

EXPLORING NOVICE RN'S PERCEPTION OF ACLS SIMULATION:  
RECOGNITION AND PREVENTION OF FAILURE TO RESCUE

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Doctor of Philosophy

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by

MARYANN NIEMEYER

Dr. Amy Vogelsmeier, Dissertation Supervisor

MAY 2020

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The undersigned, appointed by the dean of the Graduate School, have

The undersigned, appointed by the dean of the Graduate School, have examined

the dissertation entitled

EXPLORING NOVICE RN'S PERCEPTION OF ACLS SIMULATION:  
RECOGNITION AND PREVENTION OF FAILURE TO RESCUE

presented by MaryAnn Niemeyer,

a candidate for the degree of doctor of philosophy of nursing,

and hereby certify that, in their opinion, it is worthy of acceptance.

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Associate Professor Amy Vogelsmeier

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Associate Professor Lori Popejoy

---

Associate Professor Bonnie Wakefield

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Professor Joi Moore

## Dedication

This work is dedicated to my family:

My mother, Dorothy, for her loving, unwavering support during my dissertation, and my step-father, Lee, for his positive outlook and encouragement.

My father, Richard, for showing me how to be a curious individual and the resilient student that I am today.

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EXPLORING NOVICE RN'S PERCEPTION OF ACLS SIMULATION:  
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MaryAnn Niemeyer

Dr. Amy Vogelsmeier, Dissertation Supervisor

ABSTRACT

The purpose of this study was to determine whether simulation in healthcare improves novice RNs' perceived self-efficacy for recognizing and responding to changes in patient's condition. Having 6-24 months' nursing experience, novice RNs have characteristically little practical RN experience. Medical errors, harm resulting from the delivery of care, constitute the third leading cause of death in the U.S. with 50%-60% of medical errors deemed preventable. One common preventable medical error is known as failure to rescue (FTR), characterized as delays in responding to changes in the patient's condition. Failure to rescue events frequently occur in the presence of a novice registered nurse (novice RN). Many hospitalized patients who experienced an adverse change in condition exhibited abnormal changes in symptoms and vital signs 8-24 hours prior to the event. To mitigate FTR occurrences, novice RNs need training to safely expedite and intensify their experience with adverse changes in patient's condition.

With this in mind, the first chapter of this dissertation discusses the background and significance of patient instability and failure to rescue, the demand for nurses, novice RNs, and simulation. In addition, the conceptual framework provides a foundation for exploring novice RN's perceptions of clinical behavior towards responding to changes in patient condition through the use of ACLS simulation. Lastly, the purpose of this study, aims and research questions are noted.

Chapter 2 is a systematic literature review of qualitative, quantitative, and mixed methods research completed to explore effective continuing education strategies that target novice RNs' professional development, enhance clinical confidence, and focus on patient safety (Niemeyer, 2018). This report identifies simulation in healthcare, an interactive technique replacing real experiences with guided experiences, delivered excellent results with helping novice RNs gain skills and knowledge enhancing their clinical practice. Simulation was also shown to improve self-efficacy in pretest-posttest studies. The systematic review informed the design of the purpose, aims, and questions for this study.

The dissertation proposal presented in Chapter 3 details the purpose of the study: to explore how ACLS simulation influences a novice RN's perceived ability to recognize and respond to changes in the patient's condition that if otherwise left untreated, would result in a failure to rescue. It is a mixed methods study that includes 16 novice RN participants who completed the General Self-Efficacy (GSE) survey before and within 3 months after ACLS simulation. Twelve of those participants completed individual interviews with within 3 months after the ACLS simulation.

Chapter 4 is a manuscript which includes the results from the Specific Aims and Research Questions. The study design is a mixed methods approach aimed at deriving quantitative as well as qualitative findings for preventing failure to rescue events. Sixteen novice RN completed a GSE survey before receiving ACLS simulation training and again within 2-3 months after the training was completed. Results of the GSE test-retest ( $\alpha > .05$ ,  $t = 3.229$ ,  $p = .006$ ), were statistically significant. Participants were found to have gained an average of 3.5 points on their GSE scores. Twelve of the 16 nurses participated in individual interviews within 3 months of training completion. Three thematic patterns

were found: *1. Recognizing Limited Capacity*, *2. Identifying and Managing Change*, and *3. Reliance on Supportive Connections*. Overall, findings indicate that novice RNs demonstrate an increase in their perceived self-efficacy from ACLS simulation learning strategies. This chapter will be submitted for publication.

Chapter 5 contains a discussion of the findings found in the qualitative and quantitative strands of the study. The significance of the work and the strengths and limitations of the study are examined. Finally, recommendations for future research endeavors are addressed.

# CHAPTER 1

## INTRODUCTION

### **Background and Significance**

Approximately 35 million people are hospitalized annually in the U.S. (AHA, 2011). Of those persons, 33% experience an adverse medical event, and of those, 49% experience more than one event (Classen et al., 2011). Medical errors are defined as harm resulting from the delivery of care and are the third leading cause of death in the U.S. (Stern, 2013). As many as 60% of medical errors are deemed preventable (James, 2013). Medical errors also have substantial financial repercussions. Consumers pay an additional \$17 billion in medical costs including ancillary services, prescription drug service, and inpatient and outpatient care (Shreve, Van Den Bos, Gray, Halford, Rustiagi, and Ziemkiesicz, 2010).

Registered nurses are at the forefront of healthcare and as such are involved in medical errors. Common preventable errors involving RNs include medication errors (Smith & Crawford, 2003), patient falls (Kenward & Zhong, 2006; Smith & Crawford, 2003), delay in patient care, documentation errors, communication errors with physicians, equipment error, policy and procedure errors (Berkow, Virkstis, Stewart, & Conway, 2008; Smith & Crawford, 2003), wound infection (Morrow, 2009) and other healthcare associated infections (Armstrong, 2009; Fiona, 2009; Heslop, 2014). The longer an RN has been in practice, the lower the risk of medical error (Berkow et al., 2008; Smith & Crawford, 2003). A preventable medical error commonly involving novice RNs is delays in responding to abnormal changes in the patient's condition (Massey, Chaboyer, & Anderson, 2017). Novice nurses having fewer than two years practice experience are

extremely limited and inflexible, and are governed by rules and policies and dependent on a mentor or preceptor (Benner, 2001).

### **Patient Instability and Failure to Rescue**

Observational studies suggest patients with physiological instability show signs of clinical deterioration 24-48 hours prior to a serious clinical event (Kovacs, 2016; Smith, 2014). In addition, nearly 80% of hospitalized patients who experience a cardiac arrest encounter abnormal vital signs up to eight hours prior to the event (Buykx, Cooper, Kinsman, Endacott, Scholes, McConnell-Henry, & Cant, 2012). Incomplete vital signs taken or inability to interpret these at-risk signs may lead to patient harm (AHA, 2016; Stevenson, Israelsson, Nilsson, Petersson, & Bath, 2016). Annually, up to 11 percent of inpatient deaths are a result of undetected, untreated changes in patient condition (Luettel & Healey, 2007) resulting from what is termed failure to rescue (FTR). Failure to rescue is defined as the inability of a clinician to identify patient symptoms that if treated would mitigate preventable harm (AHRQ, 2016a). When changes in condition are recognized, appropriate interventions designed to prevent harm may be initiated (Buykx et al., 2012).

### **The Demand for RNs**

Nurses are vital to the healthcare team and the demand for RNs has increased dramatically (ANA, 2017; Center, 2008). To meet the increasing workforce demand, nursing schools are attempting to produce more RN graduates (AACN, 2013). The result is that graduation numbers have steadily increased resulting in a large, continuous supply of novice RNs (Herleth, 2019; NLN, 2014a). Data compiled by the Health Resources and Services Administration (HRSA) reveals that between the years of 2001-2011 the number of individuals who passed their NCLEX-RN licensure examination more than doubled



with 142,390 persons receiving their RN licensure in 2011 (HRSA, 2013). Rising over 70 percent from 2001-2008, novice RNs comprise more than 10% of hospital nursing staff (Center, 2008), a remarkable rise in the numbers of working bedside RNs at increased risk for making errors.

### **The Novice RN**

Many novice RNs may never have had the opportunity in nursing school or in their nursing orientation to care for a patient experiencing changes in condition. Moreover, while novice RNs begin to gain experience they rely on pre-set rules taught in school to care for their patients (Herron, 2017). Evidence suggests novice RNs have difficulty grouping important clinical information together to understand the patient's change in condition (DHWA, 2014). Thus, novice RNs may wait for help to arrive instead of immediately providing care or contacting more experienced RNs for assistance (Cioffi et al, 2006). Patient mortality is highest among RNs with two or fewer years of experience (Hickey, Gauvreau, Curley, & Connor, 2013) and approximately half of all novice RNs are involved in nursing errors (Kenward & Zhong 2006; Saintsing, Gibson, & Pennington, 2011; Smith & Crawford 2003). Only about 20% of employers were satisfied with the decision-making abilities of novice RNs (Saintsing et al., 2011) with 65% of errors attributed to poor clinical decision making (Brennan et al., 2004; Leape, 2000).

Novice RNs transitioning into practice often experience difficulty applying their knowledge to real world situations (Purling & King, 2012; Saintsing et al., 2011). Complex clinical environments, patients with multiple, chronic illnesses, (Berwick, Calkins, McCannon, & Hackbarth, 2006; Bleich, 2011; Booth, 2006; Herleth, 2019)

advances in treatments and technology, increases in the complexity and/or number of state and federal regulatory requirements (Heller, Oros, & Durney-Crowley, 2000), understaffing, nursing staff turnover (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002), and nursing experience (Handwerker, 2012; Herleth, 2019; Kavanagh & Szweda, 2019; Saintsing et al., 2011; Sephel, 2011) all affect the quality of patient care. Only 23% of novice RNs demonstrate entry-level competency and practice readiness (Kavanagh et al., 2019). Therefore support for transition from student to clinician is vital to prepare a novice RN for safe practice (Herleth, 2019; Jewell, 2013; Morrow, 2009; Slaikeu, 2011).

Continuing education and skills training can help support the novice RN and are crucial to the safety of patients for detecting and managing changes in patient condition (Massey et al., 2017). RNs who participate in continuing education consistently perform at higher levels during changes in patient condition thus preventing situations such as failure to rescue (Brunt, 2005). Simulations are a demonstrated strategy to supplement experience and education required for novice RNs to provide safe patient care (Rhodes et al., 2016; Young & Burke, 2010). Simulated patient scenarios have been shown to improve monitoring vigilance, the detection of changes, and enhance performance during rescue interventions (Schubert, 2012)

### **Simulation**

Simulation in healthcare is an interactive technique to replace real experiences with guided experiences that depict substantial aspects of actual patient care (Gaba, 2007). Improved education of early warning signs to changes in the patient's condition using simulation could prevent delays in care, reducing the risk of FTR (Levett-Jones et al., 2010) and ensures that initial novice RN experiences are executed in a way that

cannot harm real patients (Roche, Schoen, & Kruzel, 2013). RNs gain knowledge, skills, communication skills and confidence during simulation exercises responding to changes in patient condition to prevent a failure to rescue (Askew, Trotter, Vacchiano, Garvey, & Overcash, 2012; Schubert, 2012). Simulation has been widely studied in academia for the clinical education of undergraduate nursing students. (Cant & Cooper, 2016; Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). Few studies, however, have focused on novice RN hospital-based simulation (Aebersold & Tschannen, 2013; Rhodes et al., 2016; Young & Burke, 2010).

Previous studies using simulation as an intervention have examined self-efficacy outcomes. Recent systematic reviews describe simulation to improve self-efficacy in pretest-posttest studies, and in experimental studies, simulation far outperforms other teaching methods (Cant & Cooper, 2016; Carter, Creedy, & Sidebotham, 2016; Kaakinien & Arwood, 2009; Niemeyer, 2018; Orique & Phillips, 2018; Rutherford-Hemming & Alfes, 2017). Advanced Cardiovascular Life Support (ACLS) is a simulation-based systematic approach to teach healthcare providers to monitor, assess, and treat acutely ill or injured patients with simulation education focused on appropriately responding to changes in patient condition (AHA, 2016). According to the American Heart Association (AHA), the ACLS trained novice RN is more resilient to error as a result of having gained experience with simulated at-risk patients and simulated patients with pre-arrest symptoms. The use of a systematic approach to guide novice RNs' surveillance, assessment, and treatment of changes in patient condition can make the difference between rescue and failure to rescue (Brown, Neudorf, Poitras, & Rodger, 2007).

The ACLS program is led by instructors trained in ACLS simulation. Cognitive skills (knowledge) and psychomotor skills (hands-on) are learned through small-group case scenarios and are practiced on simulator manikins. The student takes turn at being both a leader and team member in the case scenario care team. ACLS features include learning stations to practice essential skills using simulated clinical scenarios that encourage active participation. Active participation in these roles gives the student the opportunity to demonstrate proficiency in skills used to recognize and manage clinical changes in condition (ACLS, 2017).

### **Conceptual Framework**

Bandura's theory of self-efficacy is the conceptual framework for this study. Self-efficacy, a construct derived from social cognitive theory, is a person's belief in their capacity to execute behaviors necessary to achieve specific goals (Bandura, 1997) and is one of the most powerful motives of behavior (Muretta, 2004). Self-efficacy theory describes a model where behavior, cognitions, and the environment all influence one another as forces that stimulate change (Bandura, 1986). Self-efficacy is dynamic and malleable, changing as a result of a person's learning, experience, and feedback (Dweck, 2017; Gist & Mitchell, 1992) and is important for predicting and improving performance (Chohan, Bhatti, & Naeem, 2017; Gist & Mitchell, 1992).

Elements within Bandura's model are the conceptual underpinning for exploring perceptions of novice RNs for their ability to improve clinical behavior towards responding to changes in patient condition through the use of ACLS simulation. Novice nurses' descriptions will be analyzed for their perceived ability to execute clinical behavior in the form of monitoring, recognizing, and implementing appropriate

interventions for changes in patient condition after having experienced ACLS simulation training. Implications for this study include knowing how to build a sense of self-efficacy in novice RNs for recognizing early changes in patient condition provides further direction for structuring simulation and other education experiences. Self-efficacy assessment can provide guidelines for predicting novice RN needs and for tailoring programs to individual needs.

### **Current Study**

The purpose of the study was to explore how ACLS simulation influences a novice RNs' perceived ability to respond to changes in the patient's condition that if otherwise left untreated, would result in failure to rescue. Perceived ability, or self-efficacy, is a person's belief in their capacity to execute behaviors necessary to achieve specific goals (Bandura, 1997). The sample includes novice RNs with between 6 – 24 months of critical care experience employed by one 1,250-bed academic hospital and one 220-bed community hospital in the Midwestern United States. Aim 1 is designed to explore novice RNs' self-efficacy as affected by ACLS simulation, and will be measured by participants completing the General Self-Efficacy (GSE) scale both pre-and post-ACLS training. GSE scores will be analyzed using a paired sample t-test for effect. Aim 2 is designed to explore novice RNs' perceived ability to respond to situations that could result in a failure to rescue and will be obtained through semi-structured interviews within three months of completing in an ACLS simulation session. Analysis will be conducted using a thematic analysis approach.

Implications for this research include a better understanding for how to potentially build a sense of self-efficacy in novice RNs for recognizing and responding to changes in

patient condition. This enhanced understanding will provide further direction for structuring simulation and related education experiences as nurses enter their real-world practice.

**Specific Aim 1:** To describe if ACLS simulation affects a novice RN's perceived self-efficacy to recognize and respond to changes in the patient's condition that, if left untreated, could result in a failure to rescue.

Research Question 1: Does ACLS simulation affect a novice RN's self-efficacy scores based on the General Self-Efficacy Scale?

**Specific Aim 2:** To explore the influence of ACLS simulation on novice RN's perceived ability to recognize and respond to situations that could prevent a failure to rescue.

Research Question 2: How does ACLS simulation influence a novice RN's perceived ability to identify early signs of change in condition that could result in a failure to rescue?

Research Question 3: How does ACLS simulation influence a novice RN's perceived ability to respond to emergent changes in patient condition that could result in a failure to rescue?

## CHAPTER 2

### EFFECTIVE PATIENT SAFETY EDUCATION FOR NOVICE RNS:

#### A SYSTEMATIC REVIEW

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#### ABSTRACT

##### Background and Objectives

The need is great for identifying effective evidence-based strategies that focus on increasing novice RN confidence for the application of skills used to care for patients safely. The purpose of this systematic review is to explore effective continuing education strategies that target novice RNs' professional development, enhance clinical confidence, and focus on patient safety.

##### Methods

The EBSCOhost database search was set to find recently published papers within the last ten years, sorted by relevance from January 2007 through August 2017. This search yielded twelve studies deemed eligible for inclusion by the databases CINAHL, Communication & Mass Media Complete, Education Full Text (H.W. Wilson), Health & Wellness Resource Center, and Science Direct. Commonalities and distinguishing features among the strategies are examined.

##### Results

This systematic review identified 12 articles that describe effective training strategies aimed at improving novice RNs' clinical practice confidence and skill. A

thematic analysis of the data was used to systematically gain knowledge about strategies used to educate novice RNs working in the hospital setting. The majority of strategies employed a number of different types of simulation and reported varying degrees of success for improving novice RN ability to care for patients safely. Simulation, virtual reality, preceptored clinical experiences, and interdisciplinary experiences were found to be effective education strategies enhancing novice RN's skill for providing safe care. Didactic instruction had positive results, but was not as effective as simulation for novice RNs learning safe patient care. Finally, written instruction was not as effective as simulation, and hard copy supplements provided no added value to novice RNs learning safe patient care.

### **Conclusions**

Findings from this review are foundational to address calls from the Institute of Medicine (IOM) and the National League for Nursing (NLN) to reform and support post-graduate nursing education. The development of novel education and training targeting novice RNs in the hospital setting is essential, but more research is needed to enhance safe patient care.

### **Key Words**

Confidence, Competence, Continuing education, Novice RN, Medical error, Patient safety, Teaching strategy, Systematic review



## **Introduction**

In the healthcare setting, an adverse event refers to an injury resulting from medical intervention (Classen et al., 2011). Over 33 million individuals are hospitalized annually in the United States (U.S.) (AHA, 2015). Of those hospitalized, one third experience at least one adverse medical event. Among hospitalized individuals that experience an adverse medical event, half will experience more than one event (Classen et al., 2011). Each year approximately 210,000-440,000, or 44%, of hospitalized patients experience one or more preventable medical errors resulting in harm that contributed to their death (James, 2013).

Patient safety is the absence of preventable harm during the process of health care (Donaldson, 2014). Yet despite deliberate attempts to improve quality of patient care, patient safety is still at the forefront of concerns for healthcare delivery (Chassin & Loeb, 2013). The Institute of Medicine (IOM) reported on the dire problem of patient safety in healthcare nearly two decades ago (Kohn, Corrigan, & Donaldson, 2000), nonetheless patient harm remains a significant concern for hospitals (James, 2013).

Nurses are at the forefront of health care and essential for excellence in patient care (Aiken et al., 2002; Lacey & Cox, 2009; Sales et al., 2008). More than 10% of the acute care nursing workforce are newly licensed, novice registered nurses (RN) who have a notably higher risk of patient harm during their practice (Berkow, Virkstis, Stewart, & Conway, 2009). Novice RNs, those with less than 2 years of practice experience have formal education but limited practical experience. Evidence suggests a relationship between patient safety and number of years of practice (Jewell, 2013; Morrow, 2009;

Slaikeu, 2011). Patient mortality is highest among RNs with 2 or fewer years of experience (Hickey et al., 2013)

### **Background**

Confidence is one of the most influential motivators of behavior a novice RN can possess. Albert Bandura, social cognitive psychologist, believed that self-confidence and performance were inextricably related, and that experiences play a big part in confidence development (Bandura, 1997). Evidence supporting Bandura's research suggest that novice RN's perception of ability, or self-confidence, is necessary for improving clinical performance. Likewise, the risk of preventable adverse events decreases the closer a novice RN moves towards competent clinical performance (Aronson, Glynn, & Squires, 2012; Ulrich et al., 2010).

Nursing is a practice-based profession with clinical training a critical part of nursing education. Nursing education programs each contain their own set of curricular requirements. RNs are prepared for a wide range of roles and responsibilities caring for patients in a variety of institutional settings (Ballard, 2003). Novice RNs have this formal education but limited practical experience (Jewell, 2013; Morrow, 2009; Slaikeu, 2011) often with insufficient exposure to a diverse set of clinical situations (Benner, Hughes, & Sutphen, 2008; Heidari & Norouzadeh, 2015; Hickey, 2009; Jamshidi, Molazem, Sharif, Torabizadeh, & Najafi Kalyani, 2016; Jamshidi et al., 2016; Saintsing et al., 2011; Valiee, Moridi, Khaledi, & Garibi, 2016). Novice RNs often lack confidence in their skills and find the transition from the role of student to working professional RN particularly challenging (Sparacino, 2016).

Confidence is a common theme in studies that have examined novice RNs' ability to learn skills required for safe patient care (Askew et al., 2012; Beyea, Slattery, & von Reyn, 2010; Beyea et al., 2010; Edwards, Hawker, Carrier, & Rees, 2015; Massey et al., 2017). However, few studies focus on novice RN confidence and training strategies in the hospital setting. The investigation of hospital training strategies will build the knowledge base for improving novice RN confidence for the application of clinical skills used towards safe patient care.

In the hospital setting, novice RNs have increased error rates and severity of error for the first six years of their practice. The risk of error falls by 10.9% and serious error decreases by 18.5% with each additional on-the-job year of experience up to six years at which time the risk is diminished to that of experienced RNs with six or more years of hospital practice (Westbrook, Rob, Woods, & Parry, 2011). Investigators report descriptions of novice RNs as individuals requiring extra advice and guidance for clinical procedure and technical skill deficits (Hickey, 2009; Westbrook et al., 2011).

Furthermore, the skill mix of novice vs. experienced RNs during patient care can be a concern (Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Aiken et al., 2003; Kanai-Pak, Aiken, Sloane, & Poghosyan, 2008). In the hospital setting, a staffing mix of 50% novice RNs can significantly degrade quality of care as compared to hospital units that have 20% novice RNs. Hickey et al. (2013) reports a much lower cut-off point for unsafe staffing mix where 20% novice RN staffing significantly increases the risk of harm to patients. In today's fast-paced, complex clinical environment, training strategies in acute care are needed to facilitate the transition of newly graduated, novice RNS into practice to minimize error and patient harm (Jewell, 2013; Morrow, 2009; Slaikeu, 2011).

The Joint Commission supports the use of planned, comprehensive training periods for newly graduated, novice RNs so that sufficient knowledge and skill may be acquired to deliver of safe, quality care that meet professional standards of practice (TJC, 2003). The Robert Wood Johnson Foundation at the Institute of Medicine published recommendations for transforming healthcare that include achieving higher levels of RN continuing education training (IOM, 2011). Numerous sets of training competencies designed to help bridge the gap from novice to practicing RN are available from a variety of sources (Boeing, Oberritter, & Daniel, 2015; Emanuel, Combes, & Hatlie, 2008; Ginsburg, Castel, Tregunno, & Norton, 2012; Greiner & Knebel, 2003; McGuinn, 2012; NLN, 2014b; Walton, 2011). However, continuing education is often fragmented and underdeveloped (IOM, 2011).

To complicate matters, research suggests that novice RNs solve ill-structured problems differently than experienced nurses. The design and support for training novice RNs is therefore more challenging than training experienced RNs (Sarsfield, 2014). Strategies that are meant to help transition novice RNs into real world practice need to be grounded in evidence-based education where training is integrated with best practice techniques (Robinson & Dearmon, 2013).

Although patient safety in healthcare is often hampered by a variety of cultures and organizational changes, efforts to embed patient safety into continuing education must continue (Catchpole, 2013; Ginsburg et al., 2012). The identification of effective evidence-based strategies is central for supporting novice RNs in the profession, for example efforts are underway to replace passive learning experiences with experiential approaches (Coram, 2016; Kyrkjebø, Brattebø, & Smith-Strøm, 2006; Schams, 2013;

Walshe, O'Brien, Murphy, & Hartigan, 2011; Walshe et al., 2011). The safety of patients depends on research driven, dedicated patient safety content being integrated into health professional curricula and training programs (Catchpole, 2013; Ginsburg et al., 2012).

Previous systematic reviews addressing nurse education strategies with a focus on patient safety and confidence have discussed undergraduate RN education (Cant & Cooper, 2016), specific training strategies for all RN experience levels (Meurling, Hedman, Sandahl, Felländer-Tsai, & Wallin, 2013), and training programs designed for novice RNs such as nurse residency, internships, or orientation programs (Edwards et al., 2015). The purpose of this systematic review was to synthesize findings from qualitative, quantitative and mixed methods investigations that examined effective continuing education and training strategies for improving patient safety in hospitals while enhancing confidence among novice RNs.

### **Methods**

A Boolean search using EBSCO*host* search engine was applied for this review. The search was set to show recently published papers within the last ten years, sorted by relevance from January 2007 through August 2017, while searching for the most recent patient-safety focused research-based novice RN training. The author of this manuscript independently conducted the search and selection process. The articles of the initial search were critically reviewed for relevant data by the title and abstract. These articles were indexed as eligible, potentially eligible, and not eligible. Prospective eligible and potentially eligible full-text reports were reviewed for inclusion through predefined criteria and study quality indicators. Data were extracted, synthesized, summarized, and reported based on the reporting approach, the 'Preferred Reporting Items for Systematic

Reviews and Meta-Analyses' (PRISMA) (Moher, Liberati, Tetzlaff, & Altman, 2009).

Figure 2.1 summarizes the study selection process for this search, including identification, screening, eligibility, and inclusion criteria (Liberati et al., 2009).

### **Eligibility Criteria**

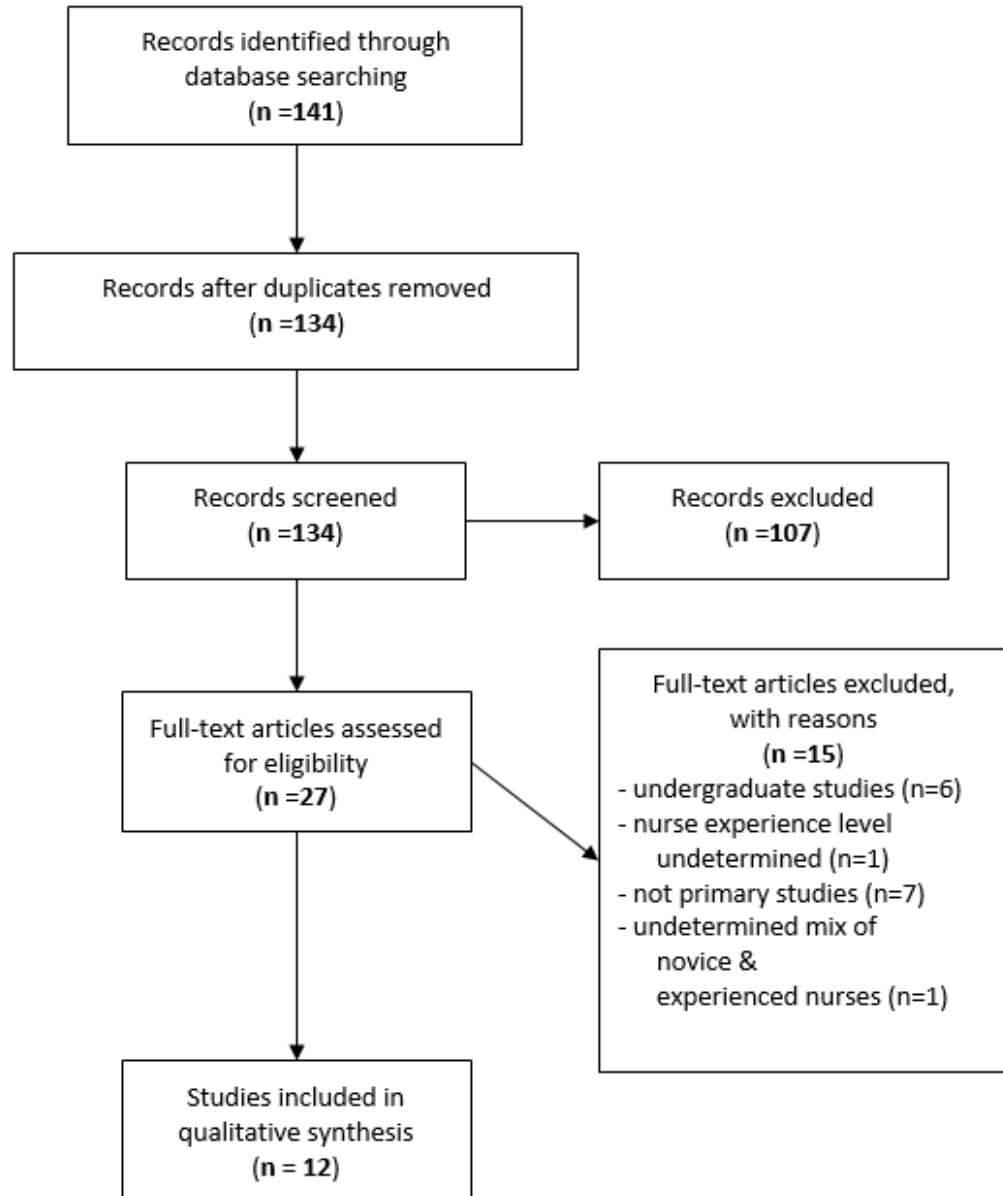
For this review, post-graduation education development programs refer to education and training programs in a hospital setting, and are synonymous. The terms novice nurse, new nurse, graduate nurse (GN) and newly licensed registered nurse (NLRN) are characterized in the literature as a newly graduated, novice RNs with up to 3 years of experience after graduation. To be included in this review, novice RNs must have experienced some type of continuing education or learning experiences and have hospital based employment. Reports on methods or strategies of education or training provided to undergraduate nursing students or primarily with other allied health learners are excluded. Education must have been delivered, facilitated, or monitored by an experienced educator or clinical team. This review includes peer-reviewed, primary literature of original research published in English.

### **Search Process**

The following databases were used in this search: CINAHL, Communication & Mass Media Complete, Education Full Text (H.W. Wilson), Health & Wellness Resource Center, and Science Direct. Key terms included, ("teach method" OR "education strateg\*" or "education method" OR "teach strateg\*") AND ("self-efficacy" OR "confidence") AND ("novice nurs\*" OR "new graduate nurs\*" OR "newly licensed registered nurs\*") AND ("patient safety" or "safe patient care").

**Figure 2.1**

*Systematic Review Selection Process*



## **Information Sources and Study Selection**

The initial EBSCO*host* search yielded a total of 141 articles. Seven articles were removed as being duplicates. The titles of these remaining 134 potentially relevant publications were screened for eligibility. If eligibility could not be determined by the title the article was further assessed by reading the abstract. If the eligibility could not be established by the content of the abstract, the entire article was accessed and reviewed for fit. One-hundred and seven records were excluded for not matching the purpose of the study. The remaining full text articles were assessed for eligibility. Fifteen articles were at this point excluded with six studies being undergraduate studies, one with indeterminate documentation of nursing experience, and seven not primary studies. Thus, twelve studies were deemed eligible for inclusion. Seven studies were conducted in the U.S. and five in other countries. To ensure quality of primary studies with diverse designs within this mixed method systematic review, the evaluation tool ‘Mixed Methods Appraisal Tool’ (MMAT) – Version 2011 was used to assess the eligible qualitative, quantitative, and mixed methods studies for study quality indicators (Pluye et al., 2011).

## **Results**

### **Education Strategies**

The Results section presents an analysis of education strategies, study design, theoretical framework and key outcomes (confidence, competence).

According to the literature there are multiple strategies available to design education programs for novice RNs focused on patient safety. The main education strategies, in order of high to lower frequency of use, were: (1) simulation-based learning (Beyea et al., 2010; Fadale, Tucker, Dungan, & Sabol, 2014; Jung, Lee, Kang, & Kim,



2017; Kaddoura, 2010; Rhodes et al., 2016; Roche et al., 2013; Shepherd, Kelly, Skene, & White, 2007; Tsai et al., 2008; Yoo & Park, 2014; Young & Burke, 2010), (2) didactic instruction and preceptored clinical experiences (Beyea et al., 2010; Spiva et al., 2013), and (3) use of multi-media electronic technologies (Tsai et al., 2008; Yoo & Park, 2014). Case scenarios were reported as adjunct strategies and were used in a majority of studies (Beyea et al., 2010; Fadale et al., 2014; Jung et al., 2017; Kaddoura, 2010; Pfaff, Baxter, Jack, & Ploeg, 2014; Rhodes et al., 2016; Roche et al., 2013; Shepherd et al., 2007; Tsai et al., 2008; Yoo & Park, 2014; Young & Burke, 2010). Student feedback was reported in most of the strategies as being provided through human debriefing experiences (Fadale et al., 2014; Jung et al., 2017; Kaddoura, 2010; Rhodes et al., 2016; Roche et al., 2013; Shepherd et al., 2007; Spiva et al., 2013; Young & Burke, 2010), through real time computerized feedback (Tsai et al., 2008), and through real time live human feedback (Beyea et al., 2010; Spiva et al., 2013).

It is notable that when several strategies were applied together, simulation-based learning was most frequently used as the base strategy. For example, simulation in this review frequently included case study and debriefing (Fadale et al., 2014; Jung et al., 2017; Kaddoura, 2010; Rhodes et al., 2016; Roche et al., 2013; Shepherd et al., 2007; Young & Burke, 2010). In addition, simulation was found to have been combined with other strategies such as lecture (Beyea et al., 2010; Shepherd et al., 2007), skills stations (Beyea et al., 2010), clinical practice with preceptors (Beyea et al., 2010) and with self-directed learning packages (Shepherd et al., 2007).

Of the simulation strategies, multiple simulator tools were used. The most common simulator tool was the manikin (Beyea et al., 2010; Fadale et al., 2014; Jung et

al., 2017; Kaddoura, 2010; Rhodes et al., 2016; Roche et al., 2013; Shepherd et al., 2007; Young & Burke, 2010), including both high and low fidelity simulator capabilities. The second most frequently used simulator tool was multi-media electronic technologies (Tsai et al., 2008; Yoo & Park, 2014). These can be separated into different types of electronic technologies, 1) a virtual reality task trainer (Tsai et al., 2008) and 2) an audio visual case presentation (Yoo & Park, 2014).

High-fidelity simulator manikins are programmed to have a large degree of precision for replicating human clinical reaction (Beyea et al., 2010; Fadale et al., 2014; Jung et al., 2017; Kaddoura, 2010; Rhodes et al., 2016; Roche et al., 2013). Low-fidelity manikins copy or reproduce physical findings but do not interact with the learner (Shepherd et al., 2007; Young & Burke, 2010). Simulations without manikins included multi-media technologies where simulation recreates a partial environment for education training where one or more targeted tasks are performed (Tsai et al., 2008; Yoo & Park, 2014). Physical task training tools combined with computer technology replaced real clinical procedure experiences with guided, direct participation (Tsai et al., 2008; Yoo & Park, 2014). Education without any type of simulation included investigation for effectiveness of collaborative interdisciplinary practice experiences (Pfaff et al., 2014), and the effectiveness of classes and clinical experiences (Spiva et al., 2013). Overall, most studies had small sample sizes.

### **Study Design**

Research designs varied within the twelve studies reviewed. Study sample sizes ranged from 10-514 individual novice RN participants. Of these, three were experimental designs (Roche et al., 2013; Shepherd et al., 2007; Tsai et al., 2008), including: one

prospective experimental design (Roche et al., 2013), one interventional study (Shepherd et al., 2007), and one experimental pretest posttest, random assignment (Tsai et al., 2008). There were two mixed methods designs, including one explanatory sequential mixed methods design (Pfaff et al., 2014) and one experimental, retrospective design (Young & Burke, 2010). Four investigations were quasi-experimental, including one prospective study design using pre-test, intervention, and post-test with a non-synchronized, non-equivalent control group (Yoo & Park, 2014), two pretest-posttest cohort designs (Jung et al., 2017; Rhodes et al., 2016), one pretest-posttest single group design (Fadale et al., 2014), and one longitudinal, non-randomized study (Beyea et al., 2010). There were two qualitative designs, including one exploratory, semi-structured individual interview design (Kaddoura, 2010), and one individual, unstructured, open-ended interview design (Spiva et al., 2013).

### **Theoretical framework**

Theoretical frameworks and conceptual models serve as foundations for investigations and are used to describe the phenomenon under investigation. Theoretical foundations provide a systematic method for articulating an idea (theory) and how that idea is turned into action (practice). Theory is therefore an important element of the systematic review as it assists the reader with understanding the interpretation of investigational outcomes. In essence, the inclusion of theory in the design of an investigation works as a guide when implementing interventions for clinical practice. The absence of a theoretical framework produces a lack of awareness of the underlying concepts and hinders data extraction and the methodological criteria used to interpret

findings. Theory is foundational to scientific study; reports should clearly describe the logic of how the theory operates in the study (Soares & Yonekura, 2011).

About one-half of the studies reported methods guided by a theoretical framework. Beyea et al (2010), Jung et al. (2017), Kaddoura (2010), Roche et al. (2013) and Tsai et al. (2008) cited no specific theory to describe the underlying concepts in their studies. Pfaff et al. (2014) described the conceptual basis for the interventional strategy as being interprofessional collaboration. Yoo & Park (2014) reported the intervention to be based on a constructivist framework. Fadale et al. (2014) and Shepherd et al. (2007) reported using Bandura's Self-efficacy theory. Fadale et al. (2014) measured changes in self-efficacy and Shepherd used the theory to describe the impact of learning interventions.

Rhodes et al. (2016) found Dewey's experiential learning a good fit and used this theory as a foundation for examining nurse multidisciplinary simulation. Young & Burke (2010) used Rogers's theoretical framework to guide the investigation for the exploration of students' self-actualization experiences with simulation. Rhodes et al. (2016) was the only investigator to have described a theoretical model for debriefing. In this study, Rudolph's advocacy/inquiry provided guidance for creating a psychologically safe yet constructive learning environment.

### **Key Outcomes**

Outcomes in all studies were investigated by examining the perceptions of novice RNs. Findings were determined using a wide range of data collection and analysis techniques. For the most part, instruments were documented as valid and reliable, with the exception of the SSCS tool (Beyea et al., 2010) and the ACES validation form

(Young & Burke, 2010) where the design of the instruments were described but presented without clear documentation of validation or reliability. In some studies, confidence was measured and discussed in terms of self-efficacy. Others discussed the improved confidence of novice RNs for conducting specific clinically-important skills. Competence improved in novice RNs across all studies.

**Confidence.** Thematic analysis of the data resulted in finding conceptual patterns among the sources. Although training strategies varied, confidence was found to a strong theme in ten of the twelve studies. Notable, the investigation reported by Pfaff et al. (2014) on interprofessional collaboration had particularly interesting finding that suggest certain services may help facilitate novice RN confidence development. Here, acute care RNs experiencing interprofessional collaboration developed higher confidence levels compared to those in community care and long term care employment.

Other factors related to enhanced confidence were found to be the novice RNs proximity to the educator, accessibility to the educator, proximity to manager, accessibility of manager, number of team strategies, number of different disciplines worked with daily, and satisfaction with the team (Pfaff et al., 2014). Interview data corroborated the participant's reported increases with confidence in supportive relationships, respect, knowledge and interprofessional collaborative experience (Pfaff et al., 2014). Confidence in the novice RNs' ability to think critically in terms of priority setting, decision making, communication, and reporting improved during simulated experiences (Jung et al., 2017). Elsewhere, confidence levels improved after high priority education was delivered in classes and through clinical rotations. Confidence

improved over time and within different themes of learning such as experience, learning to manage time, and learning to communicate (Spiva et al., 2013).

Several simulation studies also examined confidence (Beyea et al., 2010; Jung et al., 2017; Rhodes et al., 2016; Shepherd et al., 2007; Spiva et al., 2013; Tsai et al., 2008). Novice RN confidence improved over time in simulation experiences (Beyea et al., 2010; Spiva et al., 2013) and in the clinical environment up to 18 months after the simulation training (Rhodes et al., 2016). Analysis demonstrated positive feedback in confidence with mastering skills (Tsai et al., 2008), and gains in knowledge were also associated with the improvement of confidence (Shepherd et al., 2007). Others found simulation experiences to boost confidence for using staffing resources (Young & Burke, 2010).

Confidence improved with practice in solving clinical problems. In case-based learning (CBL), confidence levels improved for novice RNs actively engaged in problem-solving during the viewing of video re-enactment simulated case-based scenarios (Yoo & Park, 2014). This study included a non-equivalent control group. The education was delivered by two different specialty groups of professionals during two different periods of time. The traditional lecture was delivered by the Quality Management Department to novice RNs in 2009 whereas the professional video case reenactment was created and delivered in 2010 by the investigators and a case-based learning education consultant (Yoo & Park, 2014).

**Competence.** Competence was a second thematic pattern found within the data. Of the twelve studies included in this review, all twelve found an improvement in competence levels among novice RNs (Beyea et al., 2010; Fadale et al., 2014; Jung et al., 2017; Kaddoura, 2010; Pfaff et al., 2014; Rhodes et al., 2016; Roche et al., 2013;

Shepherd et al., 2007; Spiva et al., 2013; Tsai et al., 2008; Yoo & Park, 2014; Young & Burke, 2010). Competency in novice RNs was described as the ability to meet entry-level expectations of the nursing profession (Beyea et al., 2010). More frequently, however, competency was defined in terms of specific clinical skill or skills, such as in communication (Jung et al., 2017; Pfaff et al., 2014; Roche et al., 2013; Spiva et al., 2013; Young & Burke, 2010), assessment skills (Roche et al., 2013; Shepherd et al., 2007; Spiva et al., 2013) critical thinking skills (Jung et al., 2017; Kaddoura, 2010; Yoo & Park, 2014; Young & Burke, 2010), prioritization skills (Young & Burke, 2010), advanced nursing skills (Fadale et al., 2014; Tsai et al., 2008, 2008), modest steady increases in knowledge, (Rhodes et al., 2016) and in overall clinical performance (Beyea et al., 2010; Kaddoura, 2010).

As noted, competence was measured in multiple skill types. For example, Pfaff et. Al. (2014) found that communication skills improved for participants who engaged in interprofessional educational opportunities, with qualitative data supporting the quantitative findings for improved communication skills (Pfaff et al., 2014). Communication also improved during novice RNs orientation experiences. Professional growth was found to improve with time as novice RNs improve communication skills (Spiva et al., 2013). While exploring novice RN experiences of simulation, research findings suggest that both clinical and simulation experiences improve novice RN communication while fostering critical thinking skills, (Young & Burke, 2010) and increasing knowledge (Rhodes et al., 2016). Interestingly, communication performance data demonstrated no statistical significance between the simulation intervention group and the written case studies control group (Roche et al., 2013); however the intervention

group (simulation) performed better on safety behaviors than the control group (written case studies). This suggests that practicing scenarios with hands-on experiences is more effective than discussion of the scenarios without hands-on practice.

In an investigation by Shepherd et al. (2007), three learning interventions were analyzed for clinical reactions of novice RNs: a self-directed package, a self-directed learning package with two scenario-based didactic lectures using PowerPoint workshops, and a self-directed learning package with two low-fidelity manikin simulation sessions. Novice RNs' patient assessment skills improved significantly during simulation interventions as compared to control groups using scenarios-based didactic lecture with PowerPoint. Novice RNs' patient assessment skills also improved significantly during simulation interventions as compared to the control groups using the self-directed learning package (Shepherd et al., 2007).

Critical thinking as a competency was also measured. Beyea (2010) found critical thinking proficiency to improve during manikin simulations as novice RNs learned to "think on the fly". (Beyea et al., 2010). Young and Burke (2010) also found critical thinking to be enhanced using simulation during the Advanced Clinical Education and Simulation (ACES) course. In a mixed method study, novice RNs were surveyed on their course experiences. Novice RN participants reported that the manikin simulation course fostered their critical thinking competency during their transition into skilled and safe practicing RNs (Young & Burke, 2010).

Other investigations reporting improved competency discussed enhanced prioritization skills (Young & Burke, 2010), advanced nursing skills (Fadale et al., 2014; Tsai et al., 2008, 2008), and overall clinical performance (Beyea et al., 2010; Kaddoura,



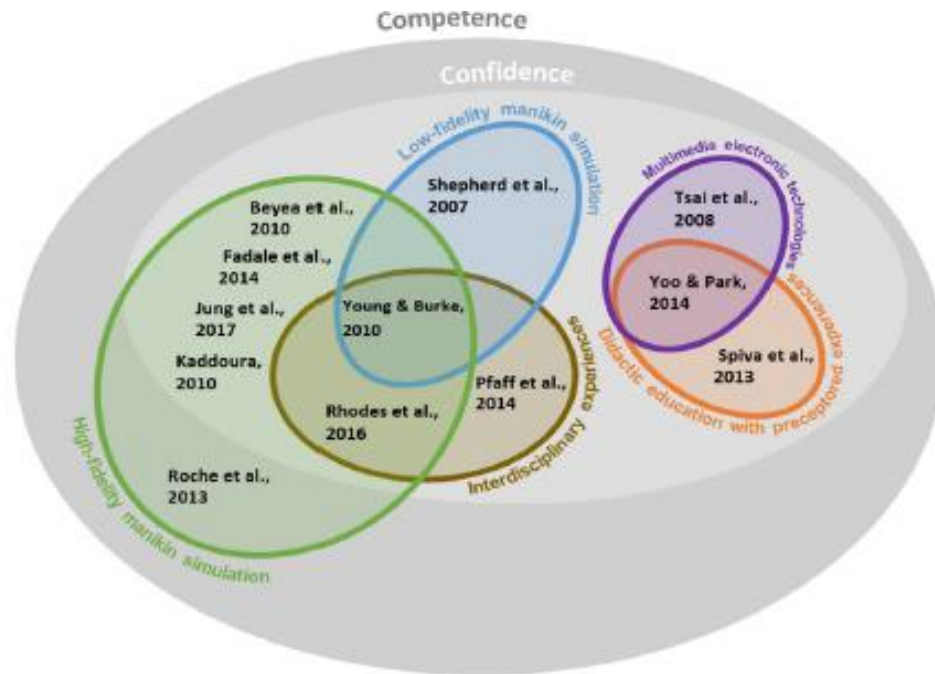
2010). Although novice RNs perceived the simulation portion of the ACES course to have improved their prioritization skills, a larger majority thought that the post-simulation debriefing sessions were more valuable for learning to prioritize. In an investigation by Fadale et al. (2014), advanced nursing skills were found to improve during port-a-cath simulations using electronic multi-media. Self-directed learning during virtual reality simulations was found to be an effective process for improving advanced skills with knowledge gains and improved clinical procedure skills (Tsai et al., 2008). Simulation also proved to be helpful for learning vasopressor titration skills, an advanced nursing skill (Fadale et al., 2014). These are especially useful findings as they may aid in improving patient safety training as simulation experiences were found to be effectively prepare novice RNs to care for very sick patients (Beyea et al., 2010; Kaddoura, 2010).

### **Discussion of Education Strategies**

Figure 2.2 provides a representation of selected studies' education strategy with findings for confidence and competence. Improvements to novice RNs' confidence were found in seven out of eight investigations that included manikin simulation. The Discussion section herein presents key evidence from each of the education strategies, and discusses how confidence and competence play a role in each of the findings.

**Figure 2.2**

*Illustration of Commonalities and Distinguishing Features among Education Strategies Reported to have Improved Confidence and Competence in Novice RNs*



Novice RNs require specialized teaching strategies as they are at increased risk of medical error resulting in patient harm. Effective patient safety education for novice RNs working in hospitals in an understudied topic. The implications for the findings in this review could affect the direction of nurse training investments. Simulation in healthcare seems to be the overall favorite as an interactive technique replacing real experiences with guided experiences (Gaba, 2007). Depicting substantial aspects of patient care, simulated nursing experiences are one option among numerous strategies available to supplement the education and training novice RNs require to increase the confidence and competence novice RNs for safe patient care (Beyea et al., 2010; Fadale et al., 2014; Jung

et al., 2017; Kaddoura, 2010; Roche et al., 2013; Shepherd et al., 2007; Young & Burke, 2010).

Simulation has been widely accepted and used in academia for the clinical education of undergraduate nursing students (Cant & Cooper, 2016; Hayden et al., 2014). Few studies, however, have focused on novice RN hospital-based simulation training for continuing education (Aebersold & Tschannen, 2013; Jung et al., 2017; Rhodes et al., 2016; Young & Burke, 2010). Previous literature indicates that simulation could increase safety awareness by widening the scope of simulated experiences to include potential errors and strategies for resolution (Radhakrishnan, Roche, & Cunningham, 2007; Roche et al., 2013). A recent meta-analysis affirms the findings in this systematic review for simulation having a positive effect as a continuing education strategy with RNs, improving both knowledge and performance outcomes (Orique & Phillips, 2017).

On a basic level, simulation is the interactive technique for enhancing the reaction of participants to a high risk skill (Gaba, 2007). It can be a substitution for the real thing, such as using a manikin or a human being for simulating a healthcare scenario. Although simulation does not require a manikin, training may be enhanced by its use. Simulation in any form must match learners' needs (Aggarwal et al., 2010). Scenarios using simulation methods can range from focused clinical education to mass trauma scenarios. Simulation, however, should be seen as an exercise not necessarily dependent how well the simulation matches the realism of the clinical situation. Instead the objective should be for the trainee and the trainer to skillfully utilize simulation to gain knowledge and experience (Aggarwal et al., 2010). Simulated scenarios can be designed to be cost-effective strategies for providing continuing education (Aggarwal et al., 2010).

## **Low and High-Fidelity Manikin Simulation**

A key advantage to low fidelity simulation is that it is cost-effective and portable. Low fidelity simulators can be mobilized to facilitate learning in a contextualized, real-world setting. Accessibility to training could improve training compliance and reduce time spent away from clinical care. Scenarios, when repeated frequently, may serve to reinforce training by decreasing the deterioration of learned concepts. Moreover, regularly scheduled simulations could help with the comfort level of managing critical patient events, improving novice RN ability for early recognition of patient deterioration and crisis situation interventions with increased frequency of training events. A disadvantage is that that low fidelity simulators do not respond to the actions of the novice RN, there is no life-like feedback. Novice RNs learning in low fidelity situations must be given information verbally about the scenario with their patient during their care (Shepherd et al., 2007; Young & Burke, 2010).

High fidelity simulation, on the other hand, allows for the realism of more complex patient care scenarios. High fidelity simulators provide immediate, life-like feedback to the learner. Confidence and competence were each found to be important findings in simulation strategies. These improvements are likely due to the gains in experience novice RNs receive by role-playing and practicing critical clinical skills required for safe patient care. Through the fidelity of the simulation, just-in-time feedback assists with supporting health care concepts learned in the classroom. Moreover, high fidelity simulations could help with improving novice RN ability for early recognition of patient deterioration and management of crisis situation interventions to prevent failure to rescue situations.

However, high-fidelity simulation has its drawbacks. High fidelity simulators are expensive, and are less mobile than low fidelity simulators. Because of the realistic, life-like responses, high fidelity simulation can be intimidating for the novice RN learner. In addition, high fidelity simulators require more extensive educator training. Even with experienced nurse trainers, the complexity of a high fidelity simulator can be daunting as educators learn to use the computerized programming of the simulator. Feedback is essential to novice RN learning, and is best provided by an experienced and well trained simulation educator (Beyea et al., 2010; Fadale et al., 2014; Jung et al., 2017; Kaddoura, 2010; Rhodes et al., 2016; Roche et al., 2013).

### **Multi-Media Electronic Technologies**

Virtual reality and audio-visual simulations provide cost-effective user education that can be practiced over and over again without the need for an onsite trainer. This method can employ case scenarios for training purposes, or can demonstrate proper technique of a specific clinical skill. The downside is that the education must be created in advance using technology that may be challenging to learn, or cost-prohibitive as an initial purchase. Another limitation is that there is no learner feedback unless a trainer is onsite to interact with the students (Tsai et al., 2008, 2008; Yoo & Park, 2014).

Simulation without learner feedback is likely a significant limitation as necessary information required for effective learning is absent, potentially affecting learner outcomes.

### **Interdisciplinary Experiences**

Interdisciplinary experiences provide well rounded learning in the clinical setting. Connecting novice RNs with formal leaders and members of the interdisciplinary team

can increase novice RN confidence in team communication. A limitation is that the experiences, when practiced on live hospitalized persons, produced safety risks. One way to minimize risk is to simulate interdisciplinary scenarios, however simulated interdisciplinary scenarios require considerable planning and could remove some clinicians away from patient care (Pfaff et al., 2014).

### **Didactic Learning with Preceptored Experiences**

Preceptored experiences also served as non-traditional methods for training novice RNs (Spiva et al., 2013). Preceptored education strategies have similar outcomes to previous findings that “master apprenticeships” are valuable for the clinical training of novice RNs (Aggarwal et al., 2010). However, there are too few preceptors in the workplace, placing undue stress on the few that remain in the workplace further exacerbating risks to patient safety. Moreover, novice RNs can sometimes cause patient harm on patients by practicing before they are safe clinicians. Findings from this literature review, on the other hand, note that the use of simulated clinical experiences ensure that those initial novice RN high risk or safety focused experiences can be instead practiced in a way that cannot harm real patients.

For example, coupled with preceptored clinical experiences and individual training sessions, the effectiveness of scheduled classes for novice RN education can enhance overall clinical confidence and skill competence (Spiva et al., 2013). Interestingly, there is no added value with the addition of self-directed learning packets with didactic instruction for the improvement of competence and confidence when combined with simulated learning experiences (Shepherd et al., 2007). Didactic learning is an efficient method for quickly dispersing small bits of information in short bursts of

time such as for providing content in orientation. Preceptored experiences are an excellent resource for novice RNs, providing some protection from harm for novice RNs and the patient during the novice RNs' first weeks and months of patient care. Individual training for skills such as IV and port-a-cath insertions, pump programming, Foley catheterizations, or chest tube maintenance, where during school little to no practice was provided.

### **Implications for Practice**

Americans are older, sicker, and more expensive to care for than at any time in history. Almost 20 years after the Institute of Medicine reported on hospital safety, "To Err is Human: Building a Safer Health System, medical error is the third leading cause of death behind breast cancer, AIDS, and motor vehicle crashes (Gonzalez & Ghaferi, 2014). Previous efforts to improve safety in hospitals has stalled (McCarthy, 2015). In hospitals, novice RNs have the greatest risk for medical error and severity of error. Novice RNs learn differently than experienced RNs because they do not have the experience to draw from. This makes their education that much more challenging. What remains unclear is how to best educate patient safety to the novice RN to minimize or prevent medical error.

Simulation strategies that work well for the transition from novice to practicing RN is an important goal for patient safety initiatives in novice RN education. Simulation has proven a positive alternative to traditional continuing education in novice RNs. The search for the most successful combinations of education patterns, those that have not yet been recognized as proven strategies, might be uncovered as important features for professional development in the novice RN transition to competent RN. Moreover,

novice RNs experiencing positive transitions to safe, practicing RN create happier novice RNs, potentially raising retention rates for this group (Brakovich & Bonham, 2012). In addition, overall improved quality of hospital care lowers the risk of medical error and has the potential for producing happier patients as evidenced with improved patient satisfaction scores (Andel, Davidow, Hollander, & Moreno, 2012).

Today's healthcare setting care is complex. Caring for patients safely is more challenging than ever before. In this review multiple examples of learning strategies have helped describe effective training for post-graduate novice RNs, including manikin simulation, multi-media electronic technologies, interdisciplinary experiences, and didactic learning with preceptored experiences. Simulation as a non-traditional learning approach included low and high fidelity manikins, and multi-media electronic technology simulation. It appears that simulation is the most adaptable of the three dominant strategies reviewed. Simulation can be used independently or combined with other strategies; in addition simulation seems to provide tremendous location flexibility and cost efficiency, and can be molded around objectives designed to fit the need of the novice RN.

In the hospital, both high and low fidelity simulation can help with improving novice RN ability for early recognition of patient deterioration and management of crisis situation interventions, and each strategy has its drawbacks. While high fidelity experiences provide immediate, life-like feedback to the learner, they are expensive and can require a laboratory setting with highly trained clinical educators. Low-fidelity simulation can be used to train novice RNs in a variety of settings for multiple patient safety scenarios. Simulation sessions where the novice RNs needs to have hands-on



practical exercise is possible with both with lab and in-situ novice RN training exercises. For example, when a patient is transferred to a different level of care, multiple patient safety assessments need to be completed. Scenarios that include safety checks such as physical assessment, medication verification, IV assessment, IV pump and other equipment assessments can be completed by low-fidelity manikin simulation in either setting, lab or in-situ. Especially in the clinical setting, simulations are an effective strategy in preparing novice RNs for the unexpected clinical scenario (Shepherd et al., 2007).

Simulation was found to be the overwhelming predictor for novice RN gains in confidence and practice competence. Based on the articles analyzed for this systematic review, it seems clear that simulation is an effective choice for training novice RNs as they transition into confident, competent RNs who practice safely. Nurse educators with experience in acute care and simulation training techniques can add to novice RNs' patient care experiences by using simulation in the acute care setting. Simulation strategies in healthcare are a useful tool for addressing error and improving teamwork and communication. Novice RNs are able to improve confidence and competency when provided simulated training, and view simulated scenarios as training experiences capable of producing a change in their behavior for the acquisition of new skills.

The use of effective teaching strategies has been found as especially important for studying complex concepts such as patient safety in clinical education. Simulation for training novice RNs was demonstrated as a powerful and effective strategy, and each of the nine investigations that used simulation in some form experienced an improvement in competence, confidence, or both during novice RN training. Simulation has shown to be

beneficial to novice RNs learning to care for patient safely, and simulation research with novice RNs is one unique course of action that might help prevent future medical error tragedies among novice RNs.

### **Recommendations for Further Research**

Diverse forms of data sources and analysis methods are important in research design because multiple, varied data sources and perspectives help strengthen the validity and credibility of the systematic analysis. Therefore, suggestions for further research include a more comprehensive synthesis of data in the form of a mixed method systematic review using a team approach. Moreover, increasingly complex hospital environments, greater numbers of patients with multiple, chronic health care problems, limited preparation time, and scarce numbers of clinical sites result in novice RNs receiving limited hands-on opportunities- the very experiences required to prepare them to function as competent, safe RNs in today's hospital setting. The findings from this review support Benner's understanding of novice RN professional development from novice to expert nurse (Benner, 2001). Nurses may be better able to conceptualize and therefore identify appropriate courses of actions through repeated practice, including simulated experiences. Thus, education that is designed fill gaps in the preparation and readiness of novice RNs will most likely be fulfilled through the development of simulation interventions to be used in the hospital setting. Future research should additionally focus on the prevention of "failure to rescue" events by novice RNs. By gaining confidence and competence particularly in caring for lower volume emergent situations such as a patient experiencing clinical deterioration, novice RNs will greatly

reduce their risk of medical error and hospitals will achieve improved safety for its patient population.

### **Strengths and Limitations**

This review examines strategies to teach novice RNs learning to care for patients safely. A strength of the review is the structured search of available literature within peer-reviewed primary studies for strategies used to train novice RNs. The review outlines strategies for supporting novice RNs, and describes the lesser successful strategies. Educators are able to take these results and use them for improving the development of unique, effective post-graduate novice RN training. The limitation of the ten-year search range and by limiting the sample to novice RNs in the hospital setting many have reduced evidence found on patient safety continuing education strategies. Also, the data field search strategy using EBSCOhost resulted in capturing a limited number of databases. In the future a broader set of keywords might help increase the return on the number of databases, therefore increasing the number and variety of potentially eligible articles. In addition, the inclusion of a second search engine for exploring biomedical literature such as PubMed (NCBI, n.d.) and searching databases individually could yield an increase in search results (Berkeley, 2011).

Another limitation is that approximately half of the studies were completed outside of the United States increasing the divergence of clinical practice and settings. This variability of locations may have contributed to potential differences in learner perspectives. Across studies, education strategy was also diverse and varied widely both in the base and adjunct education strategies thereby limiting generalizability of the results. In addition, the assessment of novice RNs clinical ability differed and in some

cases was reported as challenging. A higher quality assessment of novice RN clinical ability could help support methods for evaluating novice RN learning achievements and serve as a starting point for a greater focus on post-graduate education development. Moreover, outcomes for each strategy were measured using different instruments and direct observation was described as not always accurate due to the techniques used in assessment and outcomes for each strategy were measured using different instruments and direct observation was described as not always accurate due to the techniques used in assessment and potential inter-rater differences. Novice RNs rating their outcome perceptions each have their own human history of clinical and life experiences and so perceptions when rating learning experiences are likely to vary as well. When data collection methods vary, outcomes comparisons across studies are challenging.

To reduce publication selection bias this systematic review encompasses qualitative, quantitative, and mixed methods research. A qualitative synthesis, this report does not include meta-analysis. The omission of a meta-analysis might be considered a limitation by some readers. However, the outcomes of the selected studies were derived by both quantitative and qualitative data. Qualitative methods are based on observation and do not use figures and numbers. In addition, the strategies reviewed covered multiple educational modalities. Thus, a mathematic summary meta-analysis of the outcomes using the available statistical results would provide little insight for readers (Gopalakrishnan & Ganeshkumar, 2013).

## **Conclusion**

Continued evidence collection and the assessment surrounding safe patient care education facilitates a better understanding of how novice RNs can improve their practice confidence and effectively learn to keep patients safe. This literature review investigated strategies used to train novice RNs for safe patient care and spotlights the paucity of evidence focused on confidence and safety in hospital-based continuing education. A highlight of this review reveals several interesting findings. Simulation, far outnumbering other reported strategies, seems to be gaining acceptance as an effective option that can be used to increase novice RN confidence for the application of clinical skills used to care for patients safely. The pathway to get there, according to the literature, is to ensure simulated experiences include potential errors and strategies for resolving those errors. Combined with an increased focus on patient safety, hands-on simulated clinical experiences appear to positively affect novice RNs' abilities to obtain relevant clinical experience and, by making connections through repeated practice, develop higher levels of thinking. Serving as a guide for future research in the exploration for novel methods of delivering simulation training, this review supports the call by the Institute of Medicine (IOM, 2011) the Agency for Healthcare Research and Quality (AHRQ, 2016b), and the National League for Nurses (NLN, 2014b) to develop, test, and evaluate strategies with a focus on simulation for improving the safe delivery of health care. The overarching goal is to create a foundational knowledge base from which to draw from in planning the investigation of simulation for behavioral changes of novice RN at the patient bedside, and later for the impact of learning on patient outcomes.

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**CHAPTER 3**  
**RESEARCH PROPOSAL**

**EXPLORING NOVICE RN'S PERCEPTION OF ACLS SIMULATION:  
RECOGNITION AND PREVENTION OF FAILURE TO RESCUE**

The purpose of this study is to explore how ACLS simulation influences a novice RNs' perceived ability to respond to changes in the patient's condition that if otherwise left untreated, would result in failure to rescue. Perceived ability, or self-efficacy, is a person's belief in their capacity to execute behaviors necessary to achieve specific goals. The sample includes twelve novice RNs with between 6 - 24 months of critical care experience employed by one 1,250-bed academic hospital and one 220-bed community hospital in the Midwestern United States. Aim 1 is designed to explore novice RNs' self-efficacy as affected by ACLS simulation, and will be measured by participants completing the General Self-Efficacy (GSE) scale in the form of a survey, pre-and post-ACLS training. GSE scores will be analyzed using a paired sample t-test for effect. Aim 2 is designed to explore novice RNs' perceived ability to respond to situations that could result in a failure to rescue. Data will be collected through transcribed semi-structured interviews to be completed within three months of participating in ACLS training. Analysis will be conducted using a thematic analysis approach.

Implications for this research include a better understanding for how to potentially build a sense of self-efficacy in novice RNs for recognizing and responding to changes in patient condition. This enhanced understanding will provide further direction for structuring simulation and related education experiences as nurses enter their real-world practice. Therefore, in order to address the gaps in novice RN's perceived self-efficacy,

the purpose of this study is to examine how ACLS simulation training facilitates individual hospital staff nurses' ability to recognize and respond to patients experiencing health instability. Consistent with this purpose the following aims have been developed utilizing Bandura's theory of self-efficacy as a conceptual framework:

**Specific Aim 1:** To describe if ACLS simulation affects a novice RN's perceived self-efficacy to recognize and respond to changes in the patient's condition that, if left untreated, could result in a failure to rescue.

Research Question 1: Does ACLS simulation affect a novice RN's self-efficacy scores based on the General Self-Efficacy Scale?

**Specific Aim 2:** To explore the influence of ACLS simulation on novice RN's perceived ability to respond to situations that could prevent a failure to rescue.

Research Question 2: How does ACLS simulation influence a novice RN's perceived ability to identify early signs of change in condition that could result in a failure to rescue?

Research Question 3: How does ACLS simulation influence a novice RN's perceived ability to respond to emergent changes in patient condition that could result in a failure to rescue?

## **Research Design and Methods**

### **Design**

To achieve the study aims, an exploratory mixed-methods design will be conducted. Mixed-methods designs makes use of both qualitative and quantitative approaches. By combining the elements of both approaches the breadth and depth of the understanding of the research problems are expanded (Creswell, 2013). To achieve aim 1, pre-and-post ACLS simulation measurements of self-efficacy will be obtained by administering the General Self-Efficacy (GSE) scale survey. To achieve aim 2, semi-structured interviews will be conducted following the ACLS simulation experience.

### **Setting and Sample**

This study will be conducted in one 1,266-bed academic teaching hospital and one 220-bed community hospital in the Midwest (Glossary, 2019). The hospitals do not keep track of the number of nurses, including novice RNs hired annually into each specific specialty area. Currently, novice RNs in these hospitals that work in critical care specialty areas are required to successfully complete ACLS simulation training with some nurses in the non-critical care, medical surgical areas volunteering to complete the training (Advanced, 2019; Everything ACLS, 2019).

The academic hospital employed 2,575 and 2,657 bedside staff RNs in 2017 and 2018, respectively (xxx, xxx Human Resources Director and xxx, Talent Acquisition Manager, email communications, March 21, 2018 and August 15, 2019). Registered nurses staff critical care areas including seven Intensive Care and Step-Down Units (ICU/SD), one large Emergency Department (ED); and multiple non-critical, medical surgical units (Glossary, 2019). The community hospital employed approximately 444

and 426 bedside staff RNs in 2017 and 2018, respectively. Registered nurses here staff critical care areas including one Intensive Care Unit (ICU), one Step-Down Unit (SDU) and two Emergency Departments (ED); as well as multiple non-critical medical surgical care units (xxx, xx Human Resources Administrative Coordinator and xxx, Senior Talent Acquisition Specialist, email communications citing xxx Hospital Human Resources Key Performance Indicators (HR KPIs), November 8, 2018 and August 15, 2019).

The participant sample includes novice RNs that work critical care (Emergency Department, Intensive Care or Step-Down Units) and medical surgical areas, Table 4.1. Currently, novice RNs in critical care specialties are required to successfully complete ACLS simulation; those working in the non-critical, medical surgical specialties have voluntarily chosen to complete ACLS to advance their patient care skills. In 2017 and 2018, the academic hospital hired 310 and 426 graduate nurses respectively (xxx, xxx Human Resources Director and xxx, Talent Acquisition Manager, email communications, March 21, 2018 and August 15, 2019). In 2017 and 2018 the community hospital hired 58 and 51 graduate nurses respectively (xxx, xxx Human Resources Administrative Coordinator and xxx, Senior Talent Acquisition Specialist, email communications; November 8, 2018 and August 15, 2019).

**Inclusion criteria.** Novice RNs who have been in practice between 6 – 24 months who work in critical care and non-critical medical surgical areas, and are regularly scheduled for at least 24 hours every two week pay period will meet inclusion criteria. RNs with more than 24 months of practice experience, those working fewer than 24 hours per pay period, PRN/Per Diem status, outpatient clinics, temporary and agency staff are excluded from the study.

**Sample size.** Sample size is an important consideration in any study (Smith, 2013). Research should produce useful information; therefore, any study should only be undertaken if there is a realistic chance for yielding new or different findings. For example, a study that has a sample size which is too large could waste scarce resources and could expose more participants than necessary. On the other hand, a sample size which is too small may produce inconclusive results. Conducting a study that has little potential for the advancement of knowledge puts participants to needless risk and is thereby considered unethical (“How to calculate,” 2018).

According to Guest, Bunce, & Johnson (2006), a sample size of 12 participants is appropriate for qualitative data collection from a purposive sample of a relatively homogenous group. A purposive sample is useful in exploratory qualitative research, research with limited time, resources, and workforce, when there are limited numbers of participants that can serve as primary data sources, or when the sample is based on specific characteristics of a population. The objective of the study must also be taken into consideration. Purposive sampling is also known as judgment, selective, and subjective sampling and is a non-probability sampling technique (Etikan, Musa, & Alkassim, 2016). This study will undertake purposive sampling with defined inclusion and exclusion criteria leading to a representative sample of novice RN.

For the intervention pretest-posttest analysis, a statistical a power analysis (the probability of detecting the true effect size) was conducted to determine the size of the required sample that would provide clinically meaningful findings (Sullivan, 2012). The use of 80% is commonly used as a metric in research for the minimum power thought to yield a statistically significant result (Statsols, 2016).



The primary purpose of a power analysis in research is to determine the smallest sample size for detecting the effect of a given test at the desired level of significance. If the sample is too small there could be little detectable difference between the means resulting in insufficient evidence to draw a conclusion (Smith, 2013); therefore an underpowered sample could result in either a false negative type II error or a false positive type I error. In this study, an a priori sample size was calculated for the differences between two dependent means using the G\*Power computer application. This application, first released December 1, 2007 by Faul, Erdfelder, Lang, & Buchner (2007) is free. Screenshots of G\*Power do not require permission (Faul et al., 2007; “Power analysis,” 2017).

A fixed sample size of 12 novice RN, as proposed for the qualitative portion of the study, will result in the quantitative sample size being too small to be powered sufficiently for detecting statistical differences in SE scores. By having a fixed sample size, power needs to be determined post hoc in order to detect the probability of any true effect. In this study, 12 sets of data with a known GSE effect size of 0.5 (Luszczynska, Scholz, & Schwarzer, 2005) will yield a power of 49% (“Power analysis for paired sample t-test: G power analysis,” 2017). Therefore this sample is too small there could be little detectable difference between the means resulting in insufficient evidence to draw a conclusion (Smith, 2013); an underpowered sample could result in either a false negative type II error or a false positive type I error. Thus, by using a fixed sample size of 12 participants the study would be statistically underpowered and would be a limitation of the study.

Using the G\*Power computer application, an a priori power analysis indicated a minimum sample of 16 participants to detect a large effect size ( $d=0.75$ ) of significant differences in self-efficacy when comparing means in pre and post survey scores of novice RNs (Luszczynska et al., 2005). Effect size is useful because it is a way of quantifying the difference between groups (means) rather than confounding with sample size (Coe, 2002). Effect size, in terms of estimating this paired t-test sample size, is calculated by first determining the clinical meaningful increase (mean of the differences) and what type of variation (standard deviation of the differences) is expected for the pre-test and the post-test. Effect size is the expected mean difference divided by the standard deviation. Using an estimated mean difference of 3 and an estimated standard deviation of 4, with a significance level (alpha) of 0.05 using a two-sided, paired, dependent-samples t-test, effect size calculates to  $\frac{3}{4} = 0.75$ . An effect size of 0.75 is considered a large effect size. Appendix D.

## **Procedure**

**Recruitment.** In both hospitals, purposive sampling techniques were will be used to seek participants from the acute and critical care bedside nursing specialties. An Administrative Review from the Department of Research For Patient Care Services, New Study Proposal Review Committee xxx Hospital (xxx) Administrative Review - Student and the Administrative Review from the Department of Research For Patient Care Services, New Study Proposal Review Committee xxx Hospital (xx) Administrative Review – Student, was secured for IRB approval. Approvals letters by each organization are enclosed, Appendix I. Participants will be recruited as directed by the academic hospital by submitting a letter of invitation and the advertisement flyer for the study to

the Research Coordinator with the Department of Research for Patient Care Services for distribution to RNs registered class dates scheduled in September, October, November, and December. Participants will be recruited at the community hospital by presenting the study's purpose in person with the advertisement flyer to ACLS participants to RNs registered for the class date scheduled in November and December. The letter of invitation, Appendix J, briefly outlines the purpose of the study to prospective participants. The flyer, Appendix K, will contain information describing the study, inclusion criteria, contact information, and compensation. If the participant decides to participate they will contact the PI. Participants that meet study criteria will be asked to sign the consent form, Appendix G, and complete the demographics and the pre survey; within three months they will be contacted to complete a post survey and may be asked to interview. The signed consent will cover all areas of the study, including the pre and post survey, demographics, and the interview portion. Participant's email addresses will be collected and matched with their respective participant ID number so that participants may be contacted for the follow up portion of the study. ID numbers and email addresses will remain separate from the surveys and interviews to ensure anonymity.

### **Instrumentation**

**GSE scale.** The Generalized Self-Efficacy (GSE) scale is a self-report measure of self-efficacy (SE) that scores the general belief of a person's own ability to solve problems and reach goals. The self-efficacy of an individual is described in terms of a behavior or ability with regards to a specific situation. The GSE is a ten-item survey that was developed by Schwarzer, and Jerusalem (1995), originally in German. It was, however, translated into English by one of the authors, Schwarzer. The instrument has

since been translated into 33 languages. Over 1,000 international studies were completed using different translations of the GSE, these studies provide validity information on the GSE (Schwarzer, 2016). The authors provide an international SSPS dataset involving 18,000 participants to which individual researchers could verify their data (Schwarzer, 2016).

This survey has ten items, four choices per question scored from 1-4 points, respectively, "not true at all; hardly true; moderately true; and exactly true." The ten items are: "I can always manage to solve difficult problems if I try hard enough," "if someone opposes me, I can find the means and ways to get what I want," "it is easy for me to stick to my aims and accomplish my goals," "I am confident that I could deal efficiently with unexpected events," "thanks to my resourcefulness, I know how to handle unforeseen situations," "I can solve most problems if I invest the necessary effort," "I can remain calm when facing difficulties because I can rely on my coping abilities," "when I am confronted with a problem, I can usually find several solutions," "if I am in trouble, I can usually think of a solution," and "I can usually handle whatever comes my way." The total score is the sum of the ten questions and ranges between 10 and 40 points.

International average of GSE scores is 29.55 points. Lower scores indicate less self-efficacy and higher scores indicate more self-efficacy although no recommendation for scores achieving adequate self-efficacy is provided by the authors of the survey.

Permission to use the survey is granted to the public as long as the authors, Matthias Jerusalem and Ralf Schwarzer, are duly cited (Schwarzer & Jerusalem, 1995a; Schwarzer, 2014). Appendix C.

**Reliability and validity.** A survey that has already been shown to be valid and reliable is preferable (Creswell, 2013) The GSE has been widely used as a statistical test in healthcare (Schwarzer & Jerusalem, 1995a). The GSE is geared exclusively towards measuring self-efficacy and has produced consistently acceptable reliability and validity assessments during psychometric tests (Schwarzer & Jerusalem, 1995a).

Internal consistency, how well items on a survey measure the same construct or idea, is measured with Cronbach's alpha. Repeated studies have found the GSE survey items to measure the same latent or unobserved variables of self-efficacy. The GSE Cronbach's alpha for internal consistency, gauging how well the survey items measure self-efficacy, has been measured at 0.76 (acceptable reliability) and 0.90 (excellent reliability) (Schwarzer & Jerusalem, 1995b; Schwarzer, 2009).

The GSE has been found to be stable over time. A six-item shorter form of the GSE, the GSE-6, was developed and tested by Romppel et al. (2013) and the mean score was found to be stable after 28 months. The GSE relative stability was measured in reference to itself (two variables) over time for strength and direction of linear relationship. Coefficients were measured by re-administering the GSE-6 twice at 12 months:  $r = .50$  (moderate positive linear relationship) and at 28 months: correlation coefficient  $r = .60$  (moderately-strong positive linear relationship) (Romppel et al., 2013).

**Semi-structured interview guide.** A semi-structured interview guide, consisting of open-ended interview questions, will guide the interviews. The interview guide will serve to provide topics to explore regarding the influence of ACLS simulation on novice RNs' perceived ability to respond to situations that could prevent a failure to rescue. The questions are designed to elicit descriptions from participants of how ACLS simulation

might influence their ability recognize and manage changes in condition in hospitalized patients. Appendix E.

The interview guide and interviewing methods will be guided by the techniques described by Bricki & Green (2007). Bricki and Green suggested that open-ended interview questions should be organized to first include general interest questions to put the participant at ease, followed by specific and interesting questions to motivate the participant, sensitive topics should be covered last. Bricki and Green (2007) further suggested that interviews should be conducted in a private space that is free from disruptions.

### **Demographic Profile**

Demographic data will be collected at the time of interview. Demographic questions will include contact information, type of academic RN training, type of unit, most frequent shift worked. For the purposes of the GSE participants will be assigned a unique ID number. Appendix F.

### **Data Collection**

It is important to know how long and under what circumstances after the intervention that self-efficacy is perceived to be significantly improved and sustained (Bresó Esteve, Schaufeli, & Salanova Soria, 2011; Townsend & Scanlan, 2011). According to an investigation conducted by Buckley & Gordon (2011), self-efficacy was sustained with the majority of RNs (79%) having utilized their new advanced clinical skills between one and five times in the three month period following their simulation workshop. Moreover, in this three-month period, 64% of RNs reported they were better able to recognize an unstable patient, 87% reported that they retained the ability to

respond to an unstable patient in a systematic manner, and 77% reported improved ability to coordinate immediate responders during actual patient clinical emergencies since completing the workshop. This study demonstrates that advanced skill simulation can facilitate sustained self-efficacy in novice RNs with multiple opportunities for use of the new skills in actual emergency events resulting in positive patient outcomes. Recent simulation intervention studies provide evidence that multi-disciplinary medical professionals retained self-efficacy at least three months after simulation (Bhatnagar et al., 2017; Buckley & Gordon, 2011; Egenberg, Oian, Eggebø, Arsenovic, & Bru, 2017; Govender, Rangiah, Ross, & Campbell, 2010; Partiprajak & Thongpo, 2016).

Advanced Cardiovascular Life Support is a structured set of educational concepts and clinical interventions designed to assist with the recognition and urgent treatment of cardiac arrest, stroke, and other life-threatening medical emergencies (ACLS, 2003). The hospital providing the ACLS course runs one session per month and each session is conducted with a ratio of six students to one instructor. Data collection may require two or more sessions over the course of two to four months so that a sample of 16 novice RN participants may be identified. To address intervention fidelity, each group will receive the standardized ACLS training as set forth by the American Heart Association, Appendix A. To increase the response rate and to thank participants for their time, a prepaid Amazon.com gift card will serve as an incentive in exchange for completing the study.

Data for aim 1 will be collected by administering the GSE survey (Schwarzer & Jerusalem, 1995b; Schwarzer, 2009). The pre-test survey will be administered before ACLS training has begun. Post-test surveys will be administered remotely, within 3 months post ACLS simulation, by SurveyMonkey for participants not completing an

interview. For participants who are meeting with the PI for an individual interview, GSE surveys will be administered following the interview. It takes an average of four minutes to complete the GSE (Schwarzer & Jerusalem, 1995a) so completion should not be too burdensome for participants. The answers from the respondents will be collected and compiled into an EXCEL 2013 spread sheet for statistical analysis. To ensure anonymity, names will be removed and each respondent will automatically be assigned a random identification number for the purposes of organizing the qualitative and quantitative data. Participants completing the pre and post-test GSE, and those completing an interview, will be matched samples, paired with their appropriate numbers so that the resulting analyzed data is valid.

Data for aim 2 will be collected through individual face-to-face, online virtual, or telephone interviews using a semi-structured interview guide. Each interview will be conducted in a quiet location and time chosen by the participant, such as an office at the hospital or the hospital library either before or after work. Online virtual interviews will be recorded using laptops or cell phones installed with the online platform Zoom (Zoom, 2018). Two separate digital recorders will be used to record conversations during all interviews Interview audio files will be transcribed into text by the PI. Verification of text transcription accuracy of the recorded audio files will be completed manually by the PI, and if needed, will be edited to accurately match the audio recording.

The PI will member check with the participant throughout the interview to verify that the PI has an accurate understanding of the true meanings for the answers provided. The PI's personal biases will be kept in check to avoid tainting collected data to ensure quality research (Bricki & Green, 2007). Member checking is a form of respondent



validation to help pinpoint the accuracy and validity of the information provided by the participant during the interview. It also provides the respondent an opportunity to volunteer additional feedback (Bricki & Green, 2007).

### **Data Analysis and Interpretation**

The analysis and interpretation of the data are structured according to the aims of the study.

**Aim 1:** Data analysis for aim 1 are guided by quantitative, statistical methods using a paired sample, two-directional t-test collected from GSE survey data from novice RNs. A two-directional t-test consisting of a sample of matched pairs of similar units or one group of units that has been tested twice is used when there is a need to know if there is a significant difference in the mean between groups from pre to post intervention (UCLA, 2017). This statistical analysis will calculate the difference in the means between the two paired samples. In this study the matched pairs consist of the novice RN pre and post survey scores.

The t-test eliminates analysis bias by objectively determining if the difference in the mean is statistically significant or not significant. The pre-survey score serves as the control group because the survey will be taken by the novice RN before the intervention, the ACLS training, has been applied. By comparing the same novice RN's numbers before and after ACLS simulation, each novice RN is their own control for random variation of confounding factors (Polit & Beck, 2012).

**Aim 2.** Data analysis for Aim 2 will be guided by qualitative thematic analysis approach described by Braun & Clarke (2006). Thematic analysis will occur by searching across a data set of a number of interviews to find repeated patterns of meaning (Braun &

Clarke, 2006). The PI will upload interview transcripts into the Dedoose (2017) software for organization and management purposes which will help the PI become familiar with the data. Dedoose (2017) platform is a software program for qualitative and mixed methods data management, excerpting and coding, and data analysis.

Each transcript will be coded independently identifying salient text and phrases from the verbal data. Analysis of the study data will be guided by making thematic connections. Coding is the transitional process between data collection and data analysis and is completed through phases. Descriptive transcript coding can range from a single word to a small phrase. Codes summarize the primary topic of the excerpt into a condensed idea. Codes can also be taken directly from what the participant says and put in quotation marks. Codes are created so that patterns or themes in the data are more easily discoverable.

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In this study initial codes will be generated as the PI looks for themes to categorize for analysis. Braun & Clarke (2006) describe six phases in the thematic analysis and will be followed as described: 1. Each transcript will be read and re-read in

order to become familiar with the contents. During this time memos, recording reflective notes, will reference sources and describe meanings of the preliminary codes, recorded using the software Dedoose. 2. Next, analysis of the initial codes will be examined for patterns. Data will then be collapsed by making inferences on their meaning. Memos will continue to be entered into Dedoose and detailing why codes were combined and how codes may be related. 3. After data has been coded they will be combined and sorted into overarching themes. Memoing reflective notes will help the PI learn from the data during this phase. Initial codes may form sub-themes and other codes may later be discarded. Themes that do not seem to match an overarching theme may be housed into a miscellaneous section until the PI is sure that they do not fit into any main themes. 4. Each theme will be reviewed and analyzed for interesting aspects and patterns. Memoing will continue with theme interpretation and how themes were combined. Candidate themes that seem to form a pattern will be identified, and codes and themes that do not fit together will not be used. 5. Themes that make contributions to understanding the data will be reported using thick description, explaining both the behaviors and the context of the behavior in a meaningful way so that each theme contributes to the story. 6. Lastly, final analysis takes place and the themes are used to tell a compelling story of the data. Data extracts will provide evidence of prevalence of the theme (Braun & Clark, 2006). The resulting patterns and themes of this study will illuminate how novice RN's perceived their ability to respond to situations that could prevent a failure to rescue. A report will be created on the findings on the relationships of these identified concepts. Advisor Dr. Amy Vogelsmeier and committee members Dr. Lori Popejoy, Dr. Bonnie Wakefield, and Dr. Joi Moore are experienced qualitative researchers and will assist with

validating the ensuing Dedoose matrix and the analysis process throughout this investigation.

***Trustworthiness.*** Unlike quantitative research, qualitative designs do not rely on surveys to test if their findings are reliable and valid. Instead, qualitative research relies on findings that are trustworthy to establish if the findings are credible, transferable, confirmable, and dependable. *Credible* findings mean that the data was looked at from several points of view—that the data was explored by triangulation—using more than one method to collect data on the same topic. This investigation will have data collected using two methodologies, both qualitative and quantitative inquiries. *Transferability* of findings refers to when research is applicable to other situations with similar circumstances and similar populations, so these results will apply primarily to critical care novice RNs working in hospitals. This PI will use thick description to describe the contexts, circumstances, and situations of the study. *Confirmability* is the degree to which the findings are based on participants' responses. To enhance *dependability*, the same interview guide will be used for each participant. In an effort to conduct a neutral study by minimizing bias, this PI will not interject potential opinions or persuasive behavior of any kind during the collection, analysis, and interpretation of the data. In addition, an audit trail will be kept, including each step of data analysis to provide a rationale for the decisions made. Lastly, it is important that if the study were to be replicated, findings would consistent by other investigators. In this study details of the investigation and progression through the study will be documented step by step (Guest et al., 2006; Robinson, 2014).

Transcribed interviews will be read and re-read multiple times to assist the PI with gaining a thorough understanding of the content. To enhance categories of evidence and to clarify participant's perceptions, quotations will be used during analysis and reporting of the findings. All data will be documented and managed by the PI using software specifically designed for qualitative and mixed methods research; quality will be checked for procedure, thoroughness, and logic by the PI's advisor and committee members at weekly intervals; and retrievable by the PI advisor and committee members at any time throughout the investigation and for a period of time after the investigation as long as the software is available. To protect the rights and welfare of the human research subjects recruited to participate in this mixed methods study, at the conclusion of the project results will be communicated to the respective Institutional Review Boards (IRB), xxx Hospital, xxx Hospital, and University of Missouri Columbia.

**Strengths and Limitations.** Knowledge, expertise, and interpersonal skills will be used to explore interesting or unexpected ideas or themes raised by informants. Little is known about how novice RNs perceive simulation in hospital-based settings. However, simulation can increase safety awareness in novice RNs by including practice with potential errors and strategies for problem resolution. Strategies such as simulation can be designed to help novice RNs transition from academia to patient care, minimizing errors and patient harm. This investigation will advance the understanding of RNs' perspective on learning to respond to changes in the patient's condition and, as such, is important for the safety of patients.

**Strengths.** This study is a mixed method approach to research. The data from qualitative and quantitative method are to be integrated to provide enhanced

understanding of the research problem than by using either method alone. By approaching the problem using methodological triangulation, different aspects of the problem can be identified, examined, and analyzed. Qualitative data provides detailed information about the subjects and the context of the situation under investigation. Words are used to communicate ideas and information which can provide a detailed picture about how the novice RNs respond to simulation, and their feelings about simulation training. Quantitative data uses numbers and is used for statistical analysis. Results are intended to provide unbiased findings and can be used to assess the impact of the simulation intervention. Additional evidence and support for the findings is generated by combining and integrating both approaches in one study (Choy, 2014). The investigation will advance the understanding of RN's perspective on learning to respond to changes in the patient's condition, and is therefore important for the safety of patients.

***Limitations.*** The participants are to be recruited using a purposive sample from two hospitals. This recruitment method could result in a sampling bias because participants are from a small sample of the population of critical and non-critical care novice RNs having taken ACLS training. The goal of this research, though, is not to generalize the results but to enable the transferability of the findings under similar contexts (Patton, 2002). In addition, the results of the G\*Power calculation determined that 16 novice RNs are an appropriate sample size for detecting significant differences in self-efficacy when comparing pre and post survey scores of novice RNs. The qualitative sample size is 12 novice RN is insufficient to be powered sufficiently to detect statistical differences in SE scores, therefore additional participants are to be recruited for the quantitative portion of the study. Self efficacy measurements are also a limitation as a

natural improvement in skills may occur as a result of accumulated experiences over time. The findings from this study will enhance the understanding of how critical care novice RNs process their critical care training using simulation experiences, and if that simulated experience changes their perceived self-efficacy for preventing failure to rescue.

Time constraints for each participant are a consideration. Busy school, work, and family schedules can create time challenging and every effort will be made to maneuver around potential participant's school and work schedules. Lack of a significant sample size could be an obstacle to finding patterns in the qualitative and quantitative data. This will be overcome by repeated visits to the training site until the appropriate number of participants have been accessed. In addition, the PI has established a relationship with the organization's education department and ACLS trainers who have access to potential participants.

Qualitative research as a method of data collection is also a limitation. Interview data cannot be independently verified. Each interview is a recollection of experiences. These recollections are self-reported data that can contain potential sources of bias. For example, participants may have a selective memory and recall only certain events or experiences. In addition, events and outcomes may be recalled out of sequence, outcomes may be subjectively attributed to the participant's abilities and external forces, or outcomes of the experience may be exaggerated. To validate data accuracy, the PI will member check informants during interviews to, improving the credibility, validity, and transferability of findings.

### **Project Timetable and Dissemination of Findings**

The proposed study will take approximately 10 months to complete. The primary investigator is responsible for conducting all aspects of the study. During the 10 months activities will include recruitment, sampling, analysis, and interpretation of data. Findings will be disseminated through the preparation of manuscript for publication in a peer-reviewed journal and presented in nursing conferences. If requested, the organization will be given access to de-identified findings in the form of a password protected, secure electronic file.

The recruitment of participants is expected to take place on site. Data collection is expected to take three months from the administration of the initial quantitative survey to the post-survey and interviews. Transcription of interviews will be ongoing and continuous, simultaneous with data analysis, interpretation, and validation. Dissertation manuscript preparation will begin towards the second half of the study. Dissemination of findings will include a dissertation manuscript and a journal manuscript. For a depiction of this timeline and the proposed research budget, see Tables 3.1 and 3.2.

**Table 3.1**

*Project Timetable*

<b>Month</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Approval										
Recruitment										
Data Collection										
Transcription of interviews										
Data analysis										
Data interpretation										
Validation procedures										
Manuscript preparation										
Dissertation defense										
Graduation										



**Table 3.2**

*Budgeted Items*

<b>Budgeted Item</b>	<b>Estimated Costs</b>
Dedoose platform software license for data management, excerpting and coding, and analysis.	\$11/month x 2 persons x 12 months = \$264
Digital recorders (x2)	\$104
Domestic Travel for 13 round trip drives (gasoline) @\$3.00/gal /80 mile round trip; 3.5 gallons used/roundtrip = \$10.5 x 13	\$136.5
Incentive gift cards for 12 individuals@\$25/card	\$300
Incentive gift cards for 16 individuals@\$5/card	\$80
1) Transcription of 12 Interviews 2) Materials and supplies including advertising materials and consent forms	1) \$70/1 hour recording = \$840 2) \$2
<b>Total</b>	<b>\$1,726.50</b>

**Protection of Human Subjects**

**Ethical Issues**

Permission to conduct the study will be obtained from the organization's administration and approval from the Health Sciences Institutional Review Board (I.R.B.) will be obtained prior to initiation of this study. Appendix H. Interviews will take place at a time that is mutually agreeable to the PI and participant. Interviews will be arranged during participants' off duty time. The PI will arrange to use a quiet private location on site away from participants' work location. To ensure participant's privacy the on-site face-to-face interviews will be scheduled at least 30 minutes apart so that participants do not meet each other. Participants choosing the distance-mediated Zoom meeting option will connect to a meeting with the PI for an individual online face-to-face meeting.

Participants will be provided a written and verbal explanation of the interview procedure, an explanation of what confidentiality means in this study, and contact information for the PI and the I.R.B. This will be contained in the Informed Consent document which must be signed prior to the interview. Participants will be requested to provide electronic consent prior to taking the GSE pre-and post-test surveys via SurveyMonkey, Appendix L. Participants who decide to participate in the study will provide consent at the beginning of the study for the pre and post-survey and for completing an interview, and will be assigned an anonymous participant ID at that time.

### **Risks to Human Subjects**

**Human subject involvement and characteristics.** Results of this study will provide information about how novice RNs perceive ACLS simulation to influence their ability to recognize and manage changes in condition in hospitalized patients. Participants will be recruited by email distribution and consented by the PI. No vulnerable populations such as fetuses, neonates, pregnant women, children, prisoners, institutionalized individuals, other vulnerable populations will be included in this study. One exception is potentially pregnant RNs who will not be excluded from the study as there is minimal risk to participants and pregnancy information will not be collected as it has no relevance to the study.

**Potential risks/burden.** Potential risks to study participants are very low. One burden might be participants' ability for finding the time to attend a research study as this is free time away from their families. IRB procedure will be followed and responses of participants will not be reported to the organization or other authorities. Interview questions may cause some emotional discomfort as participant's voice their views and

recall their past patient care and simulation experiences, but this risk is minimal.

Participants will be reassured verbally and in writing that their participation is voluntary and that they may choose to withdraw from the study at any time.

The participants may perceive the PI a leader with some form of influence, legal liability, or as someone who could exert potentially negative repercussions over their careers. Participants will be assured that their employment will not be affected should they choose not to participate. The PI will reassure participants that their identities will remain confidential any time during the recruitment process, and at any time prior or after the interviewing process. There is a potential for subjects to be influenced by social desirability, a process by which the participant believes that the interview or study could improve their social standing. To address this limitation, during the interview the PI will not make judgmental comments and will maintain a non-judgmental atmosphere (Chenot, 2007).

Potential participants will not be revealed or exposed to one another to eliminate potential social pressures and to secure participant anonymity. There is also a concern about the recruitment of participants since they may be hesitant to share their perceptions in an interview after their simulation experience. The organization has an employee assistance programs (EAP) to provide care to employees experiencing a reaction to a stressful outcome or event (“Employee Assistance Program (EAP),” 2017) which may encourage them to participate more freely in the interview process.

The PI will have exclusive access to the individually identifiable private information of human subjects. Digital recordings will be accessible only to the PI and stored on a password protected computer. Interview guides and field notes will be stored

in a locked file accessible to only the PI. The transcriptionist will have I.R.B. training to help protect participants from disclosure of their private information during the recorded interview. Digital recordings will be deleted following each individual computer upload. Individuals referenced in publications will be given alias names to protect their identity. This research should qualify for Institutional Review Board (IRB) exempt category for a new research proposal involving human subject research (“OHRP Expedited Review Categories (1998),” 2016).

There will be no exclusion criteria based on gender or race; however due to the small sample size there may not be representation of each race/ethnicity in this study. The Bureau of Labor Statistics reports the most common race or ethnicity of RNs is white, non-Hispanics at 75.8% percent; Blacks represent 11.5% percent; Asian, Native Hawaiian, or Pacific Islander represent 9 percent. The average age of male RNs is 42.2 and female is 44.2 years. The percentage of females in nursing is 89.3 percent (Deloitte, 2015). Recruitment efforts will be directed towards all ages, genders, and races as represented in the population of the organizations.

There will be no children included in this study as it is directed towards working RNs who are necessarily adults.

### **Potential benefits of the proposed research**

The potential benefits of this research include contributions to understanding novice RN’s perceptions of ACLS simulation for recognition and management of emergent changes in patient condition, with identifying changes in the patient’s condition that if left untreated could cause a failure to rescue, and future investigations aimed at evaluating novice RN’s readiness to provide safe patient care. Long-term objectives

include developing a broader base of simulation interventions to be used at the time of entry into practice. Patients will benefit from RNs being better prepared to practice using safe patient behaviors. Educators will benefit by being provided the information derived from the study on novice RNs' learning patient safety behavior such as recognizing and managing changes in patient condition and simulation training. Direct benefits to participants of this research are minimal, however novice RNs in the future may experience enhanced simulation training resulting in safer novice RN patient care. Participants may gain a better understanding and appreciation of patient safety after having reflected over their past experiences.

**Importance of the knowledge to be gained.** Deficiencies in patient safety cause human suffering and cost lives, and is an immense financial problem for human beings and health care organizations. Results from this study will provide an understanding for how RNs perceive they learn to recognize emergent changes in the patient's condition and their ability to identify early signs of change in condition that, if left unidentified, could result in a failure to rescue. This enhanced understanding will provide further direction for structuring simulation and other education experiences. The project's long-term objectives include developing a broader base of simulation interventions to be used at the time of entry into practice. The potential benefits of this study outweigh the potential risks to participants.

## CHAPTER 4

### PERCEPTIONS OF ACLS SIMULATION AMONG NOVICE RNS FOR THE RECOGNITION AND PREVENTION OF FAILURE TO RESCUE

As the primary author I plan to submit this manuscript for publication to a scholarly, peer-reviewed journal.

#### ABSTRACT

One common preventable medical error is failure to rescue (FTR). FTR is characterized as delays in responding to changes in a patient's condition and can often occur in the presence of a novice RN. To mitigate FTR occurrences, novice RNs need training to safely expedite and intensify their experience with identifying adverse changes in patient's condition. Simulation in healthcare, an interactive technique replacing real world situations with guided experiences, was found to deliver excellent results in this regard. The current study applied Bandura's Theory of Self-Efficacy which is based on a person's belief in their capacity to execute behaviors necessary to achieve specific goals. The study design is a mixed methods approach aimed at deriving quantitative as well as qualitative findings for preventing failure to rescue events. To achieve the quantitative aim, sixteen novice RN completed a General Self-Efficacy (GSE) survey before receiving ACLS simulation training and again within 2-3 months after the training was completed. Using a two-sided, paired, dependent-samples t-test, results of the GSE test-retest survey ( $\alpha > .05$ ,  $t = 3.229$ ,  $p = .006$ ) are statistically significant. Participants were found to have gained an average of 3.5 points on their GSE scores. To achieve the qualitative aim, 12 of the 16 nurses participated in individual interviews within 3 months of training completion. Interviews were recorded and transcribed for analysis. Patterns were identified and analyzed using a thematic approach. Three thematic patterns were found:

1. *Recognizing Limited Capacity*, 2. *Identifying and Managing Change*, and 3. *Reliance on Supportive Connections*. Overall, findings indicate that novice RNs demonstrate an increase in their perceived self-efficacy from ACLS simulation learning strategies.

## **Background and Significance**

Registered nurses are widely recognized as indispensable front-line caregivers responsible for keeping patients safe by preventing medical error (Sears, 2016). Failure to Rescue (FTR) is defined as the inability of a clinician to identify and respond to patient symptoms that if treated would mitigate preventable harm (AHRQ, 2016a). Registered nurse characteristics such as experience and education level are associated with the risk of mortality and adverse events in hospitals (Audet, Bourgault, & Rochefort, 2018; Chang & Mark, 2009).

Studies focused on nursing experience demonstrate a statistically significant association between length of time working as an RN and the frequency and severity of medical error, with more experienced nurses having the fewest and least severe errors (Biegen, Vaughn, & Goode, 2001; Chang & Mark, 2009; Hezaveh, 2014; Sears, 2016). As well, perceptions by novice RNs and hospital administrators are that newly graduated nurses are unprepared for their role as RNs (Bjerknes and Bjork, 2012; Cheng, Tsai, Chang, & Liou, 2014; Dyess & Sherman, 2009; Hezaveh, 2014; Hofler, 2016; Kukkonen, Leino-Kilpi, Koskinen, Salminen, & Strandell-Laine, 2019). Novice RNs with less than two years of experience have the greatest risk of committing a medical error, with errors resulting in harm at the forefront of concerns (Berkow et al., 2008; Smith & Crawford, 2003).

Novice RNs tend to solve complex clinical problems more superficially than experienced nurses (Jewell, 2013; Morrow, 2009; Slaikeu, 2011). Hence, it is important that their education and training be intensified in order to increase their capacity to manage serious clinical situations. Continuing education available to nurses is



underdeveloped, and its effectiveness is without evidentiary support (AHRQ, 2016b; NASEM, 2016; NLN, 2014b). Thus, the challenge is to find methods that help novice RNs expedite their practice experience while keeping patients safe.

In an attempt to address concerns over patient safety, The Joint Commission encourages hospitals, who employ 60% of the RN workforce (U.S. Labor, 2019), to develop and use planned, comprehensive training for newly graduated, novice RNs. The Joint Commission (2016) stresses that novice RNs must meet professional standards of practice and may require additional knowledge and skills to deliver safe, quality care. As well, the Robert Wood Johnson Foundation at the National Academies of Sciences, Engineering, and Medicine (2016) supports efforts that include the development of programs designed to help healthcare organizations achieve higher levels of RN continuing education training. Research suggests that both clinical and simulation experiences improve novice RN knowledge and clinical skills. Simulation is especially useful as a method to improve patient safety by effectively preparing novice RNs to care for very sick patients. (Beyea et al., 2010; Kaddoura, 2010).

### **Simulation**

Simulation in healthcare is an interactive technique to replace real events with guided experiences depicting substantial aspects of patient care (Gaba, 2007). Improved education of early warning signs to changes in the patient's condition using simulation could prevent delays in care, reduce risk of FTR (Levett-Jones et al., 2010) and ensure that initial novice RN experiences are executed in a way that cannot harm patients (Roche et al., 2013). Simulated exercises responding to abnormal changes in patient condition help RNs gain knowledge, skills, communication skills and confidence (Askew

et al., 2012; Schubert, 2012). Simulation has been widely studied in academia for the clinical education of undergraduate nursing students (Blum & Parcels, 2012; Cant & Cooper, 2016; Cardoza & Hood, 2012; Durham & Alden, 2008; Fisher & King, 2013; Gore & Thomson, 2016; Hayden et al., 2014; Kaddoura, 2010; LaMartina, 2014; Nehring, 2008; Roh, Lim, & Issenberg, 2016; Roh et al., 2016). Few studies, however, have focused on novice RN hospital-based simulation (Aebersold & Tschannen, 2013; Rhodes et al., 2016; Young & Burke, 2010).

**Advanced Cardiovascular Life Support.** Advanced Cardiovascular Life Support (ACLS) is a simulation-based systematic approach to teach healthcare providers to monitor, assess, and treat acutely ill or injured patients with simulation education focused on appropriately responding to changes in patient condition (AHA, 2016). According to the American Heart Association (AHA), the ACLS trained novice RN is more resilient to error as a result of having gained experience with simulated at-risk patients and simulated patients with pre-arrest symptoms. The use of a systematic approach to guide novice RNs' surveillance, assessment, and treatment of changes in patient condition can make the difference between rescue and failure to rescue (Brown et al., 2007).

The ACLS program is led by skilled ACLS instructors. Cognitive skills (knowledge) and psychomotor skills (hands-on) are learned through small-group case scenarios and are practiced on simulator manikins. The student takes turn as being both a leader in the case scenario care team and a team member of the care team. ACLS features include learning stations for the practice of essential skills using simulated clinical scenarios that encourage active participation. Active participation in these roles gives the

student the opportunity to practice and demonstrate proficiency in skills used to recognize and manage clinical changes in condition (ACLS, 2017).

### **Conceptual Framework**

The conceptual framework for this study is Bandura's Theory of Self-Efficacy, a construct derived from social cognitive theory (Bandura, 1986). Bandura defines self-efficacy as a person's belief in their capacity to execute behaviors necessary to achieve specific goals and is one of the most powerful motives of behavior (Muretta, 2004). Bandura's theory of self-efficacy describes a model where behavior, cognition, and the environment all influence one another as forces that stimulate change (Bandura, 1986). Self-efficacy is dynamic and malleable, changing as a result of a person's learning, experience, and feedback (Dweck, 2017; Gist & Mitchell, 1992) and is important for predicting and improving performance (Chohan, Bhatti, & Naeem, 2017; Gist & Mitchell, 1992).

Elements within Bandura's model, e.g. performance outcomes, vicarious experiences, verbal persuasion, and physiological feedback, are the conceptual underpinning for exploring perceptions of novice RN's for their ability to improve clinical behavior (self-efficacy) towards responding to changes in patient's condition through the use of ACLS simulation. Novice RNs' descriptions have been analyzed for their perceived ability to execute clinical behavior in the form of monitoring, recognizing, and implementing appropriate interventions for changes in patient condition after having experienced ACLS simulation training. Implications for this study are that educators need to learn to build a sense of self-efficacy in novice RNs for recognizing and responding to early changes in patient condition. This study provides further direction for structuring

and implementing simulation and other educational experiences. Self-efficacy assessments can provide guidelines for predicting novice RN's needs and for tailoring programs to individual needs.

### **Specific Aims**

This study aimed to explore novice RN's perceived self-efficacy before and after ACLS simulation training with recognizing and responding to the decompensating patient. The following aims and research questions were explored:

**Specific Aim 1:** To describe if ACLS simulation affects a novice RN's perceived self-efficacy to recognize and respond to changes in the patient's condition that, if left untreated, could result in a failure to rescue.

Research Question 1: Does ACLS simulation affect a novice RN's self-efficacy scores based on the General Self-Efficacy Scale?

**Specific Aim 2:** To explore the influence of ACLS simulation on novice RN's perceived ability to recognize and respond to situations that could prevent a failure to rescue.

Research Question 2: How does ACLS simulation influence a novice RN's perceived ability to identify early signs of change in condition that could result in a failure to rescue?

Research Question 3: How does ACLS simulation influence a novice RN's perceived ability to respond to emergent changes in patient condition that could result in a failure to rescue?

## **Design and Methods**

A mixed-methods non-experimental design was used for this study.

### **Sample and Setting**

A convenience sample of novice RNs recruited from two hospitals including a 1,266-bed academic hospital and a 220-bed community hospital located in the Midwest United States. Bedside RNs with between 6 and 24 months of experience who worked in either critical care (ICU, ED) and/or non-critical medical surgical units were invited to participate. Additional criteria included novice RNs who work more than 24 hours per two-week pay period and who were scheduled to receive ACLS training between September and December 2018. Exclusion criteria included RNs with more than 24 months of practice experience, those scheduled fewer than 24 hours per pay period, those designated as PRN/Per Diem status, temporary and agency staff, and those working in non-bedside, outpatient areas of the hospital.

### **Recruitment and Data Collection**

Initial recruitment attempts included email to potential novice RN participants using an online flyer. The recruitment flyer, Appendix K, was emailed by hospital administration to the group of nurses registered to take ACLS in the months of September, October, November and December, 2018. After initial participants volunteered for the study, a snowball referral method of recruitment was used wherein the existing participants recruited additional novice RNs from among their coworker peers. Participant were screened for eligibility at the point of contact to assure they met inclusion criteria. For the intervention pretest-posttest analysis, a statistical power analysis was conducted to determine the required sample size that would provide

clinically meaningful findings (Sullivan, 2012). The statistical power analysis yielded a sample size of 16 to achieve an 80% power to detect a mean of paired differences of 3.0 with an estimated standard deviation of differences of 4.0. Using the recommendation by Guest et al. (2006), a sample size of 12 participants was used for qualitative data collection from a purposive sample of novice RNs.

Data for Aim 1 were collected by administering the General Self-Efficacy (GSE) survey and rated on a GSE scale (Schwarzer & Jerusalem, 1995b; Schwarzer, 2009). The Generalized Self-Efficacy (GSE) scale is a self-report measure of self-efficacy (SE) that scores the general belief of a person's own ability to solve problems and reach goals, Appendix B. Self-Efficacy of an individual is described in terms of a behavior or ability with regards to a specific situation.

**General Self-Efficacy Scale.** The GSE survey has ten items, four choices per item that are scored from 1-4 points, respectively, "not true at all; hardly true; moderately true; and exactly true." The ten items are: "I can always manage to solve difficult problems if I try hard enough," "if someone opposes me, I can find the means and ways to get what I want," "it is easy for me to stick to my aims and accomplish my goals," "I am confident that I could deal efficiently with unexpected events," "thanks to my resourcefulness, I know how to handle unforeseen situations," "I can solve most problems if I invest the necessary effort," "I can remain calm when facing difficulties because I can rely on my coping abilities," "when I am confronted with a problem, I can usually find several solutions," "if I am in trouble, I can usually think of a solution," and "I can usually handle whatever comes my way." The total score is the sum of the ten items and ranges between 10 and 40 points. International average of GSE scores is 29.55

points. Lower scores indicate less self-efficacy and higher scores indicate more self-efficacy although no recommendation for scores achieving adequate self-efficacy is provided by the authors of the survey. Permission to use the survey is granted to the public as long as the authors, Matthias Jerusalem and Ralf Schwarzer, are duly cited (Schwarzer & Jerusalem, 1995a; Schwarzer, 2014). Appendix C.

***GSE reliability and validity.*** A survey that has already been shown to be valid and reliable is preferable (Creswell, 2013) The GSE has been widely used as a statistical test in healthcare (Schwarzer & Jerusalem, 1995a). The GSE is geared exclusively towards measuring self-efficacy and has produced consistently acceptable reliability and validity assessments during psychometric tests (Schwarzer & Jerusalem, 1995a).

Internal consistency, how well items on a survey measure the same construct or idea, is measured with Cronbach's alpha. Repeated studies have found the GSE survey items to measure the same latent or unobserved variables of self-efficacy. The GSE Cronbach's alpha for internal consistency, gauging how well the survey items measure self-efficacy, has been measured at 0.76 (acceptable reliability) and 0.90 (excellent reliability) (Schwarzer & Jerusalem, 1995b; Schwarzer, 2009).

The GSE has been found to be stable over time. A six-item shorter form of the GSE, the GSE-6, was developed and tested by Rompell et al. (2013) and the mean score was found to be stable after 28 months. The GSE relative stability was measured in reference to itself (two variables) over time for strength and direction of linear relationship. Coefficients were measured by re-administering the GSE-6 twice at 12 months:  $r = .50$  (moderate positive linear relationship) and twice at 28 months: correlation coefficient  $r = .60$  (moderately-strong positive linear relationship) (Rompel et al., 2013).

After consenting to participate in the study, participants were asked to complete the demographics form. Once the consent and the demographics forms were returned to the PI electronically, participants were emailed the link to the pre-ACLS GSE survey with instructions. Post-test surveys were administered electronically within 3 months of post-ACLS simulation. Both pre- and post-test surveys were delivered via SurveyMonkey. SurveyMonkey is an online survey software used to create and run online surveys. For security, SurveyMonkey is password protected. To ensure anonymity, names were removed and each respondent was automatically assigned a random identification number for the purposes of organizing the qualitative and quantitative data. Participants completing the pre- and post-test GSE were treated as matched samples, each pre-test identification number paired with its respective post-test identification number.

Data for Aim 2 was collected through individual face-to-face and telephone interviews using a semi-structured interview guide within 3 months post-ACLS simulation. Each interview was conducted during non-work hours at a time and location chosen by the participant. Interviews were recorded using a digital recorder. Interview audio files were transcribed into text by the PI. Following transcription, verification of text transcription accuracy of the recorded audio files was completed by the PI.

### **Ethical Considerations**

Permission to conduct the study was obtained from each organization's administration and from the University of Missouri Health Sciences Institutional Review Board (I.R.B.) prior to initiation of this study. Written consent for participation was obtained prior to study participation. Special attention was paid to the timing for conducting the interviews wherein such interviews took place at a time that was mutually



agreeable to the PI and participant. Interviews were conducted during the off duty time of the participants so as not to hamper their professional obligations.

### **Data Analysis**

The analysis and interpretation of the data are structured according to the aims of the study, Aim 1 and Aim 2.

#### **Aim 1 Quantitative Analysis**

Data analysis for Aim 1 was guided by quantitative, statistical methods using a paired sample, two-directional t-test collected from GSE survey data from novice RNs. The statistical analysis reveals the difference in the means between the two samples. In this study the matched pairs consist of novice RN's pre and post-survey scores.

All statistical analyses were performed using Statistical Package for Social Science (SPSS, 2019), V.25. Using SPSS, a descriptive statistical procedure was conducted on the scores of the pre and post-test surveys taken by the novice RNs. In this calculation, a paired sample (dependent sample) t-test procedure was used to measure the difference in the means (M) of each dataset: baseline pretest and posttest mean scores. A two-tailed test was chosen so that the mean would be tested in both directions, taking into account the possibility of novice RN's experiencing either a positive or a negative effect of the training. A significance level (alpha) of 0.05 was used for analysis. An a priori power analysis indicated a minimum sample of 16 participants to detect a large effect size ( $d=0.75$ ) of significant differences in self-efficacy when comparing means in pre and post survey scores of novice RNs (Luszczynska et al., 2005).

## **Aim 2 Qualitative Analysis**

Data analysis for Aim 2 was guided by a qualitative thematic analysis approach described by Braun & Clarke (2006). The PI used the software platform Dedoose (2017) for qualitative data management, excerpting and initial coding then transferred into an Excel spreadsheet for final analysis. Interviews were transcribed by the PI, then read and re-read with codes assigned to salient texts and phrases representing participant experiences managing decompensating patients and emergent events. Next, the codes were organized according to pre-ACLS training or post-ACLS training experiences. Codes were then organized into potential themes. The themes, codes, and related text segments were then reviewed by a third investigator (LP) to assure validity. Themes were reviewed for their relationship to the research question and with the existing codes, refined and integrated into the final analysis.

Trustworthiness in qualitative research is established by demonstrating four criteria: credibility, transferability, confirmability, and dependability of the findings (Guba & Lincoln, 1985; Guest et al., 2006; Robinson, 2014) and is established by describing analytic methods with enough detail to enable the reader to determine if the research findings are credible (Guba & Lincoln, 1985; Guest et al., 2006; Robinson, 2014). Credibility of research can be further enhanced through triangulation of data sources and methods (Creswell, 2007). Participants from two different types of hospitals, one academic and one community (data source triangulation), provided an opportunity to examine potentially different perspectives. In addition, two distinct methods of data collection, interviews and surveys (methods triangulation) were used (Denzin, 1973; Hales, 2010). Credibility of the findings was enhanced by member checking with

participants throughout the interviews to verify accurate understanding for the answers provided. Member checking is a form of respondent validation to help pinpoint the accurate representation of the information provided by the participant during the interview. It also provides the respondent an opportunity to volunteer additional feedback (Bricki & Green, 2007). Third, the PI's advisor and a select committee member with experience in thematic analysis were consulted during the progression of the data collection and analysis (investigator triangulation) thus improving research confirmability (Denzin, 1973; Hales, 2010). Specifically, the study advisor (AV) and the PI iteratively reviewed the data to assure agreement with the assigned themes, codes and related texts/phrases and a third committee member (LP) provided input during initial coding and again after final analysis.

Other strategies supporting the dependability of the research were employed during the study as well. The investigation and progression were well documented step by step. For example, records of raw data collection, transcripts, and the systematic methods applied to the construction of the analysis provide a detailed audit trail. These actions provide a clear rationale for the choices made by the PI regarding theoretical and methodological decisions. The audit trail enables way readers to follow the decision trail and arrive at the same or comparable conclusions (Carcary, 2009; Given, 2008).

## **Results**

### **Demographics**

A total of 16 novice RN completed the GSE at both pre and post ACLS training; twelve of those nurses participated in semi-structured interviews. Eleven participants were employed at the academic hospital (69%) and five at the community hospital (31%).

Participants worked in a variety of non-critical, medical surgical care units (62%), and critical care including three (19%) in the emergency department (ED) and three (19%) on the step-down (SD) unit. Seven participants (44%) worked the day shift, one worked the evening shift (6%) whereas the remaining six (50%) reported working nights. Four participants (25%) were still completing their residency program and nine participants (56%) had prior PCT (Patient Care Technician) or SNT (Student Nurse Technician) hospital experience. Thirteen participants (81%) had completed their Bachelor of Science in Nursing and three (19%) had an Associate's Degree in Nursing. For the qualitative portion of the study, half of the participants (six) chose to complete their interview face-to-face at a non-work location of their choosing, half chose a telephone interview. The demographic percentile of each sample characteristic is illustrated in Table 4.1.

**Table 4.1***Novice RN Characteristics, Study Percentiles*

<b>Demographic</b>	<b>Characteristic</b>	<b>GSE</b>		<b>Interview</b>	
		<b><i>n</i> = 16</b>	<b>%</b>	<b><i>n</i> = 12</b>	<b>%</b>
Hospital	Academic	11	69%	8	67%
	Community	5	31%	4	33%
Employment Status	Full-time	16	100%	12	100%
Position	ED	3	19%	1	8%
	SDU	3	19%	2	17%
	Medical-Surgical	10	62%	9	75%
Shift	Days	7	44%	6	50%
	Evenings	1	6%	0	0
	Nights	8	50%	6	50%
Currently in Residency	Yes	4	25%	2	17%
	No	12	75%	10	83%
Prior Hospital Experience as a PCT/SNT	yes	9	56%	8	67%
	no	7	44%	4	33%
Academic Preparation, Nursing	Associate	3	19%	2	17%
	Bachelor	13	81%	10	83%

Table 4.2 displays a detailed demographic distribution, including the novice RN's months worked as a PCT, months as an SNT, nursing degree, months worked as a GN, months worked as an RN, months employed at this hospital, months worked on unit, shift worked, and whether or not the novice nurse was currently in their nurse residency verses having already completed it.

**Table 4.2**

*Novice RN Demographics*

Months as PCT	Months as SNT	Academic Preparation	Months as GN	Months as RN	Total Number of Months Employed at this Hospital	Months on Unit	Shift	Currently in Residency	
0	0	BSN	0	16	16	MedSurg	16	N	No
0	18	BSN	0.5	7	7	MedSurg	7	N	Yes
0	0	BSN	3	6	6	MedSurg	6	N	Yes
2	0	BSN	3	21	6	ED	6	N	No
0	0	ADN	0	7	7	SDU	7	N	No
7	0	BSN	0	11	11	SDU	11	N	No
0	0	BSN	0.5	15	16	MedSurg	16	N	No
0	0	BSN	0	6	6	ED	6	E	Yes
0	0	BSN	0	23	23	MedSurg	23	D	No
30	12	BSN	1	18	18	MedSurg	7	D	No
0	12	BSN	1.5	7	19	MedSurg	7	D	Yes
17	0	BSN	0	23	23	MedSurg	23	D	No
0	12	BSN	2	21	21	MedSurg	21	D	No
0	0	ADN	0	6	6	SDU	6	D	No
12	18	ADN	1	8	120	MedSurg	8	D	No
0	11	BSN	3	7	48	ED	3	N	No

*Note:* D=Days N=Nights E=Evenings

## Quantitative Findings

Examining the matched samples, the range of scores for the pre-test was 18-35 with a range of 17 points; the post-test 29-40 with a range of 11 points; the overall range in scores was 22 points. A dependent, paired t-test calculation was used to compare the means of the pre- and post-test groups and determine how likely the difference between the two means occurred by chance (Diedenhofen & Musch, 2015). The paired-t-test calculation requires three elements: knowing the difference in the means, knowing the standard deviation for each data set, and knowing the number of participants in each group (Siegle, 2002). Large differences between means are less likely to occur by chance than small differences (Siegle, 2002). In this study there was a significant difference, ( $t$ ) 3.23, ( $p$ ) 0.006, in the scores for total self-efficacy for the pre-ACLS baseline ( $M = 30.31$   $SD = 4.33$ ) and post-ACLS ( $M = 33.80$ ,  $SD = 3.60$ ). Further, the absolute value of the t-test statistic ( $t$ ) 3.23 is larger than the critical value ( $t_{crit}$ ) 2.13 of the test distribution, and is significant at the .05 level. Comparing the mean difference (MD) from the same group at different times, participants overall gained an average of 3.5 points on their General Self-Efficacy (GSE) scores.

The pre and post-test correlation results for the 16 paired samples measured a non-significant moderate, positive correlation  $r = .414$ ,  $p = .111$  (Diedenhofen & Musch, 2015). This result indicates that if a novice RN scored high on the pre-test GSE then they tended to score high on the post-test. Similarly, if a participant scored low on the pretest they tended to score low on the posttest.

The size of the standard deviation influences the outcome of a t-test. Here, the standard deviation of the spread of data points around the mean is moderately small, thus

there is moderately small variance in the novice RN's pre and post scores of the GSE survey (Diedenhofen & Musch, 2015). Groups with smaller standard deviations are more likely to report a significant difference in the means than groups with larger standard deviations and typically produce less scoring overlap between the paired groups than a larger standard deviation. Less overlap demonstrates that the pre and posttests scores are different from each other (Siegle, 2002).

The results of this study reveal that the posttest total scores (red curve) of the self-efficacy subscale ( $M = 33.81$ ,  $SD = 3.600$ ) were higher and had a smaller variance than the pretest total scores (blue curve) ( $M = 30.31$ ,  $SD = 4.332$ ), Table 4.2. This demonstrates that participant's scores tended to be more alike after having ACLS training. The overall magnitude of the pre-training low scoring group gain was larger than the higher scoring group (Diedenhofen & Musch, 2015), thus the training had an enhanced effect on the low scorers. Participants that rated themselves with lower pre-training self-efficacy tended to "catch-up" to those who rated themselves with higher pre-training scores, with the group overall having improved self-efficacy scores. The ramifications of this result is that simulation may be the great equalizer, a method effective at closing the skills gap for novice RNs with little to no experience by providing professional development, individualized support and feedback, and organizational support (Grove & Montgomery, 2003).

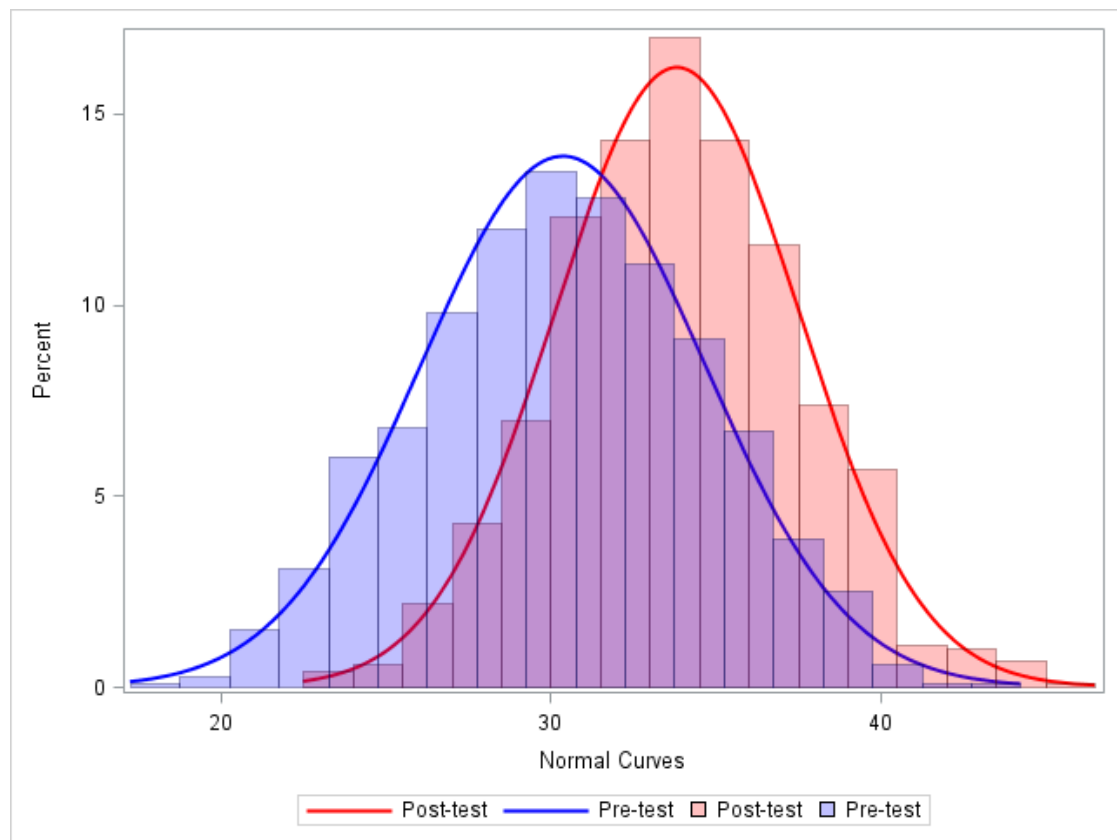
Figure 2.3 depicts the graph illustration of pre- and post-test GSE scores as generated from the two normal distributions with the specified mean and standard deviation. It also shows the theoretical distribution. A theoretical distribution can be useful as an interpolation technique for estimating parameter values. For example, if the



t-test were repeated for data collection with 1000 participants with the same mean and standard deviation, the bell curve distribution of scores would be similar to the one shown. A theoretical distribution provides a mathematical statement from which useful statistics such as mean, variance and confidence estimates can be calculated (Borradaile, 2003). The theoretical distribution depicted here demonstrates that ACLS training could be a useful tool for improving the self-efficacy of bedside novice RNs on a large scale level.

**Figure 2.3**

*GSE Pre- and Post-Test Score Distributions*



Results of the paired-samples t-test show that mean GSE scores differ before ACLS training (M = 30.31, SD = 4.33) and after ACLS training (M = 33.81, SD = 3.60) at the .05 level of significance ( $t = 3.23$ ,  $t_{crit} = 2.13$ ,  $df = 15$ ,  $n = 16$ ,  $p = .006 < .05$ , 95% CI for mean difference 1.19 to 5.81;  $r = .414$ ,  $p = .111$ ). On average the post-ACLS score was approximately 3.5 points higher after ACLS training. To determine if time in practice following ACLS training was a factor that influenced SE scores, data were also analyzed according to time between the intervention and post-test completion. Table 4.3 displays participant level data. Table 4.4 indicates that time was not a factor.

**Table 4.3**

*Post-Test Scores and Number of Days After ACLS Training*

PRE	POST	Difference	ACLS training in 2018	Number of days post-training
33	30	-3	October	76
28	31	3	October	89
34	34	0	October	89
31	35	4	November	16
35	35	0	November	58
32	33	1	November	41
18	30	12	November	40
34	40	6	November	86
30	39	9	November	84
35	34	-1	November	84
25	30	5	December	42
30	29	-1	December	15
27	36	9	December	77
30	30	0	December	90
32	39	7	December	90
31	36	5	December	87

**Table 4.4***Results of Paired T-Test and Descriptive Statistics for GSE Pre-Post Test Scores*

Outcome	Pre ACLS		Post ACLS		Post-Pre MD	n	95% CI for Mean Difference		r	t	t <sub>crit</sub>	df
	M	SD	M	SD			lower	upper				
	30.31	4.33	33.81	3.60	3.5	16	1.19,	5.81	.414*	3.23**	2.13	15

\* p = .111      \*\*p = .006

Results show a non-significant moderate correlation between pre and post-tests, and a statistically significant difference in mean General Self-Efficacy scores before and after ACLS training. Post-training scores rose an average of 3.5 points.

In summary, the quantitative findings indicate that the overall perceived self-efficacy of the novice RNs was higher after the ACLS training session than it was before they received the training. The findings are in congruence with the studies done by Lin (2016) and Khalaila (2013) who also found that simulation improved perceived self-efficacy of novice nurses.

### **Qualitative Findings**

Three primary themes emerged from the data representing novice RN perceptions. These three themes include: *1. Recognizing Limited Capacity*, *2. Identifying and Managing Change*, and *3. Reliance on Supportive Connections*. Findings are organized according to each theme with specific codes assigned under each theme. Salient quotes are included to represent participant perceptions for each code and related theme. See Table 4.5 for Themes, Codes, Excerpts; Table 4.6 for Theme and Code Frequency.

#### **1. Recognizing Limited Capacity**

Prior to having ACLS training, novice RNs described their limited capacity to care for patients at risk. They felt unprepared to intervene with advanced life supporting measures during emergent events, and a few described feelings of regret and frustration over their patient's clinical decompensation. Many felt that their lack of experience

contributed to an inability to skillfully manage complex patients. There were a few who described feeling confident based on the experiences gained through emergent events prior to taking ACLS.

**Feeling unprepared.** Seventy-five percent of novice RN participants described having too little knowledge and skill to act quickly in response to emergent situations. Although they described completing basic tasks during an event, they felt unprepared to intervene with advanced life supporting measures. The following nurses describe how they felt unprepared for their role as nurses:

(11) I was nervous, and I wasn't sure what to do besides just hook them up to vital signs and make sure that they had enough oxygen and had oxygen tubing available...

(2) I didn't really know the situation, too much, it was more just like, okay I know these labs have to be drawn. But I still, I like, I wanna [*sic*] be involved in those, but it's also hard to, I wanna be involved and not just in the way.

(4) What stands out most is that I did feel pretty unprepared for that situation...and it wasn't as emergent as some other situations...

One nurse described her unpreparedness as a personal sense of failure in not having taken the needed training to manage these situations,

(12) It really kicked into my head that I should have taken, you know, that I should have taken ACLS or some more, maybe some monitor training...

**Frustration and regret.** Some (25%) respondents described both feelings of frustration and regret. Frustration occurred when decision-making during clinical situations was felt to be absent or was made too slow. Regret was related to feeling at-

fault for their patient's rapid health decline. Nurses reported that their patients would have benefited if they, as the patient's primary care nurse, had been able to identify decompensation earlier on. This nurse described her lack of knowledge about clinical decision-making ability as frustrating, and the resulting feelings of regret over the patient outcome, stating,

(8) (regarding the patient's clinical deterioration) Not knowing (what to do) was the hardest part...I was the primary caregiver for that patient, and having to make those decisions was really hard. And feeling responsible for the decline in this patient's stability, I think was the hardest part, feeling like this was my fault and I had done something wrong...

Nurses also described their delayed actions as potentially having contributed to the patient's change in stability. This nurse remembered regret pertaining to the timing of her clinical decision making,

(7) I kind of wish that I would have just done everything a little bit earlier 'cause I kind of came to this conclusion like later in the day...So, I kind of wish that I would have just went with my gut earlier.

Another nurse described her feeling of regret for not having recognized decline despite that the patient decompensated quickly.

(9) ...it (patient deterioration) was super quick. So, I did truly believe that she was going septic, but I couldn't believe how quick...I feel like catching it sooner maybe could have prevented her progression or her decline....

**Lack of Experience Managing Complex Patients.** A majority (83%) of novice RNs noted a lack of clinical experience as hindering their ability to manage complex

patients. With very few experiences to draw from, nurses felt unable to trouble shoot complicated patient care challenges. These nurses describe their challenges with having so little experience with managing complex patients, stating,

(12) I didn't know that that was AFib [sic], because I didn't have any cardiac experience previously, so it made it challenging knowing that if I would have had some more cardiac experience or ACLS training prior to being on the floor, it would have been helpful... if I would have been able to... read the monitor and see some sort of rhythm that he would have been in... knowing what I could have done better in dealing with the moment...

(9) I feel like there were multiple factors [that made this patient challenging to manage], one being that I didn't have experience with a septic patient at all and then what to do...it [the emergent event] opened my eyes significantly to how quick someone can go septic. And how dangerous it can be for our patients... which is something that I had never seen before.

(8) ...so I was still very inexperienced. I had another nurse in the room with me, and she kept saying, do you want me to call them [the doctors], do you want me to call them? And I was like, I don't know what to do...

***Experience builds confidence.*** Although the majority of nurses described their lack of experiences managing complex patients, others (33%) were able to recall how being in the event helped boost their confidence. They perceived experience as foundational for managing future events. As these nurses explained,

(4) You know, I think when you deal with something like that you get a little bit more confident about your ability to tell when it's what I need to do to make decisions about that. So it's always good. The experience is good.

(6) ...you still get nervous even now, but I think as time goes on, the more you do it, you get more confident in what you're doing...I guess it boosted my confidence, 'cause I had one problem and now it's like, okay, I can handle this...

(11) ...information that I learned [from the emergent event]... just how to act in a rapid response type of situation. I think I've gained at least a little bit more confidence...but the more situations you're in, you gain more confidence the next time it happens.

Results demonstrate that novice RNs' are seeking to experiences they perceive help with confidence-building for identifying and responding to worsening changes in patient condition.

## **2. Identifying and Managing Change**

Nearly all participants perceived ACLS training to have improved their ability to detect early signs and symptoms of patient instability, and differentiate stable versus unstable conditions. Many believed to have improved their competence. Some nurses began to see themselves as leaders or experts, describing how they were better patient advocates as a results of having taken ACLS.

**ACLS enhances the recognition of abnormal.** A majority (75%) of novice RNs perceived ACLS training to have improved their capacity to detect early signs and symptoms of patient instability. Moreover, nurses felt that ACLS training enhanced their

ability to differentiate stable and unstable conditions. The following nurses described their improved ability to recognize early signs and symptoms of instability,

(9) We also have patients on our floor that have a history of AFib [*sic*], some of them with AFib, RVR [*sic*]. And so, when that happened, just being able to recognize that on our telemetry monitors, and recognize when the patient is symptomatic, and especially identifying when it's controlled or uncontrolled. ACLS has significantly helped with my experience there... ACLS significantly helped me realize some symptoms and some different rhythms...

(5) ...what it's [ACLS] giving me is, the actual knowledge of how to respond...  
... it [ACLS training] does definitely give you a good idea of, hey, this is when to intervene on it... when is it stable, when is it unstable? You think of that as symptomatic, asymptomatic. Is this affecting your patient in the long-term, gonna [*sic*] hurt them, or can they sit like this until morning?

(2) I did have a patient the other day who had afib [*sic*] and heart rate would go from 60 to 120, up and down and up and down and up and down. After the ACLS class, I learned a little bit more about what that meant... What caused her heart rate to jump, when she was symptomatic, and I tried to be a little bit more proactive in getting her vital signs early, assessing her... So it [ACLS] does help us kind of focus in on what would be causing something. Like a more focused assessment of their history and you kind of backtrack and look for a reason for why the patient is like that.

**Sense of improved competence and confidence.** Novice RNs described how ACLS simulation training helped with their competence and confidence in identifying



early signs of decompensation and with the emergent treatment of patients in clinical deterioration. In addition to recognizing early signs and symptoms of instability, eight (67%) of participants felt that ACLS training gave them a sense of improved competence and confidence, meaning they had improved capacity to identify and to respond to emergent patient care issues. Managing their emergent events, these nurses described how their experiences improved their perceived competence during an emergent event, and the confidence to complete those actions, stating,

(9) It [ACLS] definitely increased my experience in knowing what to do in these types of situations, delegating was very efficient in that situation.

(4)...it was nice to look at them and say, hey I know what that is! I was just so glad to go to training and now I have, I know I have some idea of what the process is and what's gonna happen and what the jobs do and what they're looking for. And so I feel more like, okay now I feel like I knew what I was doing.

Others also described their improved confidence for recognizing when to act and how to respond with appropriate interventions while managing emergent events. One nurse described how ACLS has helped her identify early signs of decompensation,

(7) I think it did [‘help] just with my confidence as far as just having that under my belt to like kind of just signs and symptoms to look for...it [ACLS] did help with my confidence and as far as in an ACT what really to do like the first step even before it becomes an actual calling an ACT or whatever.

and another nurse thought her understanding of the code process had improved,

(10) ...and as that code was going on, in my head I'm like, okay, time for an epi, time for an...just, I was ready...

Nurses also described their experiences with ACLS training having given them confidence in a variety of emergent situations, and described their improved ability to monitor for and assess emergent situations, and to know when to intervene,

(11) Because of the ACLS class, I knew more information about the drugs... vital signs with the medications we were giving. Like how frequently to take those vital signs. I feel like I had gained even more confidence. That was one of the first situations after that class, and so I just felt more confident in the whole situation and that it had gone really well.

**Practice makes perfect.** Nurses felt having the opportunity to practice newly learned skills during training was important in helping to learn advanced skills. The hands-on learning environment was thought to assist the nurse with accurate early recognition of decompensating symptoms and when to intervene using appropriate actions and resources. Fifty percent of participants described ACLS training as a skill that requires ongoing, frequent practice. Nurses appreciated the on-the-job practice they received regularly to enhance their skills to monitor and act on abnormal changes.

(4) Practicing the codes. Having the monitor there and having to look at it and decide what it is showing me what should I [*sic*] be doing. You know, what drugs go with that, how often do we give them how... What can I expect to happen...

(12) It was good to be able to simulate the experience of making sure that you have the monitor [pads] in the right place. If you are doing synchronized cardioversion, you're able to monitor, to manipulate that monitor how you need to in that situation. Because it's a little different whenever you read over a situation, you say, well, this is what I would do, rather than the way that we experienced it

in our ACLS experience, we were able to, this is what your situation is but now do something about it.

One nurse described her role-playing experience during ACLS as *practice makes perfect*. She remembered the activity as one that helped build *muscle memory*.

(2) The class itself, it was a lot of repetition... and so it was like muscle memory, like the third time you hear it you remember it.

While at the same time this same nurse felt that she might not get the practice she needed to remain skilled at ACLS.

***Use it or lose it.*** On the other hand, several nurses (25%) who had taken ACLS expressed that not everyone receives the continuing practice required to retain skills. For example, on-the-job occurrences may be minimal due to their nursing specialty or units where they may have limited encounters with patients at risk for decompensation.

(9) However, since I don't work on the cardiac floor, we don't get to see a lot of rhythms and sometimes we even only have one or two patients on the floor on telemetry, so I don't get to practice with my ACLS as much as some people, which I feel like is a disadvantage since I did the certification, I just don't get to practice it quite as much as some people.

(1) We went over the Hs and Ts [ACLS mnemonic used as a memory aid for the possible reversible causes of cardiac arrest]. But, it didn't stick with me as much as I wish it would have.

(2) ... and with a lot of this, if I don't use it, I'm gonna lose it. Practicing all this, 'cause we don't have these situations all that often... practice it all the time when you don't have actual patients doing that.

### 3. Reliance on Supportive Connections

Novice RNs noted their dependence on supportive connections. During both pre and post ACLS experiences, novice RNs described how experienced staff helped manage the patient during emergent events while they contributed according to their perceived skill level. Reliance on supportive connections was described by novice RNs as a feeling of teamwork, having *all hands on deck* which included an appreciation for qualified staff responding to the event. The novice RN relied on these supportive connections for accurate, timely judgments and interventions, and for receiving direct, expert guidance by experienced staff.

**All hands on deck.** Before ACLS, novice RNs contributed according to their perceived skill level, often relying on the support of experienced nurses to help manage more complex situations. For example, this pre-ACLS nurse described a situation when an emergent situation resulted in this perception,

(2) And when there is a code situation, it is like all hands on deck, somebody gets the crash cart, somebody's alerting the doctor, someone's being the runner, someone is drawing labs, starting IVs...

In fact, more than half of the participants (58%) felt supported by their team members during critical events before they had completed ACLS training. As others noted,

(8) And I think that, overall, we had excellent teamwork that night, everybody came into the room and just knew exactly what to do, and the orders were given, and everything went very smoothly.

(10) Yeah, I had two, I would say two nurses from the floor that really helped. One of them took over compressions really quickly so that I could start saying what I knew in the situation that happened. And then my other friend, [redacted], she helped in the code process... during the code, yeah, about two assistant nurse managers were there, the regular code team, and my main manager was in the hallway, the pharmacist was there. Definitely, a lot of people responding.

After ACLS training, half of the novice RNs (50%) perceive a need for continued support despite their ability to actively participate in advanced clinical care during an emergent event. They describe an improved ability to make decisions within the team setting, stating,

(6) Everybody worked together really well...everybody was there...most of us are ACLS up there, so we didn't have to stop and think. It was just, we flowed, we worked as a team.

(11)...and the Rapid Response nurses came into the room eventually too ..., and so we were able to brainstorm all together ... we were able to come up with a plan for how we were going to...and so everybody was on the same page with the care going forward for that patient.

**Reliance on others.** Before ACLS training, nine novice RNs (75%) described a reliance on others for completing skills such as assessing an unstable patient,

(6) V-Fib, so, I saw it...I think to have our ANM [assistant nurse manager] so close, that also helped...having somebody reassure me...

Novice RN's participated during the event but relied on experienced nurses to manage more complex situations.

(11) I just really didn't know what to do right away. ...I was basically just waiting for someone to tell me what to do...

(8) This was just barely a couple of months after I had become a nurse... I need you to help me here. And finally I was like, yes, just call them. Like, I don't know what's happening. We obviously need somebody more experienced.

The recounted experiences demonstrate the trust that novice RNs have with experienced team members for assisting with making accurate, timely judgments and initiating appropriate interventions.

After ACLS training, four novice RNs (33%) felt need for continued support, but were now able to articulate, document, and participate in specific elements of advanced clinical care during an emergent event.

(2) ...we can be like, oh yeah, hey, actually would you mind coming up and taking a look at this patient...I think our ACT nurse is actually one of the best resources we have, we just, because you can call her to come and assess ahead of time to see if we need more stuff on board...

(4) I did have a patient, well, the other night... I was training for Relief Charge, so I did have a Charge Nurse there, but we had a patient that we called a Rapid on because of chest pain...we called the Rapid...it was nice to get practice running a Rapid as charge-ish while still having my charge there too.

(3) ...it was kind of the more experienced nurses kind of reacted quicker and us that we were there for just a couple of months...and we're fortunate enough for more experienced nurses to be at the bedside. So they were getting [IV] access.

**Expert guidance.** Before ACLS, seven (58%) nurses described a need for guidance by an expert nurse or healthcare provider to properly monitor at-risk patients and for providing care during emergent situations.

(12) I had the house supervisor, who was kind of walking me through with the monitor and seeing what she was seeing and she was trying to explain it to me...

Novice RNs were provided targeted knowledge and skills for procedures and processes from experienced nurses.

(2) She [ACT nurse] made me aware of a kind of, definitely, the point in which I should tell the doctor, hey, the patient should be in the ICU by this point, she kind of helped me figure out what I could do to stay to stabilize the patient that time.

The fluids, the blankets, everything like that. Identifying where this potential source of infection could be coming from. She was like, but if she doesn't stabilize in the next couple of hours, we may need to advance her to the ICU.

(11) The Rapid Response nurse was actually super helpful. He was explaining everything to me 'cause he had known that I was a newer nurse, so he was explaining everything to me, why he was doing this, and what could possibly be happening, and causing whatever was going on.

Participants did not describe any post-ACLS scenarios referencing the need for expert guidance for either monitoring at-risk patients or during emergent patient care. It is possible that after ACLS, novice RNs began to use their improved observational skills and increased knowledge and experience in a team-like setting to guide them with monitoring and responding to patients, instead of seeking and relying wholly on others for guidance.

## Discussion

A large number of studies have focused on the success of simulation education in academic settings (Berndt, 2014; Cant & Cooper, 2016; Fisher & King, 2013; Franklin, Burns, & Lee, 2014) and in hospital settings (Aebersold & Tschanned, 2013; Muerling, Hedman, & Sandahl, 2013; Rutherford-Hemming & Alfes, 2017). In contrast, few have reported on novice RN and hospital-based simulation training outcomes (Niemeyer, 2018) and none were found specifically on ACLS simulation training with novice RNs. Therefore this study provides important new knowledge for helping train nurses with little hospital experience deliver high quality care for high-risk patients with the goal of eliminating failure to rescue events. Findings from this study contribute to nursing research in three ways.

First, the skills gap that novice RNs frequently experience between school and the workplace is often described in the literature (Herron, 2017; Purling & King, 2012; Saintsing et al., 2011) but rarely have strategies for closing that gap been explicitly explored in hospital-based simulation scenarios. Moreover, previously published findings offer very little suggestion for actionable solutions. The skills gap, although important, does not provide bedside-level descriptions of how novice RNs prepare themselves to care for at-risk patients. For example, although nurses working in the critical care areas are often required to be trained in Advanced Cardiovascular Life Support, ten (62%) of the participants in this study were employed in the non-critical care specialties and had volunteered to take the class to secure advanced skills. This study identified that novice nurses felt unprepared for their role and have concerns for the safety of their patients. They were willing to take extra time, effort, and energy to prepare themselves to close



their skills gap so they would be better prepared to manage clinical change in their patients.

Second, on-the-job nursing experience has been shown to affect the quality of patient care (Handwerker, 2012; Saintsing et al., 2011; Sephel, 2011) and attention has been paid to the association between novice RNs, medical error, and failure to rescue events (Berkow et al., 2008, 2009; Hickey et al., 2013; Smith & Crawford, 2003). However, without the availability of appropriate resources that support advanced interventions, those skills come by slowly and almost exclusively through patient interaction experiences. This results in high-risk situations for both the patient and the nurse. This study expands the concept of augmenting clinical experience through simulated training strategies by exploring the use of ACLS education in hospitals for novice RNs. Findings show that when experience is minimal, expedited and augmented support for role transition from nursing student to novice RN helps prepare RNs for safe practice in today's fast-paced, complex clinical environment.

Third, although designed for emergent conditions, this study identified how ALCS training guided nurses in identifying unstable conditions by enhancing their ability to recognize early signs and symptoms of decompensation. Clinical deterioration, for the most part, is shown to be progressive in nature with signs of instability evident up to 24 hours in advance of a serious clinical event (McGaughey et al., 2007; Smith et al., 2014). When detected in a timely manner, patient symptoms that if treated could mitigate preventable harm and prevent a failure to rescue. An inability to interpret at-risk signs and symptoms may lead to patient harm (AHA, 2016; Stevenson et al., 2016) with up to 11 percent of inpatient deaths being a result of undetected, untreated changes in patient

condition (Luettel & Healey, 2007). Oftentimes preventable harm is associated with nurses who are new graduates and therefore have little patient care experience (Berkow et al., 2008; Smith & Crawford, 2003). However, findings from this study support that providing ACLS training to novice RNs can enhance skill sets and provide confidence in their role as nurses.

Fourth, the overall results of GSE posttest total scores were higher and had a smaller variance than the pretest total scores. This means that participant's scores tended to be more alike after having ACLS training, that the overall magnitude of the pre-training low scoring group gain is slightly larger to that of the higher scoring group, potentially meaning that the training had an enhanced effect on the low scorers.

Participants that rated themselves with lower pre-training self-efficacy tended to “catch-up” to those who rated themselves with higher pre-training scores, with the group overall having improved self-efficacy scores. The ramifications of this result is that simulation may be the great equalizer, a method effective at closing the skills gap for novice RNs with little to no experience by providing professional development, individualized support and feedback, and organizational support (Grove & Montgomery, 2003).

In summary, major results of this study include quantitative findings of the improvement of perceived novice RN self-efficacy after ACLS simulation training, and three qualitative thematic patterns, including *Recognizing Limited Capacity*, *Identifying and Managing Change*, and *Reliance on Supportive Connections*. According to participants, the ACLS simulation training method has been shown to be an effective means of providing a safe yet realistic environment that improves the novice RN's confidence, competence; and repeated practice is thought to fast-forward gains in clinical

experience and expertise thus decreasing the number of failures to rescue events in novice RNs. Concerns reflect the data that novice RNs are more likely than experienced nurses at committing a medical error; this study confirms that novice RNs feel unprepared to care for complex patients (Herron, 2017). Clearly, academic preparation is not enough. The healthcare community must build on academic efforts by using simulation not only in schools but by researching best methods for simulation training in hospital-based continuing education as well. As Benner (1984) describes, nurses complete nursing school as novices. It is the ethical and professional obligation of expert nurses to help them transform into competent and proficient nurses.

### **Limitations**

The present study has several limitations. First, the participants in the study worked in two different hospital organizations with one an academic center and one a community hospital. These nurses may have received different education and training during their orientation periods, with varying levels of content and time allotment. It is possible that higher scorers were unrealistic when scoring their abilities. Moreover, nurses may have encountered different instructor approaches to the ACLS simulation education despite the training being standardized. Academic and community hospitals have very different resource availability with community hospitals traditionally having fewer educational resources for their novice RNs. Within organizations, there is a possibility that ACLS simulation might not have been conducted in a completely identical manner across the two campuses. Another consideration might be the specialty of the nurse and their decision to participate. For example, nurses that volunteered for the study were probably those that had time availability. This may explain the higher number

of acute care nurses that volunteered to participate as they may have fewer mandates to complete other advanced care education typically required for nurses beginning their employment in critical care areas. On the other hand, it is possible that the volunteers for this study were the nurses who are more passionate about nursing research than their peers. In fact, many of the nurses who completed this interview did mention in conversation their interest in nursing research and told this PI that they were “happy to help”.

### **Conclusion**

This study confirms that novice RNs are not prepared to care for complex patients despite their education (Anbari, Vogelsmeier, & Dougherty, 2019; Biegen, 2001; Chang & Mark, 2009; Muntean, 2012). However, these findings further our understanding by adding to the limited literature regarding hospital-based simulation education and novice RN’s perceived ability to recognize and respond to situations that could result in a failure to rescue. Further work in this area is necessary for the development of hospital-based simulation and to provide evidence to administrators who plan and make resource decisions that simulation education for novice RNs should be a priority. While no single experiment or study can account for all the variables affecting a novice RN failure to rescue event, researchers can continue to study individual factors and explore them to the fullest extent possible.

**Table 4.5**

*Results of Qualitative Analysis: Themes, Codes, Excerpts*

<b>PRE-ACLS THEME</b>	<b>Recognizing Limited Capacity</b>	
	Prior to having ACLS training, novice RNs described their limited capacity to care for patients at risk. They felt unprepared to intervene with advanced life supporting measures during emergent events, and a few described feelings of regret and frustration over their patient’s clinical decompensation. Many felt that their lack of experience contributed to their limited capacity to skillfully manage complex patients. Those that were able to get experience found an improvement in confidence caring for at-risk and decompensating patients.	
<b>CODE</b>	<b>RESULTS</b>	<b>EXCERPT</b>
<b>Feeling Unprepared</b> - 9 -	Novice RNs described having too little knowledge and skill to act quickly in response to emergent situations. Although they described completing basic tasks during emergent events, they felt unprepared to intervene with advanced life supporting measures.	<p>(11) I was nervous, and I wasn't sure what to do besides just hook them up to vital signs and make sure that they had enough oxygen and had oxygen tubing available...</p> <p>(10) I immediately started compressions. But beyond that, I don't think I was thinking past that step of starting compressions...</p> <p>(4) What stands out most is that I did feel pretty unprepared for that situation...and it wasn't as emergent to some other situations...</p> <p>(12) It really kicked into my head that I should have taken, you know, that I should have taken ACLS or some more, maybe some monitor training...</p> <p>(2) I didn't really know the situation, too much, it was more just like, okay I know these labs have to be drawn. But I still, I like, I wanna be involved in those, but it's also hard to, I wanna be involved and not just in the way.</p> <p>(5) I didn't really know what to expect, as far as the thought process... It's like I had never seen that happen before.</p>
<b>Frustration &amp; Regret</b> - 3 -	Feeling unprepared to function in their role as a nurse, a few novice RNs described regret and frustration over their patient’s clinical decompensation. Regret was related to feeling somehow at-fault for their patient’s rapid health decline, and frustration with their ability to make timely or safe clinical decisions.	<p>(7) I kind of wish that I would have just done everything a little bit earlier 'cause I kind of came to this conclusion like later in the day...So, I kind of wish that I would have just went with my gut earlier.</p>

**Lack of Experience  
Managing Complex  
Patients**

- 10 -

Novice RNs noted a lack of clinical experience as hindering their ability to manage complex patients. With very few experiences to draw from, nurses felt unable to trouble shoot complicated patient care challenges.

(9) ...it (patient deterioration) was super quick. So, I did truly believe that she was going septic, but I couldn't believe how quick...I feel like catching it sooner maybe could have prevented her progression or her decline....

(8) (regarding the patient's clinical deterioration) Not knowing (what to do) was the hardest part...I was the primary caregiver for that patient, and having to make those decisions was really hard. And feeling responsible for the decline in this patient's stability, feeling like this was my fault and I had done something wrong...

(12) I didn't know that that was AFib, because I didn't have any cardiac experience previously, so it made it challenging knowing that if I would have had some more cardiac experience or ACLS training prior to being on the floor, it would have been helpful... if I would have been able to... read the monitor and see some sort of rhythm that he would have been in... knowing what I could have done better in dealing with the moment...

(9) I feel like there were multiple factors [that made this patient challenging to manage], one being that I didn't have experience with a septic patient at all and then what to do...it [the emergent event] opened my eyes significantly to how quick someone can go septic. And how dangerous it can be for our patients... which is something that I had never seen before.

(8) ...so I was still very inexperienced. I had another nurse in the room with me, and she kept saying, do you want me to call them [the doctors], do you want me to call them? And I was like, I don't know what to do...

(4)...but maybe I would always feel like I could never have enough training to recognize symptoms of instability and what they mean... So it's hard to determine where that line is...

***Experience Builds  
Confidence***

- 4 -

Although the majority of nurses described their lack of experiences managing events, a few were able to recall how being in the event helped boost their confidence and was perceived as foundational for managing future events.

(5) I mean, there's just so many things you don't, really, to this day, there's still lots of things I go, I don't really know when bicarb is the best idea...but I've seen it been given...but I also don't know what it does. So, I'm like, I have no idea for sure...

(6) I would have to say, I was pretty nervous 'cause you learn about it in school, but it's different from reading about it to actually handling the situation.

(4) You know, I think when you deal with something like that you get a little bit more confident about your ability to tell when it's what I need to do to make decisions about that. So it's always good. The experience is good.

(5) Well, it [event] gave me experience. All experience is beneficial. Whether it's good or bad, it's always just making you better, and making you a better nurse. So, no matter what, just having any amount of it can be, definitely prepared me for the next asystole and anoxic brain injury, and any other.

(6) ... you still get nervous even now, but I think as time goes on, the more you do it, you get more confident in what you're doing...I guess it boosted my confidence, 'cause I had one problem and now it's like, okay, I can handle this without like, not necessarily, [name redacted] wasn't in there initially, a doctor wasn't in there initially, so it's like I can trust myself more.

(11)...information that I learned [from the emergent event]... just how to act in a rapid response type of situation. I think I've gained at least a little bit more confidence...but the more situations you're in, you gain more confidence the next time it happens.

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**POST-ACLS THEME Identifying and Managing Change**

Novice RNs having taken ACLS training described how they were now better able to manage change. A majority perceived ACLS training to have improved their ability to detect early signs and symptoms of patient instability and differentiate stable versus unstable conditions. Moreover, many nurses relayed a sense of improved competence after having managed emergent events, and began to describe themselves as leaders or experts. A few felt that their enhanced ability to recognize abnormal changes in the patient's condition improved their capacity to advocate for the patient and the patient's plan of care, and provided a better understanding the overall clinical picture of that patient.

**THEME** Novice RNs perceived increased confidence managing the care for their at-risk patients and emergent situations as a result of having attained additional knowledge and hands-on skills through their ACLS training. Moreover, nurses felt that practicing their newly learned skills and role-playing was important for remembering the advanced skill techniques learned in ACLS. One nurse likened role playing during ACLS as an activity that helped build "muscle memory". Some nurses felt that they might not receive many opportunities to use their ACLS skills at work, and voiced concerns over possibly losing those skills. These nurses felt that they needed to more frequently practice their ACLS skills in other ways or risk losing their newly acquired ACLS skillset.

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**CODE**

**RESULTS**

**EXCERPT**

**ACLS Enhances  
Recognition of  
Abnormal**

A majority of novice RNs perceived ACLS training to have improved their capacity to detect early signs and symptoms of patient instability. Moreover, nurses felt that ACLS training enhanced their ability to differentiate stable versus unstable conditions

(9) We also have patients on our floor that have history of AFib, some of them with AFib, RVR. And so, when that happened, just being able to recognize that on our telemetry monitors, and recognize when the patient is symptomatic, and especially identifying when it's controlled or uncontrolled. ACLS has significantly helped with my experience there... ACLS significantly helped me realize some symptoms and some different rhythms...

(5) ...what it's [ACLS] giving me is, the actual knowledge of how to respond, But it [ACLS training] does definitely give you a good idea of, hey, this is when to intervene on it. You can see people with lots of different arrhythmias that will go, oh, this is stable though, and still always the ingraining idea of, when is it stable, when is it unstable? You think of that as symptomatic, asymptomatic. Is this affecting your patient in the long-term, gonna hurt them, or can they sit like this until morning?

(2) I did have a patient the other day who had afib [atrial fibrillation] and heart rate would go from 60 to 120, up and down and up and down and up and down. After the ACLS class I learned



a little bit more about what that meant... What caused her heart rate to jump, when she was symptomatic, and I tried to be a little bit more pro-active in getting her vital signs early, assessing her... So it [ACLS] does help us kind of focus in on what would be causing something. Like a more focused assessment of their history and you kind of back track and look for a reason for why the patient is like that.

(1)...it [ACLS] prepares me to what to do like after a code, too. Not just focusing on like one thing. As a new nurse I can narrow it to like one thing I can fix but like now I am better to seeing the whole picture.

(11) I was able to advocate for the patient when I was noticing that the medications that we were giving were not really doing anything and able to advocate for the patient to change it up to be able to stabilize him.

(4) But it was nice to be able to look at the EKG and say, hey you know what, that looks fine. I don't see any STEMI. Don't see any weird rhythms.

(7) ACLS definitely helped with the early identification factor...trust your gut and if you notice any changes kinda go with the worst case scenario and then work off of that before you just kind of brush it off... I feel like definitely recognizing certain things early is really important.

(10) I think it [ACLS] just made me more comfortable with like knowing the possibilities that can actually happen to your patient.

(8) It was nice to learn like cardiac rhythms and things like that [during ACLS training], and recognizing those types of situations... So it [ACLS] was helpful, it was mostly helpful for the meds, understanding how much of each one to give and at what point...

**Sense of  
Improved  
Competence  
and Confidence**

- 8 -

After completing ACLS many nurses relayed a sense of improved competence when managing codes...They described themselves as taking the lead and being an expert during the event.

(6) It helps when you start the code, you kinda know what you're doing. You don't have to look for somebody for guidance. You can just, you know what you're doing, you just start. I'm like one of the [ACLS] experts up there. I know what I'm doing and it's nice to practice it and keep going, so I enjoy that.

(12) Now that I have gone through my training... prioritization is definitely one of those big experiences that has changed since I took ACLS.

(9) It [ACLS] definitely increased my experience in knowing what to do in these types of situations, delegating was very efficient in that situation.

(4)...it was nice to look at them and say, hey I know what that is! I was just so glad to go to training and now I have, I know I have some idea of what the process is and what's gonna happen and what the jobs do and what they're looking for. And so I feel more like, okay now I feel like I knew what I was doing.

(11) Because of the ACLS class, I knew more information about the drugs... vital signs with the medications we were giving. Like how frequently to take those vital signs. I feel like I had gained even more confidence. That was one of the first situations after that class, and so I just felt more confident in the whole situation and that it had gone really well.

ACLS training was found to improve novice RN's confidence caring for the patient in a variety of situations. Nurses felt as though they had acquired additional knowledge and hands-on skills through their training, and as a result felt increased confidence managing the care for their at-risk patients and emergent situations.

**Practice Makes Perfect**

- 6 -

Nurses perceived the ACLS training methodology of practicing through simulation was important in helping them recall the advanced skill techniques. The hands-on learning environment was thought to enhance their ability to accurately recognize decompensating signs and symptoms and learn to intervene using appropriate actions and resources. One nurse likened role playing during ACLS as an activity that helped build “muscle memory”.

(10) There has been a code where I was able to set up the respiratory bag and tell people to start compressions, get the crash cart there, and get everything ready for when we needed it...and as that code was going on, in my head I'm like, okay, time for an epi, time for an... Just, I was ready...But definitely I got things started quickly, where maybe if I hadn't of had the ACLS, I wouldn't feel as confident.

(7) I think it did (help) just with my confidence as far as just having that under my belt to like kind of just signs and symptoms to look for...it [ACLS] did help with my confidence and as far as in an ACT what really to do like the first step even before it becomes an actual calling an ACT or whatever.

(12) It [ACLS training] changes the priority of care rather than looking at what he already had done... I feel like I am more comfortable in ordering the correct interventions to figure out what we need to do ...

(4) Practicing the codes. Having the monitor there and having to look at it and decide what it is showing me what should I be doing. You know, what drugs go with that, how often do we give them how... What can I expect to happen, yeah... the more often I can do it the better 'cause if I had to wait two years I wouldn't...

(12) It was good to be able to simulate the experience of making sure that you have the monitor in the right place. If you are doing synchronized cardio version, you're able to monitor, to manipulate that monitor how you need to in that situation...in our ACLS experience, we were able to, this is what your situation is but now do something about it.

(5) During my actual mock solo, you have to pretty much give all the H-and-T's, ... but you pretty much have to list them off. And, I'm sitting there, listing them, well, this is what it is...

*Use It Or  
Lose It*  
- 3 -

Some nurses expressed concern that they work on units where emergent patient situations requiring use of the ACLS skillset occur infrequently. These nurses felt that they needed to more frequently practice their ACLS skills or risk losing their newly acquired ACLS skillset.

(9) However since I don't work on the cardiac floor, we don't get to see a lot of rhythms and sometimes we even only have one or two patients on the floor on telemetry, so I don't get to practice with my ACLS as much as some people, which I feel like is a disadvantage since I did the certification, I just don't get to practice it quite as much as some people.

(1) We went over the Hs and Ts. But, it didn't stick with me as much as I wish it would have.

(2) The class itself, it was a lot of repetition, which is good. So then you repeated the same treatment for each heart rhythm we did. We did two days in a row, and so it was like muscle memory, like third time you hear it you remember it. It was pretty good because each group that did it, we went through and each person played the role over and over again. So, by the end of six people going through it, it was like, okay it's pretty engrained in your head after that.... and with a lot of this if I don't use it, I'm gonna lose it. Practicing all this, 'cause we don't have these situations all that often... it's hard to practice it all the time when you don't have actual patients doing that.

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**PRE & POST-ACLS  
THEMES**

**Reliance on Supportive Connections**

Novice RN's noted a reliance on supportive connections across pre and post ACLS experiences. During emergent events, experienced staff help manage the patient while the novice RN contributes according to their perceived skill level. Reliance on supportive connections is described by many nurses as a feeling of teamwork, having "all hands on deck" during emergent events. Moreover, novice RNs rely on their supportive connections for accurate, timely decisions and interventions by having received direct, expert guidance from experienced staff.

After ACLS the majority of novice RNs described events where, although still requiring support, they were much more involved and perceived themselves capable of practicing at higher levels and working within the team. In terms of feeling part of the team with all hands on deck, novice RN's perceptions shifted from being reliant on others to being a contributing member of the team. After ACLS training, novice RNs perceive a need for continued support, but are now able to articulate, document, and participate in specific elements of advanced clinical care during an emergent event. They describe an improved ability to make decisions and quickly seek targeted assistance for their decompensating patients.

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Nurses did not describe any specific post-ACLS scenarios that included expert guidance for either monitoring at-risk patients or during emergent patient care.

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**CODE**

**RESULTS**

**EXCERPT**

**All Hands  
On Deck**  
- 7 - PRE

The code “all hands on deck” describes the novice RN’s perspective of the emergent event scene and how experienced staff rush in to help manage the patient as a team. Novice RN before ACLS training contribute according to their perceived skill level, with the support of experienced nurses to manage the more complex situations.

(2) And when there is a code situation, it is like all hands on deck, somebody gets the crash cart, somebody’s alerting the doctor, someone’s being the runner, someone is drawing labs, starting IVs, then usually the ACT nurse will come at that point. And she usually ends up running the code.

(3) It wasn't my patient, but you know how we all help. I was with the bedside nurses, so my priority was getting access, so I wasn't on meds which was kind of a relief.

(7) We have a really good support system from our ACT [acute care team] nurses on nights and days...So she was ACTing another patient on another floor, so she could only monitor with me ... but she kinda trusted me to keep him stable until were able to figure out what to do with him.

(8) And I think that, overall, we had excellent teamwork that night, everybody came in the room and just knew exactly what to do, and the orders were given, and everything went very smoothly.

(10) Yeah, I had two, I would say two nurses from the floor that really helped. One of them took over compressions really quickly so that I could start saying what I knew in the situation that happened. And then my other friend, [redacted], she helped in the code process but also helped me do the postmortem care and clean up the room. And to make sure that the patient was presentable. But during the code, yeah, about two assistant nurse managers were there, the regular code team, and my main manager was in the hallway, the pharmacist was there. Definitely a lot of people responding.

**All Hands  
On Deck**  
- 6 - POST

After ACLS the majority of novice RNs described events where, although still requiring support, they were much more involved and perceived themselves capable of practicing at higher levels and working within the team. In terms of feeling part of the team with all hands on deck, novice RN's perceptions shifted from being reliant on others to being a contributing member of the team.

(1) My floor has really great team work...I like, I knew that I could call and they would help me with what was going on.

(9) Other nurses who were, our charge nurse and then the other nurses that were also in my hallway were at the door asking if we needed anything, if they can bring supplies. Everything went very, very smoothly.

(6) Everybody worked together really well...everybody was there...most of us are ACLS up there, so we didn't have to stop and think. It was just, we flowed, we worked as a team.

(1) I had two nurses with me each with three years of experience. One of them is usually like our charge nurse at night. So they were in there with me. She kinda guided me, helped calm down the patient, it was basically teamwork, I've never worked alone in situations like that.

(11)...and the Rapid Response nurses came into the room eventually too ..., and so we were able to brainstorm all together ... we were able to come up with a plan how we were going to...and so everybody was on the same page with the care going forward for that patient.

(12) I think the nurse felt supported by having other staff members in, it was not only myself, but the charge nurse also came.

(2) It was actually a nurse practitioner taking care of her, she helped, ...and then, one of the other nurses on the floor ...helped me ..., and then figure out what the next step was, and helping with my other patients.

(5) ...the only thing that gets you through is teamwork from your team. Having a supportive team member can really change any event that's difficult.

**Reliance on  
Others**

- 9 - PRE

Before ACLS training, a majority of novice RNs relied on reassurance by others with their patient assessments. Novice RN helped according to their perceived skill level, but relied on experienced nurses to manage the more complex situations. These experiences demonstrate how the novice RN trusts experienced team members to help them make accurate, timely judgements and initiate appropriate interventions.

(6) V Fib, you learn about it, so it's something that is easily identifiable on a monitor compared to blocks and stuff. So, I saw it and went from there, and I think having our ANM [assistant nurse manager] so close, that also helped, 'cause I know what to do, but having somebody reassure me, that was pretty, it boost my confidence.

(8) This was just barely a couple of months after I had become a nurse... I need you to help me here. And finally I was like, yes, just call them. Like, I don't know what's happening. We obviously need somebody more experienced. So that was when we made the decision to call them.

(11) ...we called the Rapid Response nurse to come up, and that's about it until the Rapid Response nurse came up. I just really didn't know what to do right away. ...I was basically just waiting for someone to tell me what to do, and so that made me not be able to think clearly and act as quickly as I could have if I had an idea of what to do for the patient.

(1) I made someone else check the pressure just to make sure this is really right. Am I hearing this correctly?

(10) I had a patient (who) became unconscious, and stopped breathing and lost a pulse ...so the first thing I did was get them back in the bed and call for help.

(12)...definitely calling that Rapid and knowing that I had the comfort in trusting the ability to call that instead of just kind of trying to figure things out on our own...

(2) We resort a lot to the to the Acute Care Team...So we can call her a proactively if we know that a patient is deteriorating...

(5) I mean, still always talking to my charge nurses like, hey, this is happening. Do you think we should maybe do a pacemaker? But,

**Reliance on  
Others**

- 4 - POST

After ACLS training, novice RNs perceive a need for continued support, but are now able to articulate, document, and participate in specific elements of advanced clinical care during an emergent event. They describe an improved ability to make decisions and quickly seek targeted assistance for their decompensating patients.

she was there to... make sure everything was running appropriately...

(7) I called the ACT nurse and just see if they could lay eyes on them and kinda get a second opinion just to have someone else look at them...so it was good to have her there.

(2) ...we can be like, oh yeah, hey, actually would you mind coming up and taking a look at this patient, I think our ACT nurse is actually one of the best resources we have, we just, because you can call her to come and assess ahead of time to see if we need more stuff on board...

(4) I did have a patient, well, the other night... I was training for Relief Charge, so I did have a Charge Nurse there, but we had a patient that we called a Rapid on because of a chest pain...we called the Rapid...it was nice to get practice running a Rapid as charge-ish while still having my charge there too.

(8) I had just talked to her [nurse practitioner] and we decided to give her [the patient] some regular insulin IV, re-checked in an hour, she came down 370, and then just gave her 7 units of Lispro, subq.

(3) ...it was kind of the more experienced nurses kind of reacted quicker and us that we were there for just a couple of months...and we're fortunate enough for more experienced nurses to be at the bedside. So they were getting access.

**Expert  
Guidance**

- 7 - PRE

Before having taken ACLS nurses described needing direct clinical guidance by an experienced expert nurse or healthcare provider to properly monitor at-risk patients and for providing care during emergent situations.

(12) I had the house supervisor, who was kind of walking me through with the monitor and seeing what she was seeing and she was trying to explain it to me, so that was very helpful. It was a learning experience for me...



(9) During that day, I really got to see, I learned a lot from our more experienced nurses who were in the room. The ACT nurses were also very kind in explaining to me why they were doing what they were doing.

(2) She [ACT nurse] made me aware of a kind of, definitely the point in which I should tell the doctor, hey, the patient should be in the ICU by this point, she kind of helped me figure out what I could do to stay to stabilize the patient that time. The fluids, the blankets, everything like that. Identifying where this potential source of infection could be coming from. She was like, but if she doesn't stabilize in the next couple of hours, we may need to advance her to the ICU.

(10) I think the nurse residency program helps us be prepared to identify deteriorating things because they do let us see what's in a crash cart but they also have a medicine specialty orientation where in your first year, you go through some case studies to identify things to look for.

(11) The Rapid Response nurse was actually super helpful. He was explaining everything to me 'cause he had known that I was a newer nurse, so he was explaining everything to me, why he was doing this, and what could possibly be happening, and causing whatever was going on.

(4) I had the mentor nurse help me assess what was going on ... and then later on, my charge and the mentor...so that was really good. I had good support, I did contact a rapid so the house supervisor was there...

(8) Our charge nurse was there that evening. She was the one that helped me make the decision to call the ACT nurse.

**Expert  
Guidance**  
- 0 - POST

Novice RNs did not describe any specific post-ACLS scenarios that included expert guidance for either monitoring at-risk patients or during emergent patient care.

As noted, nurses having taken ACLS began to describe themselves as leaders and experts. It is possible that novice RNs used their improved observational skills and increased knowledge and experience in a team-like setting to guide them with monitoring and responding to patients, instead of seeking and relying wholly on others for expert guidance.

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*Note:* Excerpts were extracted from the transcribed interviews of 12 novice RN participants.

**Table 4.6***Theme and Code Frequency*

Theme	Code	Excerpt	<i>f</i>	%
Recognizing Limited Capacity	Feeling Unprepared;	<b>11,10,4,12,2,5,7,9,8</b>	<b>9</b>	<b>75%</b>
	<i>Frustration/Regret</i>	7,9,8	3	25%
	Lack of Experience Managing Complex Patients	<b>12,9,8,4,5,6, 11</b> 4,5,6,11	<b>7</b> 4	<b>58%</b> 33%
	<i>Experience Builds Confidence</i>			
Identifying and Managing Change	ACLS Enhances Recognition of Abnormal	<b>9,5,2,1,11,4,7,10,8,2</b>	<b>9</b>	<b>75%</b>
	Sense of Improved Competence and Confidence	<b>6,12,9,4,11,10,7,2</b>	<b>8</b>	<b>67%</b>
	Practice Makes Perfect <i>Use It Or Lose It</i>	<b>4,12,5,9,1,2</b> 9,1,2	<b>6</b> 3	<b>50%</b> 25%
Reliance on Supportive Connections	All Hands On Deck, pre	<b>2,3,7,8,10,1,9</b>	<b>7</b>	<b>58%</b>
	All Hands On Deck, post	<b>6,1,11,12,2,5,</b>	<b>6</b>	<b>50%</b>
	Reliance on Others, pre	<b>6,8,11,1,10,12,2,5,7</b>	<b>9</b>	<b>75%</b>
	Reliance on Others, post	<b>2,4,8,3</b>	<b>4</b>	<b>33%</b>
	Expert Guidance, pre	<b>12,9,2,10,11,4,8</b>	<b>7</b>	<b>58%</b>
	Expert Guidance, post	0	<b>0</b>	0
Total excerpts			<b>72</b>	

*Note: n = 12 novice RN participants*

## CHAPTER 5

### CONCLUSION

#### Summary and Synthesis of Findings

Novice RNs play a critical role in providing safe patient care. Nurses as bedside patient caregivers have a responsibility to recognize the early warning signs of clinical deterioration and respond with appropriate and timely interventions. The specific aims of this study were to explore how ACLS simulation influences a novice RNs' perceived ability to recognize and respond to changes in the patient's condition that if otherwise left untreated, would result in failure to rescue. Novice RNs transitioning into practice often experience difficulty applying their knowledge to real world situations and when experience is minimal, support for role transition from nursing student to novice RN is vital to prepare RNs for safe practice in today's fast-paced, complex clinical environment.

**Research Question 1 (Quantitative):** "Does ACLS simulation affect a novice RN's self-efficacy scores based on the General Self-Efficacy Scale?" Yes, the mean self-efficacy scores of novice RNs was higher after the ACLS training session than it was before they received the training (pre-ACLS baseline was (M = 30.31, SD = 4.33) and post-ACLS was (M = 33.80, SD = 3.60),  $t=3.23$ ,  $p = 0.006 < .05$  . However, three GSE scores remained unchanged before and after the ACLS training, and three GSE scores declined after having taken ACLS training, These findings could be a result of the nurses being more acutely aware of their abilities and their perceived need for additional training after ACLS. However,

the overall magnitude of the pre-training low scoring group gain was slightly larger to that of the higher scoring group meaning that the training had an enhanced effect on the low scorers. Participants that rated themselves with lower pre-training self-efficacy seemed to have had their learning expedited to a similar level as those who had rated themselves with higher pre-training scores. The results of this test demonstrate that ACLS training, a well-known simulation-based educational program, can significantly improve novice RN's perception of self-efficacy regarding skills performance for responding to an unstable patient with worsening condition.

**Research Question 2 (Qualitative):** “How does ACLS simulation influence a novice RN's perceived ability to identify early signs of change in condition that could result in a failure to rescue?” According to findings, novice RNs feel more prepared to recognize early changes in clinical decompensation after they completed ACLS training, describing their improved sense of competence and confidence caring for at-risk patients. They gave examples of instances before ACLS simulation where they felt inexperienced, had difficulty managing complex patients, felt unprepared for their role, and felt frustration gaining the advanced care knowledge and skills required to manage such patients. After ACLS simulation training participants described their improved ability in identifying early abnormal changes in their patient's condition. Moreover, the hands-on learning through repetition was thought to assist the nurse with early recognition of decompensating symptoms using appropriate actions and resources.

Novice RNs noted that supportive connections including teamwork with qualified staff helped them recognize early changes in the patient's condition and make accurate and timely judgements. These findings suggest the simulation training may have improved novice RN's confidence with their observational skills, knowledge and experience in a team-like setting to guide them with monitoring and identifying decompensating patients. These improved skills positively contribute to the goal of enhanced novice RN patient safety behavior by the prevention of a failure to rescue event.

**Research Question 3 (Qualitative):** "How does ACLS simulation influence a novice RN's perceived ability to respond to emergent changes in patient condition that could result in a failure to rescue?" According to findings, novice RNs who have taken ACLS training feel more prepared to respond to emergent events. Prior to ACLS simulation participants described their lack of experience having contributed to their poor ability to manage complex patients further stating that when they gained experiences through emergent events they gained confidence. Participants described their improved ability responding to abnormal changes in their patient's condition, and felt that ACLS provided a sense of improved competence and confidence responding to critical situations. As it was for research question 2, the hands-on learning environment was thought to assist the novice RN with learning to intervene appropriately. Nurses before having taken ACLS relied on team members to help with complex emergent situations; after having taken ACLS nurses began to describe themselves as leaders and experts better able to manage patient situations using their newly

learned knowledge and skills. It is possible that the novice RNs began applying their learned observational skills and due to their enhanced perceived ability and competence post ACLS, they could respond to patients more confidently, instead of seeking and relying wholly on others for guidance.

Insights gained from the research provide an improved understanding of novice RN's perceptions of ACLS simulation for the recognition of early changes and management of emergent patient conditions. To this effect, Bandura's Self-Efficacy theory provides a useful framework for this study design to explore simulation and novice RN self-efficacy while caring for at-risk patients. Findings from this study support Bandura's views on the required elements for the development of self-efficacy in terms his Social learning theory. Bandura explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental stimuli influences. He describes learning as a cognitive process that takes place in a social context, and that learning occurs by vicarious reinforcement of behavior. In this study, ACLS methodology successfully used all three stimuli to teach advanced knowledge and skills; for example live models displayed desired behavior during simulated demonstrations, verbal instruction described the desired behavior in detail, and symbolic modeling by way of simulated experiences demonstrated that ACLS simulation training is an ideal model by which novice RNs can learn to care safely for patient's at-risk for clinical decompensation and in emergent situations.

## **Significance of the Dissertation Work**

Clinical education in the form of simulation training represents a fundamental element for providing basic and advanced concepts, and experiential learning ensures skills are learned providing safety and improved patient outcomes. Likewise, failure to provide safe opportunities for novice RNs to learn to recognize and respond to patient deterioration will likely maintain the current rate of adverse events in hospitalized patients. In this study, a theme found among novice RNs was that ACLS simulation training methodology has made a difference by moving the concept of rescue from an event that has already occurred toward identifying patient indicators of clinical deterioration through early recognition. If patient deterioration is recognized early, intervention may significantly change patient outcomes and minimize the need for rescue in the first place. Simulation is a safe, interactive and collaborative learning method, and is especially useful for novice RNs who lack clinical practice opportunities. Limited research is available connecting novice RN self-efficacy and simulation training; this study helps fill the gaps by addressing those associations.

This study enhances the understanding of strategies useful for training hospital-based novice RNs on safe patient care. As such this report adds to knowledge base regarding safety as a focus in hospital-based continuing education. Continued research surrounding safe patient care education will provide a better understanding of how novice RNs can improve their practice confidence and effectively learn to keep patients safe. A highlight of this study supports simulation to be an effective option for improving novice RN confidence



while caring for at-risk patients. This research supports the call by the Institute of Medicine (NASEM, 2016) the Agency for Healthcare Research and Quality (AHRQ, 2016b), and the National League for Nurses (NLN, 2014b) to develop, test, and evaluate education strategies focused on simulation to improve the delivery of safe patient care.

### **Strengths and Limitations**

#### **Strengths**

This study is a mixed method approach to research. By approaching the problem using methodological triangulation, different aspects of the problem were identified, examined, and analyzed. Evidence and support for the findings was generated by combining and integrating both approaches in one study thereby enhancing understanding of the research problem (Choy, 2014; Creswell, 2013). First, quantitative data analysis using statistical computations was used to assess the impact of the simulation intervention as judged by the participants. This technique provided an opportunity to explore perspectives deductively where the relationship among variables were measured using an objective, unbiased tool (Creswell, 2013). Second, qualitative data provided detailed information about the subject's perceptions within the context of the situation under investigation. (Creswell, 2013). The use of interviews allowed probing of respondents and clarification of responses, thus, collection of in-depth information (Creswell, 2013). The participants were pooled from diverse settings: one academic and one community hospital. Participants were employed in a variety of non-critical and critical care units thereby collecting potentially various viewpoints. Thick

descriptions of what was observed by participants help determine how to transfer the findings to other settings (Given, 2008).

### **Limitations**

The limitations of the study were a small sample and lack of a control group which limits experimental control (Given, 2008). This limitation may undermine the generalizability of the findings and the ability of the study to observe findings that were a result of the intervention and not by confounding or mediating factors (Given, 2008). In addition, inductive inferences were made from the interview data also limiting the generalizability of the findings (Given, 2008). The participants were recruited using a purposive sample from one academic hospital and one community hospital. This recruitment method could have resulted in a sampling bias because participants are from a small sample of the population of non-critical and critical care novice RNs taking ACLS training (Given, 2008). The goal of this research, though, is not to generalize the results but to enable the transferability of the findings under similar contexts (Creswell, 2013; Given, 2008; Patton, 2002). The extent of the transferability of findings is subjective and the responsibility of the readers who makes their own decision regarding the commonalities of the individuals and situations under study (Given, 2008). The findings from this mixed methods study enhances the understanding of how non-critical and critical care bedside novice RNs perceive their simulated experience having changed their self-efficacy for preventing failure to rescue and as such, transfer best to individuals and situations that match that context (Given, 2008). In addition, time constraints for each participant were a consideration.

Novice nurses are busy with school, work, and family schedules that can create time challenges for data collection (Stark, 2013). For these reasons, every effort was made to maneuver around participant's school and work schedules.

Qualitative research as a method of data collection can be seen as a research limitation (Creswell, 2013; Given, 2008; Ruth, 2006). Each interview is a recollection of subjective experiences. These recollections are self-reported data that can contain potential sources of bias (Given, 2008). For example, participants may have had a selective memory and may have recalled only certain events or experiences leaving out potentially important or relevant information. In addition, events and outcomes may have been recalled out of sequence, outcomes may have been subjectively attributed the participant's abilities and external forces, or outcomes of the experience may have been exaggerated (Given, 2008). As well, during-interviews, the PI may have introduced potential bias that could have affected the respondent's choice of words or response thereby affecting the outcome of the interview (Given, 2008). This PI made every attempt to remain judgment free during the design and collection of data during this study. To validate data accuracy, the PI member checked informant's during the interview, improving the credibility, validity, and transferability of findings (Given, 2008).

### **Recommendations for Future Research**

Previous research efforts have demonstrated simulation to be a demonstrated strategy in nursing education within the academic setting. This study found simulation to be a successful method for helping novice RNs gain the confidence needed to successfully apply their skills in real-world hospital

scenarios. The current study was based on an academic and a community hospital setting and as such adds to the body of literature focused on novice RN continuing education using simulation to improve safe patient care. Increasingly complex hospital environments, greater numbers of patients with multiple, chronic health care problems, limited preparation time, and scarce numbers of clinical sites result in novice RNs receiving limited hands-on opportunities- the very experiences required to prepare them to function as competent, safe RNs in today's hospital setting. The findings from this study support Benner's understanding of novice RN professional development from novice to expert nurse (Benner, 2001). Nurses may be better able to conceptualize and therefore identify appropriate courses of actions through repeated practice, including simulated experiences. Thus, education that is designed fill gaps in the preparation and readiness of novice RNs will most likely be fulfilled through the development of simulation interventions to be used in the hospital setting. Future research should additionally focus on the prevention of "failure to rescue" events by novice RNs. By gaining confidence and competence particularly in caring for lower volume emergent situations such as a patient experiencing clinical deterioration, novice RNs will greatly reduce their risk of medical error and hospitals will achieve improved safety for its patient population.

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## APPENDIX A: ACLS INSTRUCTION AND MATERIALS

Multiple teaching methods are used in the American Heart Association ACLS Course. The environment is aimed to simulate a real patient in a hospital bed such as in the critical care or emergency department. The closer the simulation is to a real-life emergent patient scenario, the more successful the transfer of skills to the ACLS student. The ACLS course is designed to teach lifesaving techniques required to be a team member and a team leader. Extensive material is covered in a short period of time, including instructor-led training in a class room setting.

The ACLS course is designed with three components:

### **Pre-course (1-4 weeks before ACLS training)**

1) Reviewing and understanding the following:

- Advanced Cardiovascular Life Support (ACLS) Provider Manual.
- BLS skills and knowledge, including the use of an AED.
- Advanced Cardiovascular Life Support (ACLS) 4”x 6” Pocket Reference Cards (3): Cardiac Arrest Circular Algorithm; Acute Coronary Syndrome Algorithm; ACLS Pre-course Preparation Checklist.
- ECG rhythm and ECG pharmacology.
- The American Heart Association Student Website [www.heart.org/eccstudent](http://www.heart.org/eccstudent) materials that provide extra information designed to support the student taking the ACLS course.

2) Completing the pre-course self-assessment test on the Student Website.

- Major test areas include rhythm identification, pharmacology, and practical application of ability to select an appropriate treatment or intervention.
- 60 questions, 4 Likert style choices per question.
- A score of 70% or higher must be achieved to pass and print the student’s report.

### **ACLS course**

3) Completing of the ACLS Provider Course:

- Instructors deliver education designed to include both the cognitive portion of training and the psychomotor component of skills practice and testing.
- The ACLS Provider Course is approximately 15 hours and 20 minutes including breaks and lunch (ACLS, 2016).

**SELF-EFFICACY MEASUREMENT:  
Generalized Self-Efficacy  
Scale (GSES)**

Whereas most studies of self-efficacy follow Bandura's (1977) approach in measuring situation-specific beliefs (the belief in one's ability to perform a specific action), there is a growing interest in generalized self-efficacy beliefs. These are general beliefs in one's ability to respond to and control environmental demands and challenges. Much of this work has been developed by Ralf Schwarzer and colleagues (Schwarzer, 1992) and it is their scale which is included here.

**Directions for use**

**Description**

The Generalized Self-Efficacy Scale (GSES) is a ten-item scale, which has been translated by Mary Wegner from the original German version by Schwarzer and Jerusalem (in Schwarzer, 1992). It assesses the strength of an individual's belief in his or her own ability to respond to novel or difficult situations and to deal with any associated obstacles or setbacks.

**Administration**

This is a self-administered scale which normally takes two to three minutes to complete. Respondents are required to indicate the extent to which each statement applies to them.

**Scoring**

For each item there is a four choice response from 'Not at all true' which scores 1 to 'Exactly true' which scores 4. The scores for each of the ten items are summed to give a total score.

**Interpretation**

The score on this scale reflects the strength of an individual's generalized self-efficacy belief. Thus the higher the score, the greater is the individual's generalized sense of self-efficacy. For comparison purposes, Schwarzer (1993) presents accumulated data from 1,660 German adults who ranged in age from students to a group of older people, although the majority were adults in the community. The mean score for this whole sample was 29.28 (standard deviation = 4.6) and there were no age or gender differences found between samples.

**Evaluation and psychometric status**

All the normative data and psychometric analyses have been conducted with German samples. High internal consistency ratings have been found for each of the five samples studied and the alphas ranged from 0.82 to 0.93. In a sample of 991

migrants from what was then East Germany, the retest reliability was found to be 0.47 for men and 0.63 for women over a two-year period.

Concurrent validity (*see glossary*) has been established on the basis of appropriate correlations with other tests. Expected positive correlations have been found with measures of self-esteem (0.52), internal control beliefs (0.40) and optimism (0.49). Expected negative correlations have been obtained with general anxiety (−0.54), performance anxiety (−0.42), shyness (−0.58) and pessimism (−0.28).

Predictive validity has also been assessed in a one-year follow-up of East German migrants. In women, self-efficacy correlated positively with measures of self-esteem (0.40) and optimism (0.56) obtained two years later. However, less impressive correlations (0.20 and 0.34) were found for men over a two-year period.

The scale has been tested for unidimensionality with factor analyses (*see glossary*) and a single factor solution has been found, indicating that the GSES is measuring a unitary concept.

### Comparison

This is a very new measure which has only been tested formally on German populations so far. It has been translated into eight other languages and is beginning to be quite widely used. However, as yet, there are no normative or other psychometric data on the English language version. Since it is a dispositional measure, it can be usefully compared with some of the measures described in 'Individual and Demographic Differences', particularly the self-esteem and optimism scales. Clearly these measures are somewhat similar but Schwarzer (1994) argues convincingly for their separateness.

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# GENERALIZED SELF-EFFICACY SCALE

Name: .....

Date: ..... Record Number: .....

	Not at all true	Barely true	Moderately true	Exactly true
1. I can always manage to solve difficult problems if I try hard enough.	1	2	3	4
2. If someone opposes me, I can find means and ways to get what I want.	1	2	3	4
3. It is easy for me to stick to my aims and accomplish my goals.	1	2	3	4
4. I am confident that I could deal efficiently with unexpected events.	1	2	3	4
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.	1	2	3	4
6. I can solve most problems if I invest the necessary effort.	1	2	3	4
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	1	2	3	4
8. When I am confronted with a problem, I can usually find several solutions.	1	2	3	4
9. If I am in a bind, I can usually think of something to do.	1	2	3	4
10. No matter what comes my way, I'm usually able to handle it.	1	2	3	4

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# APPENDIX C: PERMISSION TO USE GENERAL SELF-EFFICACY SCALE (GSE)

*Documentation of the General Self-Efficacy Scale*

8



Freie Universität Berlin, Gesundheitspsychologie (PF 10),  
Habelschwerdter Allee 45, 14195 Berlin, Germany

Fachbereich Erziehungs-  
wissenschaft und Psychologie  
- Gesundheitspsychologie -  
Professor Dr. Ralf Schwarzer  
Habelschwerdter Allee 45  
14195 Berlin, Germany

Fax +49 30 838 55634  
health@zedat.fu-berlin.de  
www.fu-berlin.de/gesund

## Permission granted

to use the General Self-Efficacy Scale for non-commercial research and development purposes. The scale may be shortened and/or modified to meet the particular requirements of the research context.

<http://userpage.fu-berlin.de/~health/selfscal.htm>

You may print an unlimited number of copies on paper for distribution to research participants. Or the scale may be used in online survey research if the user group is limited to certified users who enter the website with a password.

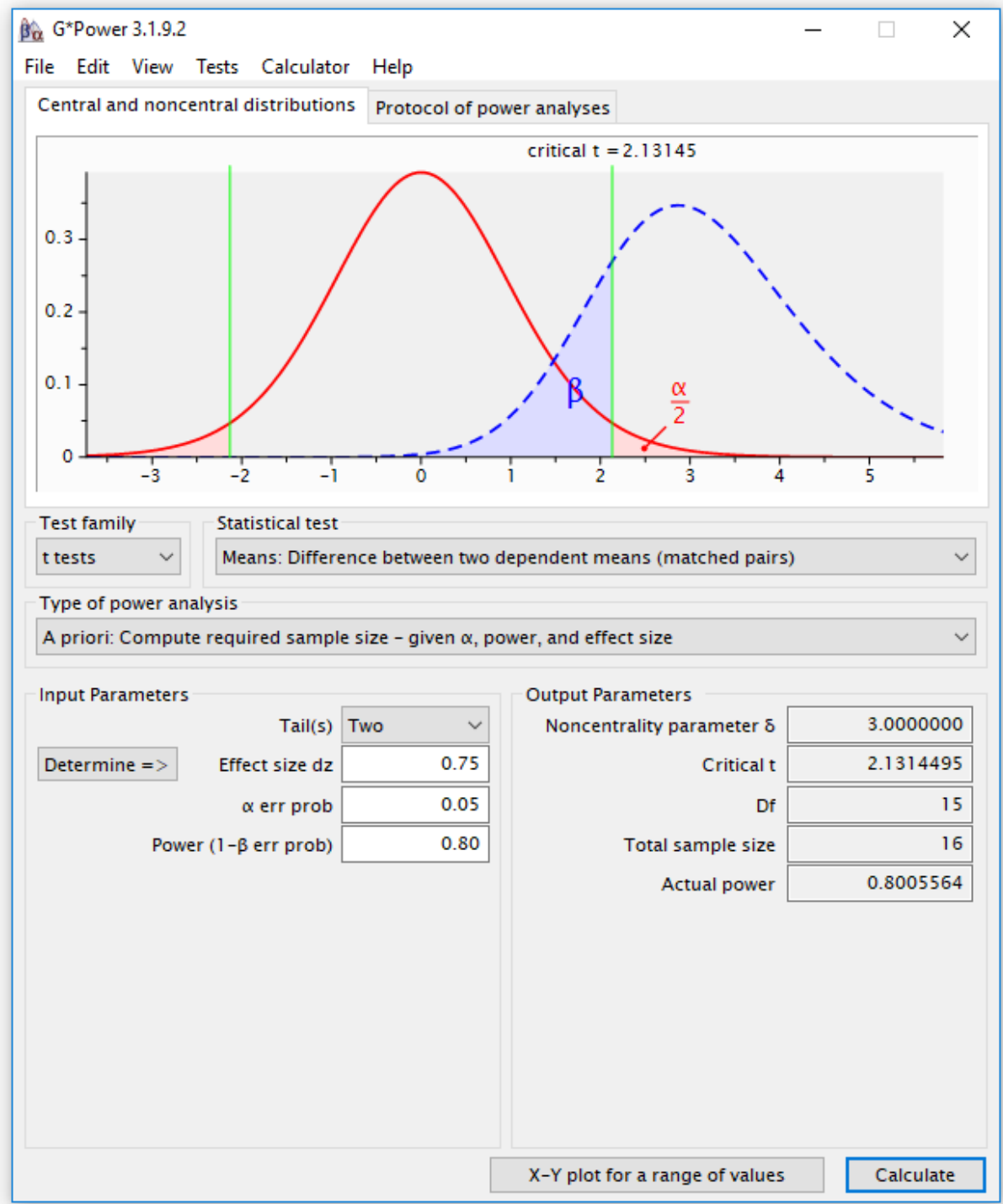
There is no permission to publish the scale in the Internet, or to print it in publications (except 1 sample item).

The source needs to be cited, the URL mentioned above as well as the book publication:

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston, *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp.35-37). Windsor, UK: NFER-NELSON.

Professor Dr. Ralf Schwarzer  
[www.rafschwarzer.de](http://www.rafschwarzer.de)

## APPENDIX D: POWER ANALYSIS



### Numeric Results for Paired T-Test

Null Hypothesis: Mean of Paired Differences = 0, Alternative Hypothesis: Mean of Paired Differences  $\neq$  0  
Unknown standard deviation.

Power	N	Alpha	Beta	Mean of Paired Differences	S	Effect Size
0.80056	16	0.05000	0.19944	3.0	4.0	0.750

## APPENDIX E: INTERVIEW GUIDE

Introduction: Do you have any questions before we start? Participant ID# \_\_\_\_\_

Hello, my name is MaryAnn Niemeyer. I am a PhD student at University of Missouri Columbia Sinclair School of Nursing. I am completing research for my dissertation. This research intends to explore simulation experiences and the development of novice RN self-efficacy in emergent situations.

The data collected is for research purposes and participation is completely voluntary and confidential. I have received permission to conduct this study at xxx. I will meet with you prior your ACLS training to complete a 4 minute survey, and then again within 3 months for the follow-up survey and a 1-hour interview. Compensation for participation is provided.

You have been through advanced cardiovascular life support (ACLS) simulation training. In that training you practiced caring for simulated patients that were experiencing life-threatening events. I am asking that you think back to those simulation experiences and how they might now influence how you care for your patients.

First, let's talk about your patient care experiences prior to taking ACLS. If you have any questions please feel free to ask for clarification. The interview will take about 60 minutes.

**I. Please try to recall and describe a time before you had ACLS simulation training when you had a patient experience an emergent situation such as an unstable patient with worsening condition.**

- 1) What stands out in your mind about that situation?
- 2) What led up to that situation?
- 3) How did you manage the situation?
- 4) What helped you manage that situation?
- 5) What made that situation challenging to manage?
- 6) What was the outcome for that patient?
- 7) What could have been done differently that would have led to a different outcome?
- 8) What went well?
- 9) What persons, if any, helped you manage the situation?
- 10) What did you learn from that event?
- 11) How did the event affect you?

**II. Now, think back to your experience with ACLS simulation. Since having taken that training, please describe a patient experience during an emergent situation such as an unstable patient with worsening condition.**

- 1) What stands out in your mind about that situation?
- 2) What led up to that situation?
- 3) How did you manage the situation?
- 4) What helped you manage that situation?
- 5) What made that situation challenging to manage?
- 6) What was the outcome for that patient?
- 7) What could have been done differently that would have led to a different outcome?
- 8) What went well?
- 9) What persons, if any, helped you manage the situation?
- 10) What did you learn from that event?
- 11) How did the event affect you?

**III. Final questions:** How have your views about responding to emergent clinical situations been altered?

- 1) Is there anything else you would like to share about the influence ACLS simulation on you as a novice RN and your ability to respond an unstable patient?
- 2) Is there anything else you would like to add to this discussion regarding identifying early signs of change in a patient's condition that could result in a failure to rescue?

Closing statement: Thank you for being a part of this research! It is my hope that patients will benefit from RNs being better prepared to practice using safe patient care behaviors. In addition, educators will benefit by being provided information derived from the study on novice RNs' learning patient safety behavior. Direct benefits to participants of this research are minimal, however novice RNs in the future may experience enhanced simulation training resulting in safer novice RN patient care. You as an active participant in this study could gain a better understanding and appreciation of patient safety after having reflected over your past experiences.



APPENDIX F: DEMOGRAPHIC DATA



**Participant ID#:** \_\_\_\_\_

**Demographics**

**Type of academic RN training received**

Diploma \_\_\_\_\_

Associates \_\_\_\_\_

Bachelor \_\_\_\_\_

Masters \_\_\_\_\_

**Months of experience employed**

as a Patient Care Tech \_\_\_\_\_

as a Student Nurse Tech \_\_\_\_\_

as a Graduate Nurse \_\_\_\_\_

as a Registered Nurse \_\_\_\_\_

in the Emergency Department \_\_\_\_\_

in the Intensive Care Unit, please specify \_\_\_\_\_

in Acute Care, please specify \_\_\_\_\_

at xxx Hospital \_\_\_\_\_

**Shift(s) most frequently worked**

Days \_\_\_\_\_

Evenings \_\_\_\_\_

Nights \_\_\_\_\_

Other (please describe) \_\_\_\_\_

**Participation in a nurse residency program**

- Yes, I am currently in a nurse residency program \_\_\_\_\_
- Yes, I have already completed a nurse residency program \_\_\_\_\_

## APPENDIX G: CONSENT FORM



### CONSENT FORM TO PARTICIPATE IN A RESEARCH STUDY

**Researcher's Name:** MaryAnn Niemeyer

**Project Number:** IRB# 2011690 MU

**PROJECT TITLE:** EXPLORING NOVICE RNS' PERCEPTIONS OF ACLS SIMULATION: RECOGNITION AND PREVENTION OF FAILURE TO RESCUE

#### INTRODUCTION

**This consent may contain words that you do not understand. Please ask the investigator or the study staff to explain any words or information that you do not clearly understand.**

You are being asked to participate in a research study. This research is being conducted to learn more about simulation and the development of novice RN ability to care for patients experiencing emergent situations. When you are invited to participate in research, you have the right to be informed about the study procedures so that you can decide whether you want to consent to participation. This form may contain words that you do not know. Please ask the researcher to explain any words or information that you do not understand.

You have the right to know what you will be asked to do so that you can decide whether or not to be in the study. Your participation is voluntary. You do not have to be in the study if you do not want to. You may refuse to be in the study and nothing will happen. If you do not want to continue to be in the study, you may stop at any time without penalty or loss of benefits to which you are otherwise entitled.

#### WHY IS THIS STUDY BEING DONE?

The purpose of this research is to explore simulation and the development of novice RN ability to care for patients experiencing emergent situations.

#### HOW MANY PEOPLE WILL BE IN THE STUDY?

Up to 16 people will take part in this study at xxx Hospital in xxx.

## **WHAT AM I BEING ASKED TO DO?**

If you decide to participate, you will be asked to complete one pre-simulation paper survey, and one follow-up post-simulation online survey. Up to 12 participants will be asked to complete an interview. The follow-up survey and interview will take place within 3 months after simulation training. The topic of the interview will be simulation and the development of novice RN's ability to care for patients experiencing emergent situations, considering your experiences that have occurred while working as a bedside nurse within the past two years.

## **HOW LONG WILL I BE IN THE STUDY?**

This study will include one 4 minute paper survey to be completed before ACLS simulation training, and one 4 minute online survey within 3 months after your ACLS simulation training. You may be asked to participate in one interview within 3 months after your ACLS simulation training. The interview will be no longer than one hour.

## **WHAT ARE THE BENEFITS OF BEING IN THE STUDY?**

Your participation will help contribute to nursing knowledge so that educational experiences for nurses can be improved. Information learned from this study is hoped to also benefit hospital patients and the practice of novice RNs.

## **WHAT ARE THE RISKS OF BEING IN THE STUDY?**

In the interviews, the researcher will ask questions about your simulation experiences and your ability to care for patients in emergent situations. It may be difficult for or stressful to talk about certain events related to caring for patients. During the interview if you feel very upset the researcher will help you find someone to whom you can talk. The online survey is not expected to elicit any strong feelings, however you may quit the online survey at any time. Please notify the researcher immediately if you feel distressed or do not want to continue either the survey or the interview.

During the interview we will be discussing simulation experiences and caring for patients in emergent situations. It is possible that you may be concerned about legal consequences for yourself or others in regards to the discussion of caring for patients. The researcher does not report to your supervisors nor is the researcher a part of the criminal justice system. Disclosure of identifiable information without your permission to other parties is prohibited.

The investigation discussion is private and confidential, with the exception of child or elderly abuse. The law states that the researcher must report cases of child or elder abuse. This investigation, however, does not involve children or elderly person and no questions will be directed towards those populations or individuals.

The researcher will anonymously report if a patient is in immediate danger to the xxx Center for Clinical Excellence, without revealing any identifying information.

### **WHAT ARE THE COSTS OF BEING IN THE STUDY?**

There is no monetary cost to you for participating in this study.

### **WHAT OTHER OPTIONS ARE THERE?**

Instead of being in this study may opt to not participate, and will not be penalized for your decision.

### **CONFIDENTIALITY**

Information produced by this study will be stored in the investigator's password protected computer on an electronic file and identified by a code number only. The code key connecting your name to specific information about you will be kept in a separate, secure location. Information contained in your records may not be given to anyone unaffiliated with the study in a form that could identify you without your written consent, except as required by law. You can skip any question you don't want to answer, and you can turn off the recorder, stop the conversation, or change your mind about being in the study at any time. Your name will not be linked with anything that you say. Identifying information, such as your name and contact information and the audio recordings from interviews are kept locked up, and will be destroyed when the study is over.

In addition, if photographs, audiotapes or videotapes were taken during the study that could identify you, then you must give special written permission for their use. In that case, you will be given the opportunity to view or listen, as applicable, to the photographs, audiotapes or videotapes before you give your permission for their use if you so request. However, there is no need for photos or videos during this study and the researcher will not be using them to collect data. Only audio transcripts will be recorded. Interviews will be audio recorded and then transcribed. Following transcription, the audio recordings will be deleted. Transcriptions of the interview will be used by the researcher to analyze themes about how novice RNs use simulation to care for patients in emergent situations. Transcriptions will be de-identified, that is, any names in the transcriptions will be replaced with your I.D. code or pseudonyms. However, you will not be asked yours or anyone else's name during the interview.

### **WILL I BE COMPENSATED FOR PARTICIPATING IN THE STUDY?**

To thank participants for their time, a prepaid Amazon.com gift card of 25 dollars will serve as compensation in exchange for completing both the qualitative interview and quantitative pre and post-test surveys of the study, to be paid immediately following the interview and post-test survey. Participants who

complete both pre and post-test surveys, but not the interview, will receive a 5 dollar gift card immediately following their online post-test survey. Gift cards will be provided online to participant's preferred email through the Amazon program, *Amazon.com eGift Cards* at [https://www.amazon.com/gift-cards/b/ref=dp\\_bc\\_1?ie=UTF8&node=2238192011](https://www.amazon.com/gift-cards/b/ref=dp_bc_1?ie=UTF8&node=2238192011)

### **WHAT ARE MY RIGHTS AS A PARTICIPANT?**

Participation in this study is voluntary. You do not have to participate in this study.

If you decide to participate you can change your mind and drop out of the study at any time. Dropping out of this study will not affect your present or future employment in the hospital. There will be no penalty or loss of benefits imposed for leaving the study. Your participation may end at any time during the study at the discretion of the investigator after she has explained the reasons for doing so.

You will be informed of any significant new findings discovered during the course of this study that might influence your welfare, or willingness to continue participation in this study.

### **WHOM DO I CALL IF I HAVE QUESTIONS OR PROBLEMS?**

If you have any questions regarding your rights as a participant in this research and/or concerns about the study, or if you feel under any pressure to enroll or to continue to participate in this study, you may contact the University of Missouri Campus Institutional Review Board (which is a group of people who review the research studies to protect participants' rights) at (573) 882-9585 or [umcresearchcirb@missouri.edu](mailto:umcresearchcirb@missouri.edu).

You may ask more questions about the study at any time. For questions about the study or a research-related injury, contact MaryAnn Niemeyer at (xxx) xxx-xxxx.

A copy of this informed consent form will be given to you to keep.

### **SIGNATURE**

I have read this consent form and my questions have been answered. My signature below means that I do want to be in the study. I know that I can remove myself from the study at any time without any problems.

---

Participant Printed Name

---

Participant Signature

---

Date

---

Investigator Printed Name

---

Participant Signature

APPENDIX H: UNIVERSITY HEALTH SCIENCES IRB



**Institutional Review Board**  
University of Missouri-Columbia

190 Galena Hall  
Columbia, MO 65201  
573-882-3181  
irb@missouri.edu

June 07, 2018

Principal Investigator: Maryann (MU-Student) Niemeyer  
Department: Nursing-PHD

Your IRB Application to project entitled Exploring novice RNs' perceptions of ACLS simulation: Recognition and prevention of failure to rescue. was reviewed and approved by the MU Institutional Review Board according to the terms and conditions described below:

IRB Project Number	2011690
IRB Review Number	238360
Funding Source	Sigma Theta Tau International
Initial Application Approval Date	June 07, 2018
IRB Expiration Date	June 07, 2019
Level of Review	Exempt
Project Status	Active - Exempt
Exempt Categories	45 CFR 46.101b(2)
Risk Level	Minimal Risk
External Funding	External Grant (ex. Federal funding, foundation funding)

The principal investigator (PI) is responsible for all aspects and conduct of this study. The PI must comply with the following conditions of the approval:

1. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date.
2. All changes must be IRB approved prior to implementation utilizing the Exempt Amendment Form.
3. The Annual Exempt Form must be submitted to the IRB for review and approval at least 30 days prior to the project expiration date to keep the study active or to close it.
4. Maintain all research records for a period of seven years from the project completion date.

If you are offering subject payments and would like more information about research participant payments, please click here to view the MU Business Policy and Procedure:

[http://bppm.missouri.edu/chapter2/2\\_250.html](http://bppm.missouri.edu/chapter2/2_250.html)

If you have any questions, please contact the IRB at 573-882-3181 or irb@missouri.edu.

Thank you,  
MU Institutional Review Board



**Institutional Review Board**  
**University of Missouri-Columbia**  
FWA Number: 0002876  
IRB Registration Numbers: 00000731, 00009014

482 McReynolds Hall  
Columbia, MO 65211  
573-882-3181  
irb@missouri.edu

April 08, 2019

Principal Investigator: Maryann Niemeyer (MU-Student)  
Department: Nursing-PHD

Your Annual Exempt Form to project entitled Exploring novice RNs' perceptions of ACLS simulation: Recognition and prevention of failure to rescue. was reviewed and approved by the MU Institutional Review Board according to the terms and conditions described below:

IRB Project Number	2011690
IRB Review Number	247287
Funding Source	Sigma Theta Tau International
Initial Application Approval Date	June 07, 2018
Approval Date of this Review	April 08, 2019
IRB Expiration Date	June 07, 2020
Level of Review	Exempt
Project Status	Active - Exempt
Risk Level	Minimal Risk

The principal investigator (PI) is responsible for all aspects and conduct of this study. The PI must comply with the following conditions of the approval:

1. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date.
2. All changes must be IRB approved prior to implementation utilizing the Exempt Amendment Form.
3. The Annual Exempt Form must be submitted to the IRB for review and approval at least 30 days prior to the project expiration date to keep the study active or to close it.
4. Maintain all research records for a period of seven years from the project completion date.

If you are offering subject payments and would like more information about research participant payments, please click here to view the MU Business Policy and Procedure:

[http://bppm.missouri.edu/chapter2/2\\_250.html](http://bppm.missouri.edu/chapter2/2_250.html)

If you have any questions or concerns, please contact the MU IRB Office at 573-882-3181 or email to [muresearchirb@missouri.edu](mailto:muresearchirb@missouri.edu).

Thank you,  
MU Institutional Review Board



## APPENDIX I: APPROVAL LETTERS

**From:** xxx  
**Sent:** Friday, August 17, 2018 4:20 PM  
**To:** Mary Ann Niemeyer <[maryann.niemeyer@xxx.org](mailto:maryann.niemeyer@xxx.org)>  
**Cc:** xxx <[xxxm@xxx.org](mailto:xxxm@xxx.org)>; xxx <[kxxx@xxx.org](mailto:kxxx@xxx.org)>; xxx <[xxxxx@xxx.org](mailto:xxxxx@xxx.org)>  
**Subject:** Decision Notification: ACLS Simulation Project

Good afternoon Ms. Niemeyer,

Thank-you for addressing the additional requirements set forth by the review committee on August 17, 2018.

The study proposal, Exploring novice RNs' perceptions of ACLS simulation: Recognition and prevention of failure to rescue, has been approved by the xxx New Study Proposal Review Committee.

Per protocol:

-xxx, Research Coordinator with the Department of Research, will send out the Letter of Invitation with the recruitment flier attached.

-The Letter of Invitation will be sent to xxx nurses who are scheduled to attend the ACLS Initial Certification Class given by the National Institute for Emergency Medical Training.

-The Letter of invitation will be sent to the classes that are being held at xxx during the months of September and October. Recruitment efforts beyond the month of October must be approved by the Department of Research.

-Please prepare the Letter of Invitation with the attached flier and send to xxx for distribution (cc xxx). If the letter is an attachment, like the flier, include a brief introduction for the body of the email. Include the dates you would like xxx to send out the Letter of Invitation, based on the September and October class dates.

Please contact us with any questions that may arise.  
We wish you all the best in your research endeavors,

xxx  
Co-Chair, New Study Proposal Review Committee  
xxx.xxx.xxxx

xxx  
Director, Department of Research  
xxx.xxx.xxxx

INSTITUTIONAL REVIEW BOARD

Tel –

Fax –

November 15, 2018

MaryAnn Niemeyer, PhD(c), RN-BC

RE: Exploring Novice RN's Perceptions of ACLS Simulation: Recognition and Prevention of Failure to Rescue.

Dear Ms. Niemeyer:

The above-stated protocol was reviewed and approved through exempted process by the Institutional Review Board (IRB). Following please find specifics of the approval:

IRB #	2018-213
Approval Date:	11/15/2018
Expiration Date:	11/15/2019
Type of Review:	Exempt - 45 CFR 46.101b(2)
IRB Review Action:	Approved
Funding Source	Sigma Theta Tau International
External Funding	External Grant (ex. Federal funding, foundation funding).

The Institutional Review Board (IRB) reviewed your project and has determined that it does not involve activities that are subject to Institutional Review Board (IRB) oversight.

The principal investigator (PI) is responsible for all aspects and conduct of this study. The PI must comply with the following conditions of the approval:

1. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date.
2. All changes must be IRB approved prior to implementation utilizing the Form 5 (request for revision or amendment to an approved protocol)
3. The Form 3 must be submitted to the IRB for review and approval at least 30 days prior to the project closure.
4. Maintain all research records for a period of seven years from the project completion date.

INSTITUTIONAL REVIEW BOARD

Tel –

Fax –

Continuing review of this activity is not required. However, if activities change you will need to submit a new application. It is very important that you close-out your project when completed or if you leave the hospital.

If further information is necessary, please contact the IRB office at

Sincerely,

Chair, Designee  
IRB

APPENDIX J: LETTER OF INVITATION



Invitation Letter - Mixed Methods Study

**I would like to invite you to participate in a research study being done at University Missouri Columbia Sinclair School of Nursing.**

Research indicates that many hospitalized patients who experience an adverse change in condition exhibit abnormal changes in symptoms and vital signs 8-24 hours prior to the event. One common preventable medical error is failure to rescue (FTR), characterized as delays in responding to worsening of the patient's condition. To mitigate FTR occurrences, advanced beginner nurses need training to safely expedite and intensify their experience with adverse changes in patient's condition.

I am writing to you because you are scheduled for Advanced Cardiovascular Life Support (ACLS) training in September, October, November, or December 2018. I am seeking participants for a study to explore ACLS and advanced beginner RNs' self-efficacy for recognizing and reacting to worsening of the patient's condition. There are no right or wrong answers. I seek to gain a variety of opinions.

If you have any questions about the study please contact me, I will be very happy to discuss with you any questions you may have. You can call, text, or email me. Contributions to this study are important for the research and development of simulation interventions to be used in healthcare organizations at the time of entry into nursing practice.

Please review the attached flyer titled "RN Study: Advanced Beginner Nurses". This flyer describes eligibility to participate. Please contact me if you are interested in taking part in this very important study.

Thank you very much for reading this letter,

Yours sincerely,

MaryAnn Niemeyer PhD(c), RN-BC  
Email [mniemeyer@mizzou.edu](mailto:mniemeyer@mizzou.edu)  
Cell (xxx) xxx-xxxx

## APPENDIX K: RECRUITMENT FLYER



# Novice RN Study



You may be eligible to participate in a study to learn more about the influence of ACLS simulation on novice RNs for caring an unstable patient with worsening condition.

You may be eligible if you:

- Are a newly graduated registered nurse with between 6-24 months of RN practice experience at xxx (xxx).
- Do not have prior professional experience working in healthcare.
- Work as an RN at xxx at least 24 hours per pay period.
- Are employed at xxx in an acute or critical care area.
- Are scheduled to complete Advanced Cardiovascular Life Support (ACLS) simulation training in September, October, November, or December 2018.
- Speak English.

Participation is completely voluntary and confidential. The nurse researcher has received permission to conduct this study at xxx Hospital.

The nurse researcher will contact with you prior your ACLS training to complete a 4-minute online survey. Within 3 months you will be contacted via email to complete an online 4-minute survey at which time you will receive a \$5 Amazon gift card.

Several participants will be chosen to complete an interview which will take no longer than one-hour. The interview is planned to take place within 3 months of your ACLS training. If chosen for an interview and you agree to participate, you will complete the second survey at the time of the interview. At the completion of the second survey and interview you will receive a \$25 Amazon gift card.

If you would like to participate in this study please contact MaryAnn Niemeyer at [mniemeyer@mizzou.edu](mailto:mniemeyer@mizzou.edu) or text or phone her at (xxx) xxx-xxxx.

APPENDIX L: GSE SURVEYMONKEY PRE-POST TEST



**General Self-Efficacy (GSE) scale PRE-TEST**

[https://www.surveymonkey.com/r/GSE\\_Pre-Test](https://www.surveymonkey.com/r/GSE_Pre-Test)

**General Self-Efficacy**

Pre-test

This is a survey for novice nurses with 6-24 months of work experience as an RN and without prior professional experience working in healthcare such as an EMT or a Paramedic. RNs with prior Student Nurse Tech or Patient Care Tech experience are eligible.

During enrollment for this study you received a participant ID. Please use that participant ID to begin this survey. Within three months you will be emailed a second survey. Upon completion of that survey you will be sent a \$5 Amazon gift card to the email address that corresponds to the participant ID number. This survey is intended only for participants who are enrolled in the ACLS research study.

Self-efficacy is commonly defined as the belief in one's ability to achieve a goal or an outcome.

**Directions:** There are ten questions in this survey. While considering each question, please rate your ability today to respond to an unstable patient with worsening condition. It is assumed that you have never received Advanced Cardiovascular Life Support training.

\*1. Participant ID #

NEW QUESTION  
NEXT

P2

—

**General Self-Efficacy (GSE) scale PRE-TEST**

\*1. *Considering my ability to respond to an unstable patient with worsening condition:*

**I can always manage to solve difficult problems if I try hard enough.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*2. Considering my ability to respond to an unstable patient with worsening condition:*

**If someone opposes or disagrees with me, I can find the means and ways to get what**

**I need.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*3. Considering my ability to respond to an unstable patient with worsening condition:*

**It is easy for me to stick to my aims and accomplish my goals.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*4. Considering my ability to respond to an unstable patient with worsening condition:*

**I am confident that I could deal efficiently with unexpected events.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*5. Considering my ability to respond to an unstable patient with worsening condition:*

**Thanks to my resourcefulness, I know how to handle unforeseen situations.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*6. Considering my ability to respond to an unstable patient with worsening condition:*

**I can solve most problems if I invest the necessary effort.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*7. Considering my ability to respond to an unstable patient with worsening condition:*

**I can remain calm when facing difficulties because I can rely on my coping abilities.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*8. Considering my ability to respond to an unstable patient with worsening condition:*

**When I am confronted with a problem, I can usually find several solutions.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*9. Considering my ability to respond to an unstable patient with worsening condition:*

**If I run into trouble, I can usually think of a solution.**

- not true at all
- hardly true
- moderately true
- exactly true

*\*10. Considering my ability to respond to an unstable patient with worsening condition:*

**I can usually handle whatever comes my way.**

- not true at all
- hardly true
- moderately true

exactly true

NEW QUESTION  
**PREV NEXT**

P3

—

### General Self-Efficacy (GSE) scale PRE-TEST

**Thank you for completing this GSE Survey!**

**Please click the DONE button when you are ready to submit your answers.**

NEW QUESTION  
**PREV DONE**



### General Self-Efficacy (GSE) scale POST-TEST

[https://www.surveymonkey.com/r/GSE Post-Test](https://www.surveymonkey.com/r/GSE_Post-Test)

General Self-Efficacy

Post-test

**This is a survey for novice nurses with 6- 24 months of work experience as an RN and without prior professional experience working in healthcare such as an EMT or a Paramedic. RNs with prior Student Nurse Tech or Patient Care Tech experience are eligible.**

**Please ensure the participant ID number you enter matches the one given to you at enrollment, before your ACLS training. At completion of this survey, if your participant ID matches a pre-test survey already on file, you will be sent a \$5 Amazon gift certificate to the email address that corresponds to the participant ID number. This survey is intended only for participants who are enrolled in the ACLS research study and have completed ACLS training.**

**Self-efficacy is commonly defined as the belief in one's ability to achieve a goal or an outcome.**

**Directions:** There are ten questions in this survey. While considering each question, please rate your ability to respond to an unstable patient with worsening condition after receiving Advanced Cardiovascular Life Support (ACLS) training.

**1. Participant ID #**



NEW QUESTION  
NEXT

P2

**General Self-Efficacy (GSE) scale POST-TEST**

1. *Considering my ability to respond to an unstable patient with worsening condition:*

**I can always manage to solve difficult problems if I try hard enough.**

- not true at all
- hardly true
- moderately true
- exactly true

2. *Considering my ability to respond to an unstable patient with worsening condition:*

**If someone opposes or disagrees with me, I can find the means and ways to get what I need.**

- not true at all
- hardly true
- moderately true
- exactly true

3. *Considering my ability to respond to an unstable patient with worsening condition:*

**It is easy for me to stick to my aims and accomplish my goals.**

- not true at all
- hardly true
- moderately true
- exactly true

4. *Considering my ability to respond to an unstable patient with worsening condition:*

**I am confident that I could deal efficiently with unexpected events.**

- not true at all
- hardly true

- moderately true
- exactly true

5. *Considering my ability to respond to an unstable patient with worsening condition:*

**Thanks to my resourcefulness, I know how to handle unforeseen situations.**

- not true at all
- hardly true
- moderately true
- exactly true

6. *Considering my ability to respond to an unstable patient with worsening condition:*

**I can solve most problems if I invest the necessary effort.**

- not true at all
- hardly true
- moderately true
- exactly true

7. *Considering my ability to respond to an unstable patient with worsening condition:*

**I can remain calm when facing difficulties because I can rely on my coping abilities.**

- not true at all
- hardly true
- moderately true
- exactly true

8. *Considering my ability to respond to an unstable patient with worsening condition:*

**When I am confronted with a problem, I can usually find several solutions.**

- not true at all
- hardly true
- moderately true
- exactly true

9. *Considering my ability to respond to an unstable patient with worsening condition:*

**If I am in trouble, I can usually think of a solution.**

- not true at all

- hardly true
- moderately true
- exactly true

10. *Considering my ability to respond to an unstable patient with worsening condition: adverse changes in patient's condition.*

**I can usually handle whatever comes my way.**

- not true at all
- hardly true
- moderately true
- exactly true

NEW QUESTION  
**PREV NEXT**

P3



**General Self-Efficacy (GSE) scale POST-TEST**

**Thank you for completing this GSE Survey!**

**Please click the DONE button when you are ready to submit your answers.**

**PREV DONE**

## VITA

MaryAnn Niemeyer was born in St. Louis, Missouri and raised in Granite City, Illinois. As an undergraduate nursing student MaryAnn worked weekends and summers as a Student Nurse Tech at Preferred Healthcare in Alton, Illinois, and at Grant Hospital in Chicago, Illinois. She earned her Bachelors of Science in Nursing at Loyola University of Chicago in Chicago, Illinois. Then as an RN, she worked for over two decades as a pediatric nurse at St. Louis Children's Hospital, first on the Infectious Disease & Gastroenterology Unit, then on the NeuroSurgery & Neuro Rehab Unit, and later worked throughout the hospital as a Float Pool Nurse and Internal Auditor. Her husband's career brought them to California where MaryAnn worked at Antelope Valley Convalescent Hospital in Lancaster managing registered nurses, licensed practical nurses, and nurse aide staff. Returning to the St. Louis area, she again entered school, completing a dual master's degree from Southern Illinois University Edwardsville in Healthcare & Nursing Administration and Nursing Education. During her time in graduate school, MaryAnn worked part-time at St. Louis Children's Hospital while taking advantage of opportunities to share her love of nursing as a Learning Specialist for Lewis and Clark Community College Nursing Program, and as adjunct faculty for the University of Missouri, St. Louis School of Nursing and St. Louis University School of Nursing. Currently, MaryAnn works at Christian Hospital in St. Louis, Missouri as a Clinical Education Specialist. There she enjoys supporting healthcare professional development by teaching, mentoring, and coaching nurses and clinical staff. At her job, MaryAnn is responsible for New Employee Orientation, Nursing Orientation, the Nurse Fellowship & Residency Program, and is or has been chair and co-chair for multiple professional councils and committees,

with one of her favorites being the Professional Nurse Development Program. For her dissertation research MaryAnn received funding from Sigma Theta Tau International. She earned her PhD in Nursing from University of Missouri Columbia. MaryAnn enjoys a lifelong marriage to her loving and supportive husband, and together they have three wonderful sons.