimons, 2004). Understanding the acuity of patients as well as the characteristics of different units may enable a better comprehension of how to develop a care model that ideally suits a specific area of a hospital.

The geography or physical location of a health care institution is another important factor to consider both for the initiation of life support by nurses as well as the optimization of nurses' scope of practice. Geography is an input in the CAHS conceptual model and impacts accessibility and the availability of resources (Nelson et al., 2014), specifically for rural or remote regions. Rural or remote regions may be underserviced or lack health human resources that urban hospitals possess. The deployment of resuscitation by nurses in rural or remote regions may be affected because of a lack of physicians or in-hospital emergency resuscitation teams. This may influence the behaviour of nurses either positively or negatively. Some nurses may rely on the support and leadership of physicians or emergency resuscitation teams to provide adequate CPR and may hesitate to promptly enact skills, such as defibrillation, as a result. In contrast, the lack of doctors or resuscitation teams may facilitate nurses performing CPR and defibrillation because they are obligated to assume full responsibility for the code situation.

At the macro level, legislation and regulation; accountability; and economic and financial constraints were prominent influences on nursing behaviour in the enactment of immediate life support. Legislation and regulation were enabling elements because the College of Nurses of Ontario (CNO) outlines competencies and practice standards that nurses must adhere to. By following these competencies and practice standards, nurses may be more likely to seek out the proper training and knowledge in order to promptly apply CPR and defibrillation when they are confronted with a cardiac arrest scenario. The CNO does not provide adequate guidelines for CPR initiation, however. A number of my participants noted this in the individual interviews. Participants also noted that the CNO does not provide recommendations for the regularity of training (College of Nurses of Ontario, 2014b). The need for physician's orders for certain aspects of life support may be another deterrent for nurses in Ontario to deploying rapid defibrillation. This factor is relevant in the context of defibrillation because if nurses only have access to a

manual defibrillator, then they require a physician or a nurse with an advanced certification in order to recognize the cardiac rhythm of a patient and, subsequently, deliver the proper number of Joules for the shocks. Few studies have looked at these broader contextual elements.

Accountability was the second macro theme that emerged from the qualitative interview data. Accountability is acknowledged in the CAHS conceptual framework and is mentioned as a manner of ensuring quality care as well as safety and provider performance. Organizational responsibility, which pertains to a health care institution ensuring that nurses have up-to-date CPR certification, is an enabler to the role of nurses as in-hospital first responders. Nurses may not acquire frequent training and if there are no consequences for not conducting regular training, then it is unlikely that these professionals will maintain their competency with CPR and defibrillation.

Economic and financial constraints was the third and final macro theme that emerged from the interview data. This theme was mentioned in the CAHS conceptual model and related to funding mechanisms as well as a lack of financing for health human resources in Canada. This theme is important for this study because nurses may have to incur significant costs for participating in certain life support courses, such as ACLS. A lack of funding for these initiatives may lead to a lack of preparedness on the part of nurses for the delivery of immediate life support interventions because they are not able to afford the expensive courses.

Key Contributions and Recommendations

From a health systems perspective, the initiation of immediate life support is facilitated through the enhancement of health human resources in Ontario. In order for nurses to deliver effective, safe, and high quality care, they must be supported through contextual elements. The behaviour of these professionals may be impacted by individual level factors, such as education, experience, self-efficacy, fear, doubt, and ethical dilemmas, but these are difficult to change without implementing modifications to the systems in general. These modifications need to include changes to practice, education, and policies.

This study offers insight into the contextual factors that affect the behaviour of nurses in their application of CPR and defibrillation. These contextual factors were missing from the previous literature on the topic and this study sought to explore these aspects of nursing behaviour in the enactment of immediate life support. Workload, variations in hospital unit types, geography, legislation and regulation, accountability, as well as economic and financial constraints were new findings in relation to the research topic. These contextual and organizational factors affect the optimization of the scope of practice of nurses and influence the effectiveness of these providers. A heavy workload, possibly linked to a lack of an adequate number of nursing professionals, restricts a nurse in their capacity to work to their optimal scope of practice as well as to promptly identify the declining health status of a patient. This supports

the need to ensure that hospitals have a sufficient number of nurses so that these professionals are able to complete all necessary tasks in a timely manner, including the early identification of the signs and symptoms of potential cardiac arrest. The rates for cardiac arrest vary between hospital unit types and although this finding may not be completely a new contribution to the literature, it is important to emphasize because certain measures need to be put in place to assist the nurses working in areas that do not have a high rate of cardiac arrest. The findings of this study suggest that all hospital units outside of high acuity settings should hold regular continuing educational exercises, such mock code blue scenarios, to familiarize nurses with the processes and provide them with the education, experience, and self-efficacy they require to enact their skills. In addition, these lower acuity floors should also have automated external defibrillators available, considering the impact this technology has on simplifying nurses' work in resuscitation scenarios. If this is not feasible, then all nurses in Ontario should have the additional education and certification to complete the tasks required for manual defibrillation. The geographical location of a hospital is another key contribution of this study. Future initiatives must focus on devising care models in rural and remote regions that mitigate the lack of adequate health human resources that may affect patient care in these parts of Ontario. The findings from this study also suggest that the regulatory body for nurses, the College of Nurses of Ontario, should provide more thorough guidelines as to the training requirements for these providers. The findings also support the need for health care institutions to have greater accountability for the recertification of nurses' CPR and defibrillation training. This may be accomplished through improved tracking mechanisms, possibly through enhanced administrative processes at hospitals. Finally, there needs to be more funding for nurses to take advanced cardiac life support and pediatric advanced life support courses, especially for nurses working in rural or remote regions where, arguably, this additional training may be more important considering the possible lack of physicians and code teams.

Augmentation of the CAHS Conceptual Model

This project identified factors that were already integrated into the conceptual framework from the Canadian Academy of Health Sciences (Nelson et al., 2014) as well as new themes that can be added to this evolving model. This project builds on the CAHS conceptual framework because it adds evidence to support the inclusion of a number of the micro, meso, and macro level factors currently presented in the model, it supports the addition of new findings into the model, and it provides impetus for modifying the structuring of the "Inputs" section of the model. At the micro level, this project identified factors that impact the optimal scope of practice of health professionals in Canada including degree of hierarchy and communication; however, these are discussed in the meso section. The micro level themes that emerged from the qualitative data do not warrant being added to the CAHS conceptual framework because these are largely occurring at the individual and psychological level. As I mentioned in the previous

section, it is more important to address the factors at the contextual level, namely meso and macro factors.

This study has a number of implications for the meso level of the CAHS model. I recommend dividing the meso section into two levels. The first level could be labeled as the "team/crew" level and the second level could be called "institutional level" above that, but below the macro/structural inputs. These two levels are similar; however, the team/crew level can vary due to the fact that members in these teams may change on a day-to-day basis and are subject to variations based on the individual characteristics of the professionals working in these groups. The institutional level, however, has a more consistent structure and is affected to a larger degree by macro and structural influences. All the meso level themes identified in this project, which include team dynamics, workload, geography, the availability and quality of technology, and hospital unit type, relate to the CAHS conceptual framework.

Team dynamics, which includes the relevant subthemes of team hierarchy, roles, and communication, is important addition to the CAHS model. This theme can potentially be combined with the "team composition" input from the micro level; however, as I've outlined above, this theme would be moved to a higher level, which I would label as the "team/crew" level. Communication and team hierarchy are themes already present in the CAHS conceptual framework and this study provides evidence as to the relevance of these factors. For example, the "roles" subtheme, which is not explicitly mentioned in the CAHS model, but is related to the team hierarchy subtheme, provides evidence as to the potential benefit of having hierarchies in a clinical setting. One of the findings of this study is that role clarity can be improved when members of the health care team have varying statuses in terms of authority. Participants in this study, both in the open-ended questions of the survey and in the individual interviews, mentioned that having a professional designated to control and guide a resuscitation is beneficial to the quality of the cardiac arrest scenario. Nurses mentioned that this clarified team members' roles and allowed for a prompter deployment of life support measures and greater coherence in the team's resuscitation efforts.

Workload and geography, although reported as separate themes, pertain largely to a lack of adequate health human resources in the Ontario health care system. Workload, which is not currently integrated into the CAHS model, may be added to the framework. Nurses in the individual interviews described how they perceived that having too much work to do in too little time may limit nurses from promptly identifying the early warning signs of cardiac arrest and, as a result, not being able to enact early CPR and defibrillation. A heavy workload detracts from nurses' abilities to work to their optimal scope of practice because it is possible that they do not have sufficient time to perform extra, albeit equally important, tasks that are truly focused on the patient wellbeing. The related theme of geography, which is included in the CAHS model, pertains to the decreased accessibility to health care services in rural and remote regions of

Canada. This study adds evidence to the relevance of this theme because there is a lack of physicians and in-hospital cardiac arrest teams in the rural and remote regions of Ontario. According to the interviewed nurses, a lack of these health human resources may negatively affect the outcomes of patients in these regions of the province and limit the optimization of nurses' scope of practice because this increases nurses' workloads. The themes of workload and geography both tie into the meso theme of "provider supply and retention" and provide impetus for organizations to maintain an adequate supply of nurses to ensure that the health needs of patients are met.

The meso level theme identified in this study, "availability and quality of technology", is akin to the "technology form and content" input included in the CAHS conceptual framework. This finding provides support for the inclusion of this theme in the model because it demonstrates the importance of electronic medical records, cardiac monitors, and the availability of AEDs. These technological components in health care aid in the optimization of nurses' scope of practice. Electronic medical records allow for a quicker method of identifying patients' DNR statuses, cardiac monitors offer a continuous reading of patients' cardiac rhythms and, as a result, a prompter identification and initiation of basic or advanced cardiac life support measures, and the availability of AEDs allows nurses to provide defibrillation without the presence of a physician or a nurse with advanced certification.

The hospital unit type, which is not integrated into the CAHS model, is a factor that may be added to the meso level because different areas in the hospital require varying care models that support the optimization of health care providers' scope of practice in that specific setting. This may be an important addition the conceptual framework because innovative care models need to be tailored to the patient acuity on a hospital unit, the structure of the unit, as well as the associated work processes of health care professionals in that environment.

The conceptual model can also be augmented by expanding the macro level factors of legislation and regulation, accountability, and economic context. Modifications to current legislation and regulation can contribute to the optimization of nurses' scope of practice in Ontario. Currently, nurses who do not have advanced certification with manual defibrillation require a physician to read the cardiac rhythm of a patient and advise the number of Joules with which to shock a patient. Defibrillation may be delayed if only the manual variety is available and if a physician is not present when a patient suffers cardiac arrest. One of my recommendations is to have AEDs available in all hospital units outside of high acuity areas; however, this may not necessarily be possible. The scope of practice of all nurses may benefit from being expanded to include cardiac rhythm interpretation as well as the ability to advise the shock value with which to manually defibrillate a patient in cardiac arrest. The regulation of the nursing profession in Ontario can also be modified. The regulatory body for Ontario nurses does not, at this time, provide guidelines for CPR training. By outlining clearer guidelines for CPR training and the

initiation of basic life support, nurses' scope of practice in regards to the deployment of CPR and defibrillation can be optimized.

This project identified the macro level theme of "accountability" in terms of implementing tracking mechanisms for nurses' CPR certification. Ensuring that nurses are updating their CPR training on a regular basis is important for maintaining high quality health care. This theme is included in the conceptual model and the findings in this study provide further support for this factor. I included "accountability" at the macro level rather than the meso level, where it is currently situated in the model. I recommend moving this theme to the macro level or, alternatively, to an "institutional" level as per my recommendation that the meso level be split into two parts.

Finally, this project provides evidence as to the importance of economic context in the development of optimal scope of practice arrangements. Economic context is incorporated into the conceptual framework and this study determined that adequate funding is required for nurses to work to their optimal scope of practice. Nurses described how a lack of funding for advanced training with life support limited these providers' abilities to acquire additional skills for resuscitation. Nurses may have to pay for the expensive ACLS courses and this may deter some nurses from obtaining further training. If this extra training was paid for by the government or nurses' employers, then it is possible that these professionals would be more prepared to enact CPR and defibrillation and, therefore, provide better care to patients.

Achieving Validity

I employed two strategies, as outlined by Creswell (2013), to test the validity of my data: triangulation and supervisor review. The first strategy, triangulation, was completed by utilizing two different methods of data collection and analysis. These different data sources, which included a survey that gathered quantitative and qualitative data as well as interviews, were intended to ensure that the data were valid. A variety of data sources offer different views of the research problem. In addition, employing both qualitative and quantitative research methods may mitigate the limitations of each method (Remler & Van Ryzin, 2015). It was a challenge in this study to determine if the quantitative data truly complemented the qualitative findings because the small sample size made it difficult to assess the psychometric properties of the scales used in the survey. The second strategy to strengthen the validity of the study, supervisor review, consisted of my research supervisors checking and evaluating my methods, data, and interpretations (Lincoln & Guba, 1985). This helped to ensure that my study remained focused and that my interpretations were relevant.

Summary of Biases, Limitations, and Directions for Future Research

As a researcher employing grounded theory analysis, it is important for me to acknowledge my potential biases and assumptions. I am a registered nurse in Ontario and, therefore, I have

both an insider and outsider perspective of the research problem. I have first-hand experience with the problem and this led me to developing my research question as well as determining the methodology with which I collected and analyzed data. During my clinical training, I witnessed two events in which nurses hesitated to apply CPR and I found these situations to be chaotic, confusing, and not very coordinated. I became interested in this topic, as a result, and decided to explore this issue. This prior experience and understanding of the topic impacted the interview guide that I created and determined how I interacted with participants. Due to my previous knowledge from experience and reading relevant literature, I asked follow-up questions that I perceived as relevant. In addition, I added and reworded questions based on information acquired in previous interviews. Although my interpretations guided these changes, the goal of this process was to fill gaps in my data. This process is part of grounded theory analysis (Charmaz, 2006) because the codes developed during data analysis often change with the collection of more information. It is important to determine gaps in the dataset and to focus in on these gaps during interviews because this allows for a more complete understanding of the issue.

There are some limitations to this study that must be noted. The quantitative data from the survey did not demonstrate a relationship between the number of times that a nurse initiated CPR and collaborative work or interprofessional conflict. This might be due to the insufficient number of participants for the quantitative survey. The two factors—collaborative work and interprofessional conflict—may be important during the actual resuscitation, but may be irrelevant when considering the prompt deployment of life support procedures. Future quantitative studies in this research area may need to have a larger number of participants for analyses. The qualitative portion of the study also had limitations. I initially aimed to have between twelve and sixteen individual interviews; however, I was only able to recruit eight participants. Fortunately, I reached data saturation by the fifth interview and felt confident that there would be no further themes emerging in future interviews. The three subsequent interviews did not yield new data, but simply provided more data to support the themes I had already established. It is important to note that although the qualitative findings are representative of the participants' perspectives, these understandings may not necessarily incorporate all possible views of nurses working in Ontario. This is an inherent flaw in qualitative research. Future studies may need to replicate this project, and include a more thorough quantitative component, to determine if the perspectives of the nurses in this study are representative of all nurses in Ontario.

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Appendices

Appendix A: Online Survey

Preamble: The survey is intended to gather data on demographics, scope of practice, and teamwork factors. The goal of the study is to understand what impacts a nurse in the decision to initiate in-hospital CPR on a patient in cardiac arrest and evaluating these aspects are important. This survey is also intended to screen for participants for a follow-up individual interview. Prior to completing the survey or participating in the interview; however, the participants will need to go through the first screen, which is the consent form.

Demographic Information

1. What area of nursing do you currently work in? Please specify: _____
2. What do you identify as your gender?
   - Female
   - Male
   - You don't have an option that applies to me. I identify as (please specify) _____.
3. What is your age? _____.
4. How long have you been working in your profession? _____years ____months
5. How long have you been working at your present job? _____years ____months
6. Have you ever independently initiated in-hospital CPR on a patient? ____Yes ____ No
7. How many resuscitation scenarios did you witness or participate in the last 12 months? _____
8. How many times have you initiated CPR in-hospital? _____
9. What type of hospital do you work in?

Community_____.

Teaching_____.

Other_____.

Scope of Practice Information

10. Do you regard the initiation of CPR to be within nurses' scope of practice?
    In general? ___yes ___no

In your hospital? ___yes ___no
If there is a discrepancy, please indicate why.

11. What do you believe are the good or bad consequences (i.e. impact) of initiating CPR?

12. What do you believe are the consequences of NOT initiating CPR?

13. Please discuss the extent to which you feel prepared (or not) to initiate CPR; Explain why.

14. How comfortable are you with initiating CPR? Explain why.

15. How would you describe the culture of your hospital?

Shared values, norms, practices regarding the use of evidence-based practice?

Shared values, norms, practices regarding support of nursing staff input and leadership?

Shared values, norms, practices regarding professional hierarchies?

16. You just mentioned the following cultural characteristics of your hospital in three broad categories: use of evidence-based practice; support of nursing staff input and leadership; and professional hierarchies. How do you think these cultural characteristics impact a nurse's decision to initiate CPR? Explain why.

17. Describe how communication between nurses (whether it is effective or ineffective) impacts a nurse's decision to initiate CPR.

18. Describe how communication between nurses and physicians (whether it is ineffective or effective) impacts a nurse's decision to initiate CPR.

19. Describe how communication systems or technology in the hospital (whether it is ineffective or effective) impacts a nurse's decision to initiate CPR.

Teamwork Factors

20. Informational role self-efficacy scale

We all have special training and knowledge that have the potential to contribute to teamwork. The following list of statements describes activities that relate to your expertise. Assess how confident you are in your ability to perform these activities by associating each activity with any number between 0 % and 100 % using the following scale:

0 %	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
I cannot do this activity				I am moderately certain I can do this						I am entirely certain I can do this activity

activity

1.	Build on my area of expertise to enrich team discussions	%
2.	Improve teamwork by interventions that showcase my professional expertise	%
3.	Clarify the nature of my professional expertise with team members	%
4.	Advise team members by integrating the specifics of my area of expertise	%
5.	Show the contribution of my area of expertise when the team needs to solve a problem	%

21. Participation in decision making

	Totally disagree	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Totally agree
1. As a member of my team, I have a real say in how the team carries out its work.	○	○	○	○	○	○	○
2. Most members of my team get a chance to participate in decision making.	○	○	○	○	○	○	○
3. My team is designed to let everyone participate in decision making.	○	○	○	○	○	○	○

22. Shared leadership

In general, how often do team members share in…

	Never	Rarely	Occasionally	Relatively often	Often	Very often	Always
1. ...planning how the work gets done.	○	○	○	○	○	○	○
2. ...allocating resources according to team's priorities.	○	○	○	○	○	○	○
3. ...setting our team's goals	○	○	○	○	○	○	○
4. ...organizing tasks so that work flows more smoothly.	○	○	○	○	○	○	○
5. ...deciding how to go about our team's work.	○	○	○	○	○	○	○

	Never	Rarely	Occasionally	Relatively often	Often	Very often	Always
6. ...providing helpful input about team's work plans.	○	○	○	○	○	○	○
7. ...deciding on best course of action when problems arise.	○	○	○	○	○	○	○
8. ...diagnosing problems quickly.	○	○	○	○	○	○	○
9. ...using our team's combined expertise to solve problems	○	○	○	○	○	○	○
10. ...finding solutions to problems affecting team performance.	○	○	○	○	○	○	○
11. ...identifying problems before they arise.	○	○	○	○	○	○	○
12. ...developing solutions to problems.	○	○	○	○	○	○	○
13. ...solving problems as they arise.	○	○	○	○	○	○	○
14. ...providing support to team members who need help.	○	○	○	○	○	○	○
15. ...showing patience toward other team members.	○	○	○	○	○	○	○
16. ...encouraging other team members when they're upset.	○	○	○	○	○	○	○
17. ...listening to complaints and problems of team members.	○	○	○	○	○	○	○
18. ...fostering a cohesive team atmosphere.	○	○	○	○	○	○	○
19. ...treating each other with courtesy.	○	○	○	○	○	○	○
20. ...exchanging career-related advice among our team.	○	○	○	○	○	○	○
21. ...helping to develop each other's skills.	○	○	○	○	○	○	○
22. ...learning skills from all other team members.	○	○	○	○	○	○	○
23. ...being positive role models to new members of the team.	○	○	○	○	○	○	○
24. ...instructing poor performers on how to improve.	○	○	○	○	○	○	○
25. ...helping out when a team member is learning a new skill	○	○	○	○	○	○	○

23. Collaborative work

Think of the last time you initiated CPR with others. Explain the extent to which this group collaborated.

	Never	Rarely	Occasionally	Relatively often	Often	Very often	Always
1. … we provided each other with useful information that makes our work progress	○	○	○	○	○	○	○
2. … we shared knowledge that promotes the progression of our work	○	○	○	○	○	○	○
3. … we understood each other when we talked about the work to be done	○	○	○	○	○	○	○
4. …we shared resources that helped perform the tasks	○	○	○	○	○	○	○
5. …we communicated our ideas to each other about the work to be done	○	○	○	○	○	○	○
6. … we carried out our tasks at the appropriate moment	○	○	○	○	○	○	○
7. …we made sure our tasks were completed on time	○	○	○	○	○	○	○
8. … we make adjustments in order to get things done before it was too late	○	○	○	○	○	○	○
9. … we made progress reports (e.g. verbally to each other)	○	○	○	○	○	○	○
10. … we exchanged information on 'who does what'	○	○	○	○	○	○	○
11. …we discussed time constraints with each other (e.g. contingencies, deadlines)	○	○	○	○	○	○	○
12. …we foresaw each others' needs without having to express them	○	○	○	○	○	○	○
13. …we instinctively reorganised our tasks when changes were required	○	○	○	○	○	○	○
14. … we had an implicit understanding of the assigned tasks	○	○	○	○	○	○	○

24. Role overload

When it comes to my roles and responsibilities on this team …

	Totally disagree	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Totally agree
1. ... it often seems like I have too much work for one person to do	○	○	○	○	○	○	○
2. ... the expectations for what I should do are too high	○	○	○	○	○	○	○
3. ...I feel that I have taken on too much	○	○	○	○	○	○	○

25. Role ambiguity

	Totally disagree	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Totally agree
1. My responsibilities are clearly defined	○	○	○	○	○	○	○
2. I have clear planned goals and objectives	○	○	○	○	○	○	○
3. I know exactly what is expected of me	○	○	○	○	○	○	○

26. Role clarity

	Totally disagree	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Totally agree
1. I am often asked to do things that are against my better judgment	○	○	○	○	○	○	○
2. I receive incompatible requests from two or more people	○	○	○	○	○	○	○
3. I have to do things that should be done differently under different conditions	○	○	○	○	○	○	○

27. Interprofessional conflict

In my workplace...

	Totally disagree	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Totally agree
1. ... there is a high level of competition between members of different disciplines or professions	○	○	○	○	○	○	○

	Totally disagree	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Totally agree
2. … interdisciplinary collaboration is often viewed as involving winners and losers	○	○	○	○	○	○	○
3. … there are frequent conflicts over the division of responsibilities between members of different disciplines or professions	○	○	○	○	○	○	○
4. … there are inconsistencies regarding the objectives pursued by the members of different disciplines or professions	○	○	○	○	○	○	○
5. … goals of members of certain disciplines or professions conflict with the mission of the team	○	○	○	○	○	○	○
6. … conflicts between members from different disciplines regarding the sharing of responsibilities are not solved easily	○	○	○	○	○	○	○
7. … there are always members who are dissatisfied with decisions made by the group	○	○	○	○	○	○	○
8. … affiliation of members to their disciplinary or professional group harms collaborative work	○	○	○	○	○	○	○

28. Is there any more information you would like to add? Please elaborate.

29. Would you be interested in participating in a follow-up individual interview? If so, please fill out your email address below. Please note: not all participants will be selected for a follow-up interview. You will be informed by email if you have been selected for an interview.

Email address: _____.

30. If you are interested in participating in a follow-up interview and have filled out your email address in question 29, please enter the first three digits of your postal code and the final four digits of your phone number so that your responses to this survey and your responses in the interview can be linked.

First 3 digits of postal code_____.

Final 4 digits of phone number_____.

Appendix B: Interview Protocol

The purpose of this study is to understand what influences a nurse's decision to start CPR on a patient in cardiac arrest before a physician or emergency resuscitation team attends to the patient. The interview will consist of six sections. I will start the interview by asking you questions about your nursing background.

Nursing Background

1. What areas of nursing have you worked in?
2. How did the variations in nursing areas influence how often patients went into cardiac arrest?

Background Preparation

I'm now going to ask you questions about your training and background preparation for CPR.

3. What type of training have you received to prepare for CPR scenarios?
4. What is your opinion on the quality of your preparedness for CPR scenarios?
5. What is your opinion on the quality of other nurses' preparedness for CPR scenarios?
    - I added this question for the second interview and asked it in all subsequent interviews. My rationale for adding this question was to understand nurses' perceptions of other nurses' preparation for CPR. I suspected that there would be a difference between the self-perceived competence and the perception of others' competence.
6. What do you think is the role of in-hospital first-responder nurses?

Experience with CPR

I'm now going to ask you questions about your experiences with CPR.

7. Typically, how many times do you witness a cardiac arrest scenario in a six month period?
8. Typically, how many times do you initiate CPR in a six month period?
    - I removed this question for the fifth interview. The following question, in conjunction with the previous question, allowed me to obtain the information I required. This question seemed to be redundant when I asked it in previous interviews.
9. What percentage of the time did you or a fellow nurse initiate CPR when you were the first responder to a patient in cardiac arrest in the past six months?
10. A) What actions have you taken when you were the first responder to a situation where a patient was in cardiac arrest or had a declining cardiopulmonary status?

If the nurse has not been the first responder to a cardiac arrest situation, ask the following question: What have you witnessed other nurses doing when they were the first responder to a situation where a patient was in cardiac arrest or had a declining cardiopulmonary status?

B) Can you describe an experience where you initiated CPR before a physician or emergency resuscitation team attended to the patient?

If the nurse has not initiated CPR before a physician or emergency resuscitation team attended to the patient in cardiac arrest or has not been a first-responder nurse, ask the following question: Can you describe an experience where you witnessed a nurse initiating CPR before a physician or emergency resuscitation team attended to the patient?

C) Can you describe an experience where you hesitated to initiate CPR before a physician or emergency resuscitation team attended to the patient?

If the nurse has not been a first responder to a cardiac arrest situation, ask the following question: Can you describe an experience where you witnessed a nurse being the first responder to a cardiac arrest situation and they hesitated to initiate CPR?

11. How does the involvement of a physician and/or resuscitation team influence a nurse's actions when a patient goes into cardiac arrest?

    - I added this question for the second interview because I was attempting to understand how the support of a physician or a code blue team may affect nursing behaviour in their decision to deploy CPR and defibrillation.

Facilitators

In this next section of the interview, I would like to explore what you perceive as the facilitators to the role of nurses as first responders.

12. What do you think prompts nurses to begin CPR before a physician or emergency resuscitation team attends to the patient in cardiac arrest?
    Probe the facilitators mentioned by the nurse.
13. What differences were there between the CPR scenarios in which a nurse did and did not start CPR in a timely manner?
    Probe differences mentioned by the nurse. Skip this question if the participant has always initiated CPR when they should have.
    - The wording of this question changed a few times over the course of the qualitative data collection. Initially, it asked what the differences were between CPR scenarios in which nurses did or did not start CPR. This wording suggested that there were only two possible outcomes: starting and not starting CPR. This question was changed to its current form for the fourth interview. The wording remained the same for the next five interviews.

14. How does a nurse's confidence with their CPR skills influence their decision to initiate CPR?
15. How does a nurse's leadership abilities impact their decision to initiate CPR?
16. How does a nurse's ability to collaborate with team members influence their decision to initiate CPR?
    - I added the three previous questions for the sixth interview, and subsequent interviews, in order to gather more information on confidence, leadership, and collaboration. These themes appeared to be important, but I had not gathered enough examples to support them.
17. How do formal and informal leaders in a nurse's team impact their decision to initiate CPR?
    - I added this question for the sixth interview to gather data on how management, senior staff, or physicians enable or hinder nurses as in-hospital first responders.
18. How does collaboration with team members influence a nurse's role during cardiac arrest situations?
19. How does the effectiveness of communication impact the role of nurses during resuscitation scenarios?
20. How does the quality of leadership impact the role of nurses during resuscitation scenarios?
    - The three previous questions were added for the fourth interview, but were not asked in the fifth interview or subsequent interviews. These questions used the word "during" and I realized that this yielded information on resuscitation after CPR had been initiated. This deviated from my research question and the goal of my project, so I removed these questions.

Barriers

I'm now going to ask you questions about the barriers to the role of nurses in CPR initiation.

21. What makes nurses hesitate from starting in-hospital CPR before the physician or resuscitation team arrives to attend to the patient?
    Probe into specific barriers mentioned by the nurse.
    - During the first three interviews, this question asked what stopped nurses from starting in-hospital CPR. The previous participants in the interviews did not believe that nurses would simply not begin CPR. I changed the wording to "hesitate" for the fourth interview and asked the question in its current form for the subsequent interviews. This rewording addressed the research issue more accurately.
22. What changes would make nurses more likely to start CPR in a timely manner on a patient in cardiac arrest?

Probe into changes mentioned by the nurse.

23. What consequences of CPR may inhibit a nurse from initiating CPR?
    - This question was added in the second interview and was asked in all subsequent interviews. I asked this question in order to gather data on the variety of fears associated with deploying CPR and defibrillation.
24. Are there hierarchies within your team? If so, how do these hierarchies impact a nurse in their decision to initiate CPR?
    - I was missing information on team hierarchies and how this influences nurses in their decision to initiate CPR. There is literature indicating this may have an impact and I wanted to explore it further. I added this question for the fourth interview and modified it to its current state for the fifth interview. It was asked in all subsequent interviews.
25. Do you have an example of a situation when you felt that you the comfort and skills to initiate CPR, but were not able to enact them?
    - I added this question in order to explore scope of practice issues. It was added in the sixth interview.
26. Do you ever feel that you have too much work to do? If so, does your workload impact your ability to properly respond to potential or actual cardiac arrest scenarios?
    - I added this question to gather data on how workload may impact the role of nurses as first responders. It was added in the sixth interview.

Possible Changes in the Future

In the next section of the interview, I would like to know what changes you think would enable nurses to initiate CPR.

27. Do you see the current state of CPR initiation as a problem? If so, what might solve the problem? If not, why do you not see it as a problem?
28. How would understanding the importance of initiating early CPR change nurses' actions the next time they were the first responding nurse to a patient in cardiac arrest?
29. Is there anything else you would like to add?

Appendix C: Codebook

Codes (main themes)	Codes (sub themes)	Type (A priori or emergent)	Definition	Example from interview transcripts
Education		A priori	The formal training and preparation for cardiopulmonary resuscitation. The quality and frequency of this education may influence how likely a registered nurse will begin CPR on a patient in cardiac arrest in a timely manner.	Well, in all of those situations, anyone who has taken any resuscitation courses or even just general first aid knows that compressions is the most important part of resuscitating a person because it's keeping blood flowing, it's keeping everything kind of going until other interventions can be done.
	Mock Code Blue	Emergent	An in-hospital training method that replicates a real resuscitation scenario. Performing regular mock code blue scenarios may enable nurses to acquire experiential learning in CPR, which may enable their role as in-hospital first responders.	I think that doing mocks, doing hands-on, knowing what to anticipate and participating is important. I know here at our organization we have mock code blue review every Thursday that the nurses and physicians go to and they go through all the steps and get themselves prepared or go through the different scenarios, so that's really helpful.
	Recognizing Warning Signs of Cardiac Arrest	Emergent	Knowledge of the signs and symptoms of cardiac arrest or declining cardiopulmonary status acquired in a formal training setting.	Whereas in the medical unit, we don't have cardiac monitors, if something is happening to a patient, especially when you come in, there's a nurse who is trying to get a blood pressure. There are nurses who are trying to start IVs. And then once it's confirmed that this patient is really going downhill and compressions need to be started, someone just hops on their chest and starts going.
	Frequency of Training	A priori	How often nurses acquire CPR training make impact their level of preparedness and comfort with CPR. This may influence their likelihood of initiating	I think it needs to be done more frequently in the hospital setting, on the unit with drills and reviews. I know the mental health nurses are terrible. Like I do CPR review with them and they don't do it that often and they're really not sure of what to do because it's something that won't doesn't

			CPR on a patient in cardiac arrest.	necessarily occur that often, maybe not in their career.
Preparation and Training		A priori	The feeling of being prepared and/or the training to prepare for the performance of resuscitation on a patient.	I think that doing mocks, doing hands-on, knowing what to anticipate and participating is important. I know here at our organization we have mock code blue review every Thursday that the nurses and physicians go to and they go through all the steps and get themselves prepared or go through the different scenarios, so that's really helpful.
Knowledge		A priori	Knowing what to do when a patient goes into cardiac arrest may facilitate a registered nurse to initiate CPR. A lack of knowledge may be a barrier to nurses as in-hospital first responders.	Well, in all of those situations, anyone who has taken any resuscitation courses or even just general first aid knows that compressions is the most important part of resuscitating a person because it's keeping blood flowing, it's keeping everything kind of going until other interventions can be done.
	Knowing Importance of CPR	Emergent	Understanding the importance of CPR may enable nurses to initiate resuscitation measures.	I know for me, when I know why something needs to be done, I understand it much better and I'm more willing to actually follow through and do whatever it needs to be done. So I think that if nurses knew more about CPR and more about the statistics behind when CPR is initiated promptly and all that stuff, I think nurses would be more willing to go start CPR as soon as it's needed rather than kind of wondering does this need to be done, does this not kind of thing.
Experience		A priori	Experiencing real-life resuscitation scenarios may increase the likelihood of a nurse initiating CPR on a patient in cardiac arrest because they are able to apply their prior knowledge and recognize similar patterns. In addition, nurses may feel more comfortable with	It's almost always nurses starting CPR and it's usually when a lot of the codes have happened in the intensive care unit or emerge, so those nurses have their extra training so they just start it right away.

			initiating CPR because they have experienced a similar situation in the past and understand what needs to be done as well as the outcomes of the scenario.	
	Mock Code Blue	Emergent	A formal in-hospital training method designed to replicate a real-life resuscitation scenario. This type of training may increase a registered nurse's comfort level and knowledge of CPR initiation because it provides an artificial experience of what a cardiac arrest situation would be like.	So I really wanted to have mock code blues where they would call a code blue on a dummy and we would just kind of learn what needed to be done and when we should be calling these codes and when we should be doing all these interventions. I was fighting for that for a while. I kind of forgot about it, but just so that all these new nurses had the experience with a code blue.
	Nursing Intuition	Emergent	A nurse's sense of a patient's declining condition. This may be acquired from experience and enhances a nurse's ability to recognize patterns that may indicate that a patient has a declining cardiopulmonary status or is in cardiac arrest.	I think as a nurse, especially if you've seen it before, you develop this intuition that you can see when a patient is going downhill and when you need to start intervening and you need to start doing everything generally.
	Recognizing Warning Signs of Cardiac Arrest	Emergent	Knowledge of the signs and symptoms of a declining cardiopulmonary status as well as cardiac arrest. This is knowledge acquired from experiencing resuscitation scenarios.	If you're in with a patient and their colour doesn't look good, they're diaphoretic, they're saying certain things to you, then you can just—I never believed it before until I actually saw it for myself when you know someone is going downhill, you can tell if a patient is not doing well and you need to get the crash cart out and hook them up and monitor them, and call the doctor to come in right now because they're not looking good.
	Poor Experience	A priori	Bad experiences with CPR scenarios may make nurse feel fearful, nervous, uncomfortable	And if they have a bad experience and they have… If it was a poor outcome or if it was kind of traumatic or unexpected, it didn't

			and/or unprepared with CPR initiation and may impact their actions in future cardiac arrest scenarios.	go as well. It can be some hesitancy on that part as well, depending on the outcome and how it went.
Confidence		A priori	The feeling of being prepared to initiate CPR. When a nurse has the sense that they would be able to enact CPR when confronted with a cardiac arrest scenario, she or he may be more likely to execute the appropriate judgement and skills.	They're not afraid of anything because they don't know what they should be afraid of. Sorry, I'm not trying to be derogatory to new graduates but just over the last five, ten years, the new graduates are very confident and feel very competent in all their skills, but they might not be fearful but they should be.
Fear		A priori	Fearful emotions inhibiting a registered nursing from initiating timely CPR.	Yeah, for sure, especially if you know the patient and it's scary no matter what, but if this is your fourth check taking care of the patient, you know this is their life in your hands and it is pretty well up to you sometimes to keep them alive until further interventions can be made or done.
	Fear of Getting In Trouble	A priori	Fear of consequences or repercussions (e.g. legal) from initiating CPR if it was not necessary.	But if you feel like you're going to get in trouble from management from starting CPR or if the doctor is going to get upset with you from going there and starting CPR it can be scary even though at the time you felt like this is what needed to be done and this is what the patient needed at the time.
	Fear of Harming Patient	A priori	The fear that initiating CPR unnecessarily will cause physical harm to the patient.	I think for sure causing harm to the patient. If they didn't need CPR, in first aid you're always taught if you start compressions, you're not going to cause harm to the patient. You might make them sore but otherwise you're doing what you thought was right.
	Fear of the Unknown	Emergent	The fear of not knowing what to do or what the consequences will be as a result of initiating CPR.	Fear factor is very high for someone that has never done it before, the fear of the unknown.

	Feeling Nervous	A priori	The emotion of nervousness influencing a nurse in their decision to enact CPR skills.	Definitely, and I don't think it's hesitation as in time hesitation. I think it's just that they have not seen something like that so they get nervous. They've never seen a dead person. They've never seen someone… so it's a first time thing, but they don't delay treatment.
Doubt		Emergent	The feeling of not knowing what to do or what to expect because of a lack of information, experience, education, or the availability of a clear DNR order.	Whereas on the medical unit, it's kind of like do you start CPR? Do you not start CPR? What is happening to this patient? And it takes a little bit more time for us to start CPR because we're just not sure. But it's almost always nurses initiating CPR and waiting for the doctor to show up.
Ethical Considerations		Emergent	There may be moral dilemmas when the decision to initiate CPR arises. There may be a clinical need to begin CPR, but the contextual and patient factors may impact the morality of initiating CPR. This may cause nurses to hesitate to initiate CPR.	I think the hesitation could be if it's like an ethical dilemma. So for example, if there's a 92-year-old, they're a full code, you know that in your heart that it will be a poor outcome. You still need to initiate it but that's probably one where that might occur.
	Influence of Patients' Family Members	Emergent	The family members of a patient may influence a nurse's decision to initiate CPR on that patient. Although the patient may have a poor outcome regardless of CPR, family members may want nurses and other health care professionals to begin CPR. This type of situation is an ethical dilemma for a nurse and can influence whether or not they enact their CPR skills.	Oh for sure. That's the example. We had a 92-year-old lady. She was taking care of her daughter who I think was in her late 60's and home. And this lady had some respiratory issues and came in all the time with respiratory arrest. And she had contracture and her quality of life was not there, but the daughter wanted everything done all the time. And it was sad because what quality of life did this patient have? Not much. But you've got to do it.

Team Dynamics	Collaboration	Emergent	A health care team's ability to works together towards common goals.	I don't think so because we have the code blue team, so we have people, the SMR is the captain and they are up to date with everything and they can collaborate with the other physician, the staff physician with what's to be done.
	Senior Nursing Staff and Management	Emergent	Having unsupportive management and senior staff may cause registered nurses to hesitate to initiate CPR because they are fearful of repercussions or judgement from official and unofficial leaders in their work setting.	But our managers and our nurse educators even, they tend to kind of, I don't want to say throw you under the bus, but they do if they don't agree with something that you've done even though it is something that needed to be done. It is really, really unfortunate because it makes it difficult for nurses to work.
	Leadership	Emergent	Leadership is an essential component of team dynamics because it is necessary to have an individual present who is directing others in the event of a code situation.	I think it's one of the things that can impact it the most. If you don't have a good leader, things I think can deteriorate quite quickly. And when I say deteriorate, it gets very confusing. People in each other's way, you need to have that one person. Whether it's the doctor or the nurse, there needs to be the definite leader. And with a nurse, it might not come to say 'okay we're going to give the epinephrine now', but at least to control the environment. Just to control everything that's going on within that room and it helps the doctor out as well.
	Physician Leadership	A priori	The quality of a physician's ability to lead a resuscitation scenario. Strong physician leadership may enable nurses to initiate CPR in a timely manner.	Technically it wasn't a code situation where we had to do CPR or anything like that, but it was just one of those weird situations where we didn't really know exactly what needed to be done until a physician came in.
	Team Hierarchy	A priori	Power gradients in a health care team that may impact the	I've influenced them. I think this is maybe more reassurance, collaboration. I don't have any of

			likelihood of a nurse initiating CPR on a patient in cardiac arrest.	the experts potentially there. Even they're not, but anyways. I get more reassurance and maybe I'm not saying power in the capital p power, like a small power physician can yay or nay things while a nurse can't. They can stop the CPR and they can initiate some other things while the nurse, if they start they can't stop but it's stopped by the physician.
	Roles	Emergent	The clarity of roles during a resuscitation is an important component of team dynamics because it ensures that members of the group understand each other's functions and responsibilities.	With this last code, the team came and it was actually right at the change of a shift so that was good because we had four neonatal nurses there, which was better than just having two because we have worked in scenarios before so it's not assigned but we sort of know whose best at what role. So we have one who can start IV's and we have one that can do the epinephrine. We had one doing compressions. The doctor had the airway and then the other one was anticipating what the doctor might need next to continue on what was recording. The girl recording was actually a girl from the code team.
	Communication	Emergent	Communication consists of the effectiveness of the exchange of information between providers and is an essential component of team dynamics. The quality of communication may impact how quickly a nurse enacts their CPR and defibrillation skills.	Depending on the information communicated between nurses, a nurse will decide whether or not to [initiate] CPR. If information is ineffectively communicated, the initiation of CPR may be delayed in order to gather the appropriate information (ex. DNR order).
Workload		Emergent	If a registered nurse feels busy or overwhelmed from the quantity of tasks during a shift, they may not notice the declining	But for that shift, I remember I had been really, really busy. I was at my wits end. I didn't have a break that day and this was like 3 o'clock in the afternoon so I just kind of stumbled upon this lady

			cardiopulmonary status of a patient or they may ignore the signs and symptoms of a patient's deteriorating health status because they have too many tasks to complete in too little time.	and it's like crap, what do we need to do? And all I could think to do was support her head and get a doctor.
Availability and Quality of Technology		A priori	The availability of technology (i.e. defibrillators, electronic medical records, cardiac monitors, etc.) may influence how likely a nurse is to initiate resuscitation. Certain devices provide vital information on a client's status and the availability of these machines can influence a nurse's decision when he or she is a first responder. In addition, certain devices that facilitate a nurse's role in resuscitation may be unavailable, which would negatively influence their behaviour in CPR scenarios.	What I've been seeing is it depends on where you're responding to the codes. If it's in ICU, because the patients are all cardiac monitored, you know exactly when they go into V-tach or V-fib or whatever, so they know automatically to start doing everything.
Hospital Unit		A priori	Variations in the characteristics of hospital units will impact the likelihood of registered nurses initiating CPR on that specific unit.	What I've been seeing is it depends on where you're responding to the codes. If it's in ICU, because the patients are all cardiac monitored, you know exactly when they go into V-tach or V-fib or whatever, so they know automatically to start doing everything.

Geography		Emergent	The physical location of a health care institution may influence how likely nurses are of deploying resuscitation skills, particularly in rural and remote communities.	No, I would have to say here at our hospital we're very fortunate that our hospital expects us to work to full scope. And anything we can basically do that may be above our scope, usually we have a medical directive. I would say especially in emerge they probably have to do a little bit more because they have the medical directives to do it. Because like I said we're a remote hospital and we're getting busier where there is usually a doctor in emerge all night long. But I can remember sometimes when there was no doctor in the hospital. So we needed the medical directives and stuff in place so that we can do better for the client because we might have to wait 10, 15 minutes for a doctor to get there.
Legislation and Regulation	Nursing Competencies	Emergent	CPR is a basic competency for nurses. If nurses do not feel capable of initiating CPR in a timely manner, then they must seek appropriate retraining. CPR has a competency is an enabler to the role of nurses as in-hospital first responders.	Yeah, that's like what you saw in your registration on a yearly basis, you met those criteria. That CPR is one of those criteria. You feel confident and competent in it. And if not, you need to seek the knowledge to get that except with any skill or competency in nursing, right?
	Practice Standards	Emergent	A standard of practice is a basic competency that all members of a profession must adhere to. Standards of practice are inherent to the profession.	So this should be a standard of practice for everybody that's employed. So if I started in this facility today, my appointment would be that on a yearly basis, I show my competency and I have proof and it's recorded somewhere, my CPR. If not, then I will be suspended until it is obtained.
	Need for Physician's Orders	Emergent	Nurses may require physician's orders for certain aspects of CPR, which would limit their	Oh yeah because once the doctor is there, you can say can we give EPI? Can we do this? Can we do that? I mean usually the doctor is pretty on top of it and will just say

			role when a patient suffers cardiac arrest.	do this, do this, do this, but we can also provide other options and ask okay can we test for this? Can we do this? Can we do this? And it just allows us to do a little bit more because for most of the codes that I've been to the doctor have always said okay guys are we missing anything? What else can we do, blah, blah, blah? It's more the doctor is part of the team and we pretty well need their okay to do anything even if we know what needs to be done.
Accountability	Organizational Responsibility	Emergent	Health care organizations may have responsibility for providing BLS, ACLS, and PALS courses as well as ensuring that the nurses at the institution maintain up-to-date CPR competency. This may aid in ensuring that nurses possess the appropriate skills and knowledge to initiate CPR without hesitating.	I think the problem is organizationally, they need to hold the staff accountable for practice, so they need to offer a CPR review for all of their staff. At least on a yearly basis, I know that you have to do you BCLS, but then no outcome that they don't. Beforehand, maybe five or so years ago, you had to show your BLS card along with your registration and now that's gone. So, I could be saying yeah I'm competent but I haven't touched CPR for ten years, right?
	Lack of Consequences for Not Retraining	Emergent	Since the provincial regulatory body for registered nurses in Ontario does not require proof of CPR competency, nurses may not retrain on a yearly basis. If nurses were held accountable for this training, then it is possible they will be more prepared to begin CPR and will not hesitate to begin the necessary actions when they are the first responder to an in-hospital cardiac arrest situation.	So this should be a standard of practice for everybody that's employed. So if I started in this facility today, my appointment would be that on a yearly basis, I show my competency and I have proof and it's recorded somewhere, my CPR. If not, then I will be suspended until it is obtained.
Economic and Financial Constraints	Expensive Courses	Emergent	The high cost for CPR courses, specifically advanced cardiac life	Education-wise, it is really, really expensive to always be reviewing your ACLS and PALS and whatever

			support (ACLS) and pediatric advanced life support (PALS), may be a deterrent for nurses to pursue further CPR training. If they do not obtain advanced training, it is possible that nurses may not feel prepared when confronted with a cardiac arrest scenario and will hesitate to begin CPR.	else. So I would say that education is key but not everybody can afford it.
	Inexpensive Courses	Emergent	Offering BCLS, ACLS, and/or PALS for a low cost may enable nurses to receive training in both basic and advanced CPR. Possessing this training may make nurses feel more prepared to initiate CPR and, subsequently, be more likely to enact CPR skills in-hospital.	Because if you offer it for free, people will not take it. But if you gear it to have some money they will guarantee that they come to the course.

Appendix D: Ethics Approval Notice

File Number: 01-16-32 **Date (mm/dd/yyyy):** 03/30/2016

Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

Ethics Approval Notice

Social Science and Humanities REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Ivy	Bourgeault	School of Management / School of	Supervisor
François	Chiocchio	School of Management / School of	Co-Supervisor
Robin	Hebert	School of Management / School of	Student Researcher

File Number: 01-16-32

Type of Project: Master's Thesis

Title: Initiation of In-hospital CPR: An Examination of Nursing Behaviour within their Scope of Practice

Approval Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
03/30/2016	03/29/2017	Approval

Special Conditions / Comments:
N/A

Appendix E: Letter of Invitation

LETTER OF INVITATION TO PARTICIPATE IN INTERVIEW

Initiation of In-hospital CPR: An Examination of Nursing Behaviour within their Scope of Practice

You are being invited to participate in the above-mentioned research study.

Study Rationale: Cardiopulmonary resuscitation (CPR) is the collection of interventions performed by health care professionals in order to preserve the life of a patient suffering cardiac arrest. CPR is important to the role of nurses because they are the most common first responders to in-hospital cardiac arrest scenarios. The early initiation of CPR activities is essential in increasing the likelihood of a patient surviving cardiac arrest. In fact, for every minute that a patient does not receive chest compressions or defibrillation when they are in cardiac arrest, the risk for death increases by 10 percent. Despite possessing the knowledge, skills, and training to initiate CPR independently, nurses rarely perform the appropriate actions in a timely manner.

Specific study objectives: The aim of this study is to better understand how teamwork factors and limitations on scope of practice may influence nurses in the role of first responder as well was what nurses perceive as the facilitators and barriers to their role in CPR initiation.

Participation: In light of your position and expertise within your health care system, we would like to conduct an interview to discuss your experiences and perspectives regarding the initiation of in-hospital CPR by nurses. The interview will cover information on demographics, background preparation for CPR, what you perceive as the facilitators and barriers to the initiation of CPR as well as possible changes that could be made that would encourage nurses to begin CPR more frequently.

The interview will be conducted in person or by telephone in English only, and will take approximately 60 minutes.

All interviews will be audio-recorded for transcription purposes. You may be interviewed at any time deemed convenient and appropriate for you, from August to October 2016.

You will only need to answer the questions you feel comfortable answering; you can refuse to answer any questions.

Excerpts from your interview transcript to be quoted in publications or presentations will be sent to you for your review and approval. These will be sent via e-mail, solely and directly to your e-mail address. The title of the e-mail will be marked “Confidential” and will include a confidentiality notice at the end of the text in the e-mail. We ask that you reply to this e-mail upon reviewing the transcript to inform us whether you approve the text of the transcript, or by requesting edits. If edits are requested, the excerpt will be revised and sent as above for your

final approval. As noted below under "Voluntary Participation", you may withdraw from this study at any time, including upon your review of the interview transcript.

Risks: There is minimal risk involved in participating in this study. You may feel uneasy about volunteering some information requested. The investigators will minimize these risks by ensuring that your participation in this study remains voluntary, anonymous and confidential. Again, you need not answer any questions you feel uncomfortable answering. No identifying information will be included in the presentation or publication of the research findings other than your profession.

Benefits: This study will give you the opportunity to contribute to a network of knowledge-sharing to improve effectiveness of nurses in CPR scenarios as well as human health resources in Ontario.

Confidentiality and anonymity: Any information you share will remain strictly confidential, and will only be discussed among members of the research team. To protect your anonymity, your name will not be recorded with your responses or identified in any way. A unique code number or pseudonym will be assigned to you to identify your taped interview. Aggregate results will be published so your identity will not be revealed in any reports or publications. Your name will not be identified in any of the research publications and presentations.

Conservation of data: All information collected from your interview will be kept in a locked filing system in locked offices at the University of Ottawa, Canada. All computers on which study data will be stored will be password-protected. The data will be accessible only to the study's investigator and research staff. All team members accessing the raw data will sign a confidentiality agreement. The study data will be stored for five (5) years following completion of the study, after which time it will be destroyed.

Compensation: There will be no monetary or other compensation for your participation in the study.

Voluntary Participation: Your participation is strictly voluntary. You are under no obligation to participate and if you choose to participate, you can withdraw from the study at any time, for any reason, without consequence. If you participate in an interview and choose to withdraw from the study, all data gathered until the time of your withdrawal will be destroyed.

Other: This research is being conducted separately from the Ontario Nurses Association.

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For More Information:
If you have any other questions or require more information about the study itself, please contact the Principal Investigator via the contact details listed below.

Principal Investigator:
Robin Hebert, Student, Master of Science in Health Systems, University of Ottawa

Project Supervisor:
Ivy Bourgeault, PhD, Professor, Telfer School of Management, University of Ottawa, (011) 1-613-562-5800 ext. 8614

Project Co-Supervisor:
François Chiocchio, PhD, Professor, Telfer School of Management, University of Ottawa, (011) 1-613-562-5800 ext. 8840

If you have any questions regarding the ethical conduct of this study, you may contact:

Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, Ontario K1N 6N5, Canada, telephone: (011) 1-613-562-5387 or ethics@uottawa.ca

Thank you for your time and consideration!

Appendix F: Contact Summary Form Template

Contact Summary Form

Contact type: Site:
Visit with: Contact date:

1. What were the main issues or themes that struck you in this contact?

2. Summarize the information you got on each of the target questions you had for this contact.

Questions	Information

3. Anything else that struck you as salient, interesting, illuminating or important in this contact?

4. What new (or remaining) target questions do you have considering the next contact with this site?