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Strategies for the Improvement of Healthcare through Simulation

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STRATEGIES FOR THE IMPROVEMENT OF HEALTHCARE THROUGH SIMULATION

by

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Abstract

Background: Medical errors continue to plague the healthcare industry. The annual rates of morbidity are approximately 2.69 million (AHRQ, 2019), while mortality rates exceed 400,000 per annum (Makary & Daniel, 2016). There may be no panacea to combat these egregious rates. However, simulation of patient care events may better prepare healthcare professionals to prevent medical errors as it has been proven to be an effective learning strategy (Kirkham, 2018), enhancing skills while gaining experiential knowledge, without risk to actual patients.

Purpose: The purpose of this qualitative study was to gain a better understanding of factors that impede or foster the frequent utilization of simulation as a modality to rehearse patient care activities for healthcare professionals, and to better identify processes that could reduce medical errors across the continuum. **Aim 1:** Describe the demographics of the study population: Current profession, area of specialty, time in profession, time in current role, education level, age of the participant, gender of the participant, and operational setting. **Aim 2:** Explore and identify barriers to the frequent practice of healthcare simulation. **Aim 3:** Identify processes that can lead to the reduction of errors in the healthcare industry.

Methods: This was a hermeneutic phenomenological qualitative study that also used descriptive statistics to gain a better understanding of the subjects and their responses to the solicited survey.

Findings: The barriers of time, space, access, and cost continue to pose impediments to iterative rehearsal. These factors were compounded by the paucity of qualified facilitators & support personnel in this modality; all exacerbated by the pandemic. A need for diversity in SBLE to reflect patient population was also identified. According to the participants, the value of simulation is realized through relevant and iterative SBLE. To enhance confidence and

competence, participants overwhelmingly indicated the need for monthly rehearsal of patient care events. Leadership buy-in was identified as key to program success.

Implications: By employing regular practice of simulated patient care events, positive patient outcomes can be realized, as the healthcare provider's clinical acumen is exercised and further developed.

Keywords: healthcare simulation, simulation-based education (SBE), simulation-based learning events (SBLE), iteration, simulationist

Table of Contents

List of Figures

List of Tables

List of Appendices

Chapter 1

Introduction

Within the healthcare setting, preventable errors account for more than 440,000 premature deaths each year in the United States (James, 2013), vaulting medical errors into third place as a leading cause of death in this country (Makary & Daniel, 2016). This does not account for those patients who incur non-fatal serious morbidity, from what essentially are preventable events rooted in miscommunication (Jones et al., 2015). Hospital acquired conditions (HACs) have decreased by approximately 8% from 2014 to 2016; however, that still means that over 2.6 million HACs occur each year (Agency for Healthcare Research and Quality [AHRQ], 2019). The precept of the Hippocratic Oath, "…do no harm" should be at the forethought of how every healthcare practitioner approaches their respective profession, and yet despite this vow of nonmaleficence, egregious rates of morbidity and mortality persist and are attributable to errors that can and should be prevented.

This study explored the rehearsal of clinically relevant simulation-based learning events, through the analysis of the lived experiences of healthcare professionals across the continuum, addressing the frequency of events and those barriers to the iterative application of healthcare simulation.

Statement of Problem

Much of adult learning and professional development is attained through the formation of experiential knowledge (Merriam, 2008), and yet with the recent levels of morbidity and mortality attributed to medical error, it is possible that a different approach is warranted. Educators, nurses, physicians, and staff development professionals should regularly utilize proactive measures, instead of responding to potential deleterious events. An effective way to

address this problem can be realized via concerted rehearsal of communication and patient care skills and their respective processes. The core of a simulation learning event is rooted in the tenets of clear communication and experiential learning that include the cyclic employment of concrete experience, reflective thinking, and development of abstract concepts, followed by active experimentation (Alinier, 2011; Baile & Blatner, 2014; Kolb, 1984). A primary advantage of healthcare simulation is that the learning event is repeatable, virtually *ad infinatum*. This process easily lends itself to the consolidation of learning, which opens the door to the development of competency (Allen et al., 2018; Kardong-Edgren et al., 2008). The use of healthcare simulation has been demonstrated to be an effective learning strategy, to enhance skills while gaining valuable experiential knowledge, all the while posing no risk to actual patients (Bland et al., 2010; Gaba, 2007; Jeffries, 2016). Even though simulation can be recognized as useful learning modality, with the application and frequency of practice among the key factors to maintaining clinical acumen, its integration into the processes of healthcare delivery has yet to be realized as the egregious rates of medical errors persist to plague the healthcare industry.

Purpose

The iterative practice and subsequent reflection of simulated patient care events, particularly those situations that involve communication skills with a pseudo patient and the healthcare team, can serve as a significant antidote to complacency and incompetence. By employing regular and consistent exercise of simulated healthcare events, positive patient outcomes can be realized, as the healthcare provider's confidence and ultimately competency is exercised and developed (Andreatta et al., 2011; Aebersold & Tschannen, 2013). The purpose of this qualitative study was to gain a better understanding of factors that impede or foster the

frequent iterative utilization of simulation as a modality to rehearse patient care activities for healthcare professionals, and to better identify processes that could reduce medical errors across the continuum (Creswell & Poth, 2018).

Aims

This qualitative study had three specific aims, with the first of which was to collect quantitative data in the form of descriptive statistics regarding the participants in the study, to better understand the perspective of the varied patrons of healthcare simulation. The first aim: To describe the demographics of the study population. These descriptive variables include: Current profession, (RN, NP, MD, etc.); area of specialty; time in profession; time in current role; education level, age of the participant, gender of the participant, and the operational setting, indicating as to what type of work environment they are currently engaged (clinical, administrative, or both). The second aim: To explore and identify barriers to the frequent practice of healthcare simulation. The third aim was: To identify processes that can lead to the reduction of errors in the healthcare industry. These aims were accomplished through a hermeneutic phenomenological approach in collecting and synthesizing the responses of the study participants.

Research question(s)

The following research questions fostered a better understanding of the phenomena of those barriers, as well as the possible processes to reduce medical errors, as identified by the responses of the study participants.

- What are the barriers to the engagement of healthcare simulation?
- What is the frequency of engagement of healthcare simulation?
- How often is considered sufficient to maintain / enhance clinical acumen?

- What are effective ways to improve life-support training?
- How is efficacy measured for life-support training?

Theoretical framework

The conceptual framework for this qualitative study is influenced by Benner's Novice to Expert (1982) clinical competency leveling and her innovative nursing model on skill development. The essence of the theory is that the learner's progressive skill and acumen development is on a trajectory that is built upon experience (Benner, 1982). This process readily resonates within the healthcare simulation community, for at its core healthcare simulation is about developing experiential knowledge, without risk to actual patients. The theory of Novice to Expert (1982) has been a benchmark assessment tool utilized in the nursing profession and has since been adopted across several other healthcare professions (Persky & Robinson, 2017), owing to its applicability in the interprofessional dimension of simulation-based learning.

The five stages of skill development and clinical competency include Novice, Advanced Beginner, Competent, Proficient, and finally Expert. The entry level to the stages is Novice, as one who has a little to no experience and whose ability to anticipate what may occur in a patient care situation is quite limited. The next stage is Advanced Beginner where through experience, the professional is starting to recognize meaningful and recurrent components of a patient care event. Building on the experience developed over the last two stages, the succeeding stage is Competent. At this level the professional embodies the traits of the earlier two stages and adds the ability to perform advance planning. The next stage is Proficient, marked by the professional considering the whole of patient care, rather than just individual components. The last stage is that of Expert where the healthcare professional has developed the necessary experiential knowledge to anticipate and respond to patient care situations intuitively.

It is worth note that each of these stages of competency are not static and require maintenance through multiple avenues of practice and rehearsal to sustain proficiency and acumen. To aid in the understanding of the phenomena that can influence the enhancement of clinical acumen, Figure 1, a two-dimensional model is provided to elucidate the process (Polit & Beck, 2017).

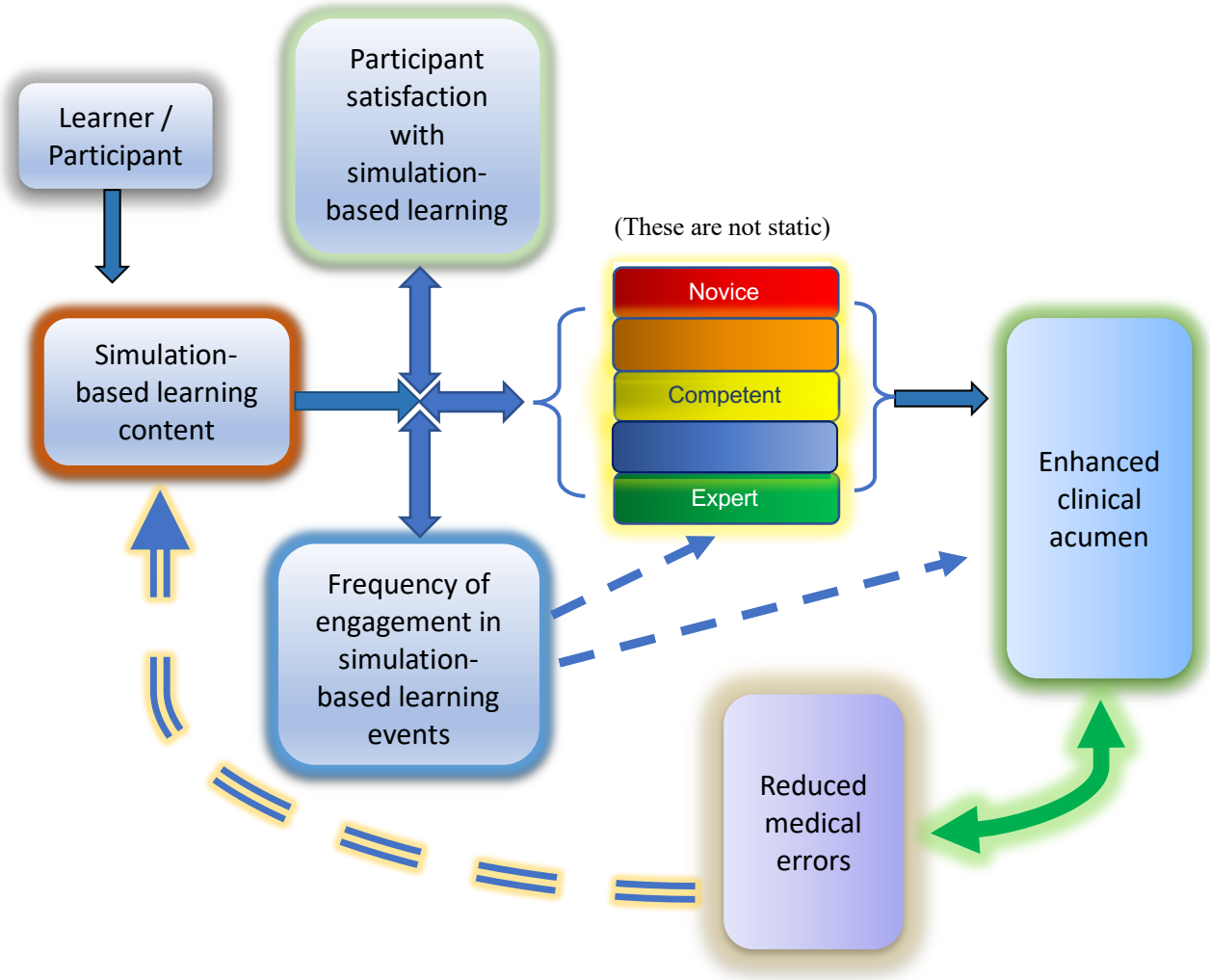

Figure 1: Conceptual model

This model illustrates the different, yet interrelated connections among the phenomena of this study. The learner enters the model on the upper left end and proceeds through the learning experience, impacted by the frequency of engagement, coupled with the satisfaction of the simulation-based learning experience as they enter the Novice stage. The dashed blue line indicates the interaction that frequency can have in moving the member toward the Expert stage. Regarding the red-outlined box titled 'Simulation-based learning content', this is where the participant engages in a simulation-based learning event, impacting the frequency and satisfaction with this modality. Frequency of engagement of healthcare simulation can have a

significant reciprocal relationship with participant satisfaction with simulation-based learning (SBL). Together, participant satisfaction and frequency of practice influence the participant's skill level and ultimately, leading to enhanced clinical acumen. The green reciprocal arrow between clinical acumen and reduced medical errors represents what is intended, as that relationship would be better explained over a future longitudinal study. The doubled dashed arrow from reduced medical errors demonstrates the potential for experiential knowledge to affect the content of future SBL offerings by incorporating lessons learned throughout the patient care process and then to be incorporated into the healthcare simulation program. Learning is a life-long process and is a continually evolving endeavor that can lead to the development of knowledge (Knowles et al., 2015).

Assumptions

A hermeneutic phenomenological study affords the researcher to opportunity to gain the perspective of added mindfulness, including self-awareness, by acknowledging potential biases. The following assumptions were held by the researcher:

1. As a simulationist I am passionate about engaging my colleagues through the modality of healthcare simulation, and I assume that other nurse educators share this passion. Yet, I acknowledge that there may be differences.

2. Conducting a hermeneutic phenomenological qualitative study allowed for rich insight into the phenomena of interest.

3. Engagement in an ongoing process of reflection and reflexivity throughout the study afforded a deeper understanding of the subject material, as well as enhanced the opportunities for discovery of new information.

Limitations

Participation in the study was voluntary and as such, the number of total participants was not guaranteed. However, to mitigate this limitation, the researcher solicited participation via email, utilizing the membership directory of the Society for Simulation in Healthcare, a professional association in which the author retains membership.

Another limitation of this study was the availability of the target population, due to the unforeseen impact of the pandemic. To mitigate this limitation, direct solicitation via electronic mail was used, with anonymity of the responses being safeguarded by the researcher.

Significance to nursing

The anticipated uses for simulation practice are only limited by the imagination of those who engage this process within the healthcare arena. There are two domains where this modality of learning is actively pursued: academic and clinical healthcare settings. The academic setting targets those pre-professional persons who are learning and developing skills within their chosen field of study, such as students in schools of nursing, medicine, and allied health. These persons would be considered to be operating in the Novice and/or Advanced Beginner level of proficiency (Benner, 1982). Within this environment participants can learn how to interact with a pseudo patient who would be exhibiting some form of adverse health event, either acute or chronic, and would take place in a simulated clinical setting. The learners would also be working from a structured scenario or script, according to a standardized simulation design, allowing for intentional practice of the learning event as they gain invaluable experiential knowledge, within the context of a psychologically safe and controlled setting (INACSL Standards Committee, 2016; Jeffries, 2016; Gaba, 2007).

Within the clinical setting, circumstances and scenarios are not dissimilar to that of an academic setting; however, other than in this setting the learners will have a greater range of experiential knowledge and their clinical acumen can span Benner's level of proficiency from Novice thru Expert (1982), thereby having the potential to foster a greater level of collaboration and interdisciplinary involvement (Beroz, 2017; Baile & Blatner, 2014). The change in the type of learner allows for application of an andragogical style of learning (Speed et al., 2015) where the event is learner-centered, and the educator facilitates learning by fostering self-discovery and exercising of critical thinking skills and enhanced communication techniques (Knowles et al., 2015; Joyce et al., 2015). Simulation-based learning events (SBLE) or otherwise known as scenarios can include, resuscitative protocol training, mass casualty training, and virtually any other clinically based event that a facilitator can imagine; limitless options as no actual patients would be subjected to this training. This andragogical approach represents a significant shift in the way and manner healthcare education and professional development is fostered (Motola et al., 2013).

As these learning events are conducted under a controlled simulated patient setting, they can foster the attainment of invaluable experiential knowledge, which could thereby enhance participant confidence, leading to clinical competency; this process can ultimately result in positive patient outcomes. The simulated patient care environment affords the healthcare professional to make mistakes, and then learn from them, in a controlled, confidential, and psychologically safe environment.

Whether or not the 10,000 hours-to-expertise (Gladwell, 2008) concept is held or not, it is abundantly clear that practice/rehearsal does lead to proficiency. The role of simulation continues to evolve within the healthcare profession, and it will become increasingly integral as

to the manner and means we develop healthcare professionals, both aspiring and current (Hayden et al., 2015).

By demonstrating the significance of regularly practiced patient care events through the modality of healthcare simulation, nurses along with other medical professionals can and will shift the paradigm of healthcare to one that incorporates frequent rehearsal of processes and procedures that can result in the elimination of preventable medical errors.

Summary

Thus far, there has been a distinct lack of research into identifying credible solutions for the looming crisis of healthcare delivery that can potentially be attributed to a lack of regularly exercised experiential knowledge via the format of engagement in frequent and regular simulated patient care events. This proposed study will be exploring and identifying, potential promoters and barriers to the adoption of regularly rehearsed patient care situations, as well as identifying prospective processes that can lead to reducing the egregious mortality and morbidity attributed to errors incurred from those who are charged "…to do no harm". Within society there are a multitude of examples of professionals who on an enterprise level are engaged in repeatable and standardized practice of their occupation. One only needs to look to professional athletes to recognize the value of repeatable practice, where football players may dedicate 80-90% of their active time to practicing their craft, and all for a 60 minute "game"; why does this ethos of practice not exist within the most intimate of professions, healthcare? Could it be attributable to a simple aspect of financial greed imposed by the healthcare industry that drives the eschewance of regular rehearsal of patient care events? The results of this qualitative phenomenological theory study will shed some much-needed light on the phenomena of medical errors as strategies for better healthcare through simulation are elucidated.

Chapter 2

Review of the literature

This chapter will provide a review and offering of context of the tenets of healthcare simulation, as they are featured in professional literature, that will illustrate the purpose and aims of the proposed study. To better appreciate the potential that healthcare simulation represents, it is important to investigate the roots of healthcare simulation.

Background and Significance

The use of simulation in the milieu of healthcare is not a new concept. Instead, it has been employed, albeit in a rudimentary form since antiquity where molded clay figures were used to identify disease states and/or the depiction of illnesses. These figurines were also used as a platform whereby women would be able to seek care by their male physician/healer, while preserving a discernable level of modesty, where exposure of the female form was forbidden (Meller, 1997). While in the pursuit of surgical skills training, human cadavers and animals have been used as surrogates for live humans, since the era of the Middle Ages and beyond (Cooper & Taqueti, 2008). One of the first widely used healthcare simulators was an obstetrical model developed in the mid-18th century by a pioneering French midwife, Madame du Coudray. She developed this teaching tool to train other midwives in the fight against a rising maternal and infant mortality rate (Gelbart, 1998). Around the same time, the father and son Grégoire duo had developed a similar obstetric training course and model, which was then adopted by other midwives and obstetricians. Both these types of birthing model utilized a modified human pelvis and a post-mortem infant, providing an innovative instructional platform to train other midwives and obstetricians on effective birthing techniques. Even though crude by today's standards, their

efforts resulted in the development of interventions that reduced maternal and newborn mortality rates, beyond France and into the far corners of Europe (Jones et al., 2015).

Fast-forward to the 1960's, the development of ResusciAnnie and the cardiology model Harvey allowed healthcare professionals to effectively practice resuscitation techniques in multiple learning domains. These not only included the obvious physical domain, but also engaged the learner cognitively and even emotionally. The onset of the 21st century saw the advent of the birthing manikin Noelle, which featured a neonatal model that was able to accurately depict both central and peripheral cyanosis (Rosen, 2008). Here again, the opportunity to repeatedly demonstrate skills in both the psychomotor and cognitive domains is enhanced, as well as engaging the affective domain via the debriefing process, all the while learning without the risk of harm to human subjects.

Within the literature the process of simulation practice has been often segregated into either medical simulation or nursing simulation; however, in the interest of expanding the hermeneutical aspects of this concept, the neutral term of healthcare simulation will be used as an inclusionary bridge for both medical and nursing simulation.

Practice and Simulation

One of the primary advantages of simulation in a healthcare environment is that plainly affords the clinician (future or current) the unique opportunity to make mistakes, and learn from them, in a controlled, reproducible, and safe environment – without risk to any real patient. It also affords the participants the opportunity to engage in patient care events that they would not normally experience on a regular basis (Aebersold, 2018; Chan et al., 2019). For the simulation learning event to be valued by the participants, it should demonstrate relevancy to learner (Knowles et al., 2015), and therefore should reflect a situation that resonates with the learner and

their respective vocation, whether they are in a pre-professional status or already working in their field of choice. A patient simulation practice event should be learner-centered, where the educator fulfills the role as a facilitator allowing the participant to exercise critical thinking, along with demonstration of psychomotor engagement (Bambini et al., 2009; Thackray & Roberts, 2017). By guiding the learning event the educator will foster reflection and discussion, thereby allowing for adult learning to germinate and flourish through critical reflection. An essential component to this process is the interaction of the learner with the event, which will lead to the formulation of new experiences (Bland et al., 2010; Kolb, 1984).

Frequency of Engagement

A major component of healthcare skills maintenance and enhancement is the frequency and duration in which the simulated patient care event is practiced. The discipline of resuscitative medicine has readily embraced the iterative aspects of simulation practice. In as much that to recertify in an individual competency such as Basic Life Support (BLS), Advanced Cardiovascular Life Support (ACLS) or Pediatric Advanced Life Support (PALS), etc., the expiration limit for certification in a resuscitative medicine discipline is currently set at two years; yet as this timeframe is being re-evaluated (American Heart Association [AHA], 2020).

The current skills rehearsal and practice initiative sponsored by the American Heart Association, is being realized through the implementation of the Resuscitation Quality Improvement (RQI) project, whereby practitioners are afforded to practice their skills, via a portable resuscitation skills trainer (American Heart Association [AHA], 2018), conducted on a voluntary basis. Even though participation in a RQI program is optional, the system does prompt the user to rehearse their skillset every three months and has demonstrated the potential to enhance the resuscitative skillset of the participant (Kardong-Edgren et al., 2020). This

represents just one measure to maintain the sharpness and accuracy of a practitioner's resuscitative skillset. However, this process has yet to be adopted across the continuum of healthcare practice.

Promising data is beginning to be collected regarding to what some have referred to as low-dose, frequent application of skills practice that are applied in a clinical setting. To elucidate the aspect of recurrent rehearsal, a study conducted in 2011 (Sutton et al.) signified a strong increase in skill attainment and retention, when applied in the milieu of resuscitative medicine. This was achieved when the participants practiced their psychomotor and cognitive skills at three- and six-month intervals, resulting in the participants effective skill retention, which had increased by 39% and 30% respectively (Sutton et al., 2011). This limited study provides evidence that when a simulated event is afforded to the participants on a frequent basis, their skills improved, and thereby enhanced self-efficacy and confidence, which can then lead to the attainment of practitioner competency (Oermann, Kardong-Edgren, & Odom-Maryon, 2011).

Additional evidence supporting the frequent employment of healthcare simulation has been realized through a randomized controlled trial conducted at a major healthcare institution located on the East Coast of the United States. The study demonstrated the benefits of brief training periods of resuscitative skillset practice, conducted at intervals of 60 to 90 days, resulting in dramatically reduced time to initiate and proficiently engage in adult resuscitative protocols (Sullivan et al., 2015). The training sessions were brief, at on average 15 minutes each, with the participants being experienced, non-intensive care unit nurses. For this study, the training and evaluation was conducted in-situ. The control-group in this particular study comprised of participants who only adhered to the certification renewal guidelines set forth by the American Heart Association (2020) of every two years and used that interval to demonstrate

their CPR acumen. The results of the study demonstrated that with moderate rehearsal, identified as at a minimum of quarterly, the participant's resuscitative medicine skillset remained sharp and accurate, far surpassing the demonstrated abilities of the control group at a minimum of two-fold (Sullivan et al., 2015).

A recent study was conducted at 10 different nursing schools across the United States to better understand the value of the frequency in practice of BLS skills, with an emphasis on the interval between practice sessions (Oermann et al., 2020). The participants would have four opportunities to practice CPR skills, whether on a daily, weekly, monthly, or even quarterly interval and then compare their results with their pre-practice capability. All four groups demonstrated significant improvements in CPR acumen, with the greatest improvement of more than 35% from pre-test skill level with the shorter intervals of daily and weekly. Although even at the quarterly practice interval, those participants' CPR acumen improved by 20% (Oermann et al., 2020).

However, despite the growing evidence that repetition and frequency of iteration of a relevant simulation-based learning event (SBLE) is enormously beneficial to the provider, the regular practice of skillsets has yet to be integrated into the preparatory process of every-day healthcare delivery. Another significant area of concern is the paucity of research examining the amount of time spent in simulation practice, coupled with the iterative engagement in those learning events that utilize healthcare simulation (Lopreiato & Sawyer, 2015; Oermann et al., 2011; Mariani et al., 2019). Much has been written concerning the efficacy of deliberate practice, yet little that addresses the occurrence and needed frequency of simulation practice (Chee, 2014; Harper et al., 2018; Kardong-Edgren et al., 2008; Oermann et al., 2020; Wiggins et al., 2018).

Barriers

One of the more prevalent barriers to participation in simulation-based education is the commodity of time (D'Souza et al., 2017; Mariani & Doolen, 2016), or more specifically the lack thereof. Just as with any learning modality, a SBLE requires the commitment and action of both the educators and participants to dedicate their time. In this instance the obligation is the devotion of time for practice and the subsequent debriefing of the learning event.

Within academia many nurse educators recognize the value of healthcare simulation practice as a valuable learning tool, so much so that the National Council of State Boards of Nursing have advocated for the replacement of up to 50% of clinical hours (Bradley et al., 2019; Hayden et al., 2015), when conducted by trained and qualified educators in this modality. However, this percentage of allowable clinical hour replacement does vary state-by-state (Hayden et al., 2015) , and will no doubt be significantly impacted by the response to the recent pandemic disease.

Another potential barrier has to do with the hosting location of the SBLE. Within the academic setting, simulation centers or classroom settings are most often utilized. Yet in the clinical arena, simulation centers or off-site facilities that can host SBLE are regularly seen as external expenditures that embody their own set of challenges, such as staffing and budget compatibility. In-situ training is often preferred in the clinical arena, as event relevancy and applicability to the healthcare professional's livelihood are direct and intentional, as well as fostering the integration of interprofessional collaboration and teamwork that is unique to the clinical setting (Sørensen et al., 2017).

Among the top barriers realized in both academia and clinical settings to the frequent utilization of SBLE is the need for trained and qualified facilitators and instructors in the

modality of healthcare simulation, as well as the need for dedicated and qualified simulation technician/operators (Al-Ghareeb & Cooper, 2016; Beroz, 2017; Qayumi et al., 2014). Compounding this barrier, the National Simulation Study (Hayden et al., 2015) recognized that support for faculty education in the modality of simulation is often underfunded or even neglected (Jeffries et al., 2015). It is difficult at best or even next to impossible to accomplish any project without the essential resources.

Other barriers to the frequent usage of healthcare simulation include a substantial resistance to change to adapting to this educational and staff development modality, along with a desire by some healthcare educators to preserve traditional styles of instruction (Qayumi et al., 2014). The impediments to the integration of regular and frequent usage of simulation are not limited to those that have been cited, although there are other barriers including space constraints, materials, and equipment (Harper et al., 2018) and yet these obstacles are not insurmountable.

Efficacy

When it comes to the question of efficacy many healthcare providers report on processes based on their perception of their own personal efficacy in their day-to-day professional lives. However, SBLEs offer the participant to hone skillsets that are relevant to their position, efficacy and skill development may not always coincide. To provide some clarity on this issue, the commonality that all participant's share is that they've had experienced at least one SBLE in the past 24 months, and for many of whom recertification in a resuscitative discipline is their primary interaction with simulation. This study the explored the participant's perceptions of efficacy regarding life-support training and how it is measured at the participant's respective healthcare facility or academic institution.

There is a well-documented positive connection between the healthcare practitioner's level of self-efficacy and the rehearsal of patient care situations in both the academic realm (Aebersold, 2018; Allen et al., 2018; Bambini et al., 2009; Sarfati et al., 2019; Shinnick & Woo, 2014), as well as in the clinical arena (Andreatta et al., 2011; Mariani et al., 2019; Morfoot & Stanley, 2018; Watters et al., 2015), yet the preponderance of the studies have been focused on the pre-professional milieu found in nursing, medical, and allied health academic programs.

Rather than primarily focusing on enhancement of self-esteem and a sense of self-efficacy it is worth examining some of the instruments that have been used to describe the efficacy of healthcare simulation as a learning modality, from the perspective of the users.

One of the earlier tools is the Satisfaction with Simulation Experience Scale (SSES) (Levett-Jones et al., 2011) that attempts to assess the participant's satisfaction with a SBLE. It is an 18-item instrument using a Likert-scale to assess agreeability to statements that address debriefing and reflection, clinical reasoning, and clinical learning. A similar tool was developed a few years after the SSES and is known as the Simulation Effectiveness Tool – Modified (SET-M). This particular instrument is an adaptation of an earlier tool, and in its current form embodies the principles extolled by the INACSL Standards of Best Practice (INACSL Standards Committee, 2016), into a 19-item instrument using a five-point Likert scale to measure agreeability to statements that address pre-briefing, learning, confidence, and debriefing. Both tools have been developed for a primary target audience of undergraduate nursing students.

There continues to be a scarcity of reliable and valid measurement tools within the world of healthcare simulation to chronicle learner performance of licensed healthcare professionals as it relates to simulation practice (Jeffries, 2016; Mariani & Doolen, 2016; Watts et al., 2017), as well as the impact of the learning event on the participant's practice of healthcare.

Life-support Training

Life-support training has been the backbone of healthcare simulation movement and for most healthcare providers it is their initial interaction with this learning modality, although for some it may be their only interaction with healthcare simulation. As noted earlier, the American Heart Association guidelines for recertification of resuscitative skillsets is currently on an interval of every two years (AHA, 2020), and for better or worse many healthcare providers will forestall rehearsal of their resuscitative knowledge and skills until their credentials are about to expire. For over a decade now, it has been demonstrated that if not regularly utilized, resuscitative skills can deteriorate in as little as three months (Soar et al., 2010). To arrest the degradation of these vital skillsets, it has been recommended to practice them at a minimum of every six months, to maintain a modicum of proficiency (Mpotos et al., 2014).

Other considerations that can improve life support training would be to consider in-situ practice sessions that lend applicability, to utilize technology-enhanced equipment that can provide feedback on the depth, rate, and accuracy of compressions and respirations, to emphasize a team approach to the rehearsal of the resuscitation protocols, as well as engage in SBLEs that hold relevance to the clinical practice of the healthcare providers (Cheng et al., 2018). What has risen above all recommendations is the increased frequency of skillset rehearsal, coupled with a reduced interval between events, lending credence to the phrase practice makes perfect.

Summary

Throughout this chapter, a review of the literature was conducted to better illustrate the purpose and aims of the study. Over the past few decades, the learning modality of simulation has grown and evolved into an integral component of healthcare education, enhanced through continual learning conducted in the professional arena.

Regarding the plague of medical errors afflicting the entire healthcare industry, nurse and other healthcare educators are taking steps to address this challenge through the learning modality of simulation (Lamé & Dixon-Woods, 2020; Mariani et al., 2019; Sarfati et al., 2019; Watters et al., 2015). As communication errors continue to play a central role in the voluminous rates of hospital acquired conditions, it is the adroit nurse educator who is leading the fight against these rates (Bradshaw & Hultquist, 2017; Latimer et al., 2017; Soydemir et al., 2017) and to add their voice (Cole et al., 2019) as an integral component in the process of reducing errors. This study has contributed to the growing body of literature relevant to the development and maintenance of clinical acumen of healthcare professionals through the frequent utilization of healthcare simulation.

Chapter 3

Methodology

In this chapter, I present the research methods, design, data collection and analysis procedures that were used in this study, as well as provide a perspective from myself, as both an active simulationist and as the primary researcher for this project.

Research design

This research was a hermeneutic phenomenological qualitative study that also used descriptive statistics to gain a better understanding of the subjects and their responses to the solicited survey. The purpose of the research was to gain a clearer picture into factors that impede or foster the frequent iterative utilization of simulation as a modality to rehearse patient care activities for healthcare professionals. This study also had three specific aims:

1. Describe the demographics of the study population.
2. Explore and identify barriers to the frequent practice of healthcare simulation.
3. Identify processes that can lead to the reduction of errors in the healthcare industry.

Through the course of this research study the author explored the lived experiences of the study participants, gaining insight from the perspective of a patron of simulation-based learning; from the perspective of the participants of SBLE, from the facilitators / educators conducting healthcare simulation programs, and from the perspective of the administrative / governance for the staff who engage in healthcare simulation. Considering the context, a hermeneutic phenomenological approach for this study is the most appropriate format, as it allows for the expression of the individual experiences and perceptions of the participants as viewed through the lens of the researcher (Creswell & Poth, 2018).

Philosophical Foundation

The current level and amount of nursing research within the world of simulation is growing (Nestel et al., 2019), as simulationists across the globe continue to strive toward making sense of and improving healthcare through simulation (*Society for Simulation in Healthcare*, n.d.). The preponderance of the studies conducted thus far have been in a quantitative style, possibly reflecting the empirical approach that is often extolled in the medical and other science communities. However, a qualitative approach is better suited to the explore the nuances and varied rationale as to why errors persist within the healthcare arena. It is a pragmatic approach for examining the truth of the phenomena, from the point of view of the participants.

A hermeneutical tactic was utilized as it affords the researcher, who is an experienced simulationist and nurse educator, the opportunity to recognize his involvement in the development and interpretation of the responses from the participants (Polit & Beck, 2017). It is a process of reflection and evolution, as the lived experiences of the participants will be explored to gain an understanding as to why errors persist even though healthcare simulation is an accepted modality for learning, as well as what are some of the barriers to the regular rehearsal and practice of patient care events.

The hermeneutic phenomenological approach also affords the researcher the ability to better recognize the essence of the participants lived experience, based on their responses recorded on the survey and subsequent interview. These responses are then reconciled with preconceptions and biases retained by the researcher in a reflective process, striving to develop a deeper understanding of the phenomena of human action and learning (Nestel & Bearman, 2015; Benner, 1994).

Martin Heidegger, whom many attribute as the father of hermeneutic phenomenology, considered the critical aspect of what it means to be human, and that it is virtually impossible to separate one's view of the world around us, and being-in-the-world; consciousness shaping and interpreting reality (Polit & Beck, 2017). Heidegger used the term *dasein,* a word with Germanic roots and no real direct English translation, nevertheless has been accepted as providing a description of being, our daily lives and the actions we take throughout; our recognition and understanding of self and the potential impact we have in creating our reality (Nestel et al., 2019). This concept is integral to the hermeneutic phenomenological approach to research, while striving to find commonality of the lived experiences of those subjects in the study, and then reconciling any fore conceptions held by the researcher; interpretation is a process of continual modification and adjustment.

Researcher's context

An integral aspect of a hermeneutical or otherwise known as interpretive style of a phenomenological study (Benner, 1994) is to become cognizant of the lived experience of the researcher and how it will have an impact on the interpretative analysis of this study. I have been actively engaged with healthcare simulation for over 20 years and have been witness to multiple applications of the learning modality of healthcare simulation. Throughout my professional career as a registered nurse, I have fulfilled the multiple roles within the milieu of healthcare simulation, initially as a participant, then as a facilitator, and later in the role of administration and governance of simulation programs. Currently, I am the director for simulation education with a major manufacturer of healthcare simulators that are used worldwide in multiple settings, such as nursing and medical institutions of higher learning, as well as in hospitals, emergency medical services, and even the military.

In my role with the industry of healthcare simulation, I have had the opportunity to interact with and learn from my fellow simulationists and other patrons of healthcare simulation. However, this role does not afford me a position of power or control when it comes to the end-users of the products, rather my relationship with other nurse educators, simulationists, and other healthcare professionals is on a peer level, as we share a passion for healthcare, wellness, and staff development. I also recognize that over the years I have developed a certain level of bias related to the world of healthcare simulation, in that mainly it can serve as a remedy for the eventual atrophy of knowledge and skills of healthcare professionals, if it is accessed and exercised on a frequent basis. Additionally, I acknowledge that not all patrons of the simulation realm may not share my zeal for this modality of learning and staff development. As a forum to address my biases, I applied a reflexive process through journaling to better reconcile my views with those gleaned from the responses provided by the participants of the study. The analysis process was not linear, but rather in a spiral fashion as one experience influenced the next, as commonalities in our perceptions of reality were discovered.

Sample

To develop a better understanding of the problem, healthcare professionals, simulationists, and those in leadership positions from medical treatment facilities who have membership with the Society of Simulation in Healthcare were solicited to participate in this study, until thematic saturation was reached (Creswell & Poth, 2018). Participation in the study was voluntary. The plan was to solicit a minimum of 75 candidates with the anticipation of approximately a 33% response rate.

Inclusion criteria

Healthcare professionals who have experienced a simulation-based learning event, including nurses, doctors, and other allied health professionals. Registered nurses are the dominant group of educators within the simulation community (*Society for Simulation in Healthcare*, n.d.), therefore nurse educators were among the target population, along with other patrons of SBLE to be considered. At the onset of the study, the prospective candidate needed to have experienced at least one SBLE over a 24-month period, within their respective facility. All candidates were actively employed or otherwise enrolled in an academic program.

Exclusion criteria

Non-healthcare professionals, as well as those healthcare professionals who have not been involved with or participated in a SBLE over the past 24 months, were also excluded from participating in the study.

Data collection

The data in this study was gleaned and interpreted from the participant's responses to the solicited survey form (see Appendix A) through purposeful sampling. The survey form was developed by the researcher to gain insight into the lived experience of the participants of healthcare simulation. The participants completed the survey electronically via a secure on-line survey site, with directions and internet address provided in e-mail correspondence. Access to the survey was individualized for the respondent using an assigned survey control number. This number served to eliminate duplicate submissions. The completed survey forms were collected and retained by the researcher in an electronic format on a password secured computer. From recruitment and consent to data collection, an overall period of 90 days was anticipated.

Recruitment

This study utilized the database of simulationists available through the Society for Simulation in Healthcare (*Society for Simulation in Healthcare*, n.d.). The membership registry consists of those who hold accreditation as a Certified Healthcare Simulation Educator, Certified Healthcare Simulation Operations Specialist, as well as those healthcare professionals who have an interest in healthcare simulation. As of this writing there are over 2000 certified professionals listed in the database (*Society for Simulation in Healthcare*, n.d.). Direct solicitation for participation was realized via a tactfully crafted e-mail (see Appendix B) that was forwarded to the healthcare professionals listed in the SSH registry.

Instrumentation

The researcher designed instrument was a brief two-page survey consisting of a demographic assessment with a mix of short answer and check-type answers, followed by a series of open-ended questions to elicit insight into their lived experience with simulation-based learning. A sample of the survey form is located in Appendix A.

Demographics. The demographic section consisted of eight short answer questions. Current profession had an open-field space to indicate the participant's current professional occupation, with an example in parenthesis noted as (i.e., RN, MD, NP, PA, etc.). The next question inquired as to the participant's area of specialty, with an open-field space to indicate their respective specialty. This was followed by two short answer questions to assess their experiential level by inquiring the number of years in their current profession, followed by a query as to how long they have been in their current respective role, also noted in years. The next question sought to assess the educational level of the participants and consisted of four items that include a check-type answer, with the level choices being bachelor's, master's, doctorate or

other. To assess the age of the respondents, check-type answer space was afforded to indicate age from 21-35, 36-50, 51-64, 65 and older, as well as the check-type option of prefer not to answer. This was followed by the query regarding gender and the choices were male, female, a write-in open-field space, followed by a check-type answer of prefer not to answer. The demographic field concluded with an open-field space afforded to indicate the respondent's operational setting of their profession, such as emergency department, medical-surgical unit, acute care clinic, etc.

Narrative. The next eight questions were open-ended and were used to solicit insight into their lived experience with simulation-based learning. The initial three queries targeted the second aim of the study, which was to explore and identify barriers to frequent practice of simulation-based learning events. The first question of this set asked the participant to recall over the past 24 months, how often they have engaged in a simulation-based learning event. The rationale for the extended period of the inquiry is that currently, the interval for the recertification of resuscitation skills is every two-years (Cheng et al., 2018). From the researcher's lived experience, most healthcare providers will wait or otherwise delay until their resuscitation certification is about to expire before they will engage in simulation-based learning. And for many, life-support training is their primary point of interaction in the realm of healthcare simulation. The following two questions in this set strove to elicit the essence of the participant's lived experience with healthcare simulation by soliciting their response as to how this modality enhanced their clinical acumen, and then for the participant to describe the type of barrier(s) they have encountered that prevented them from engaging in simulation-based learning.

The remaining narrative questions speak to the third aim, being to identify processes that can lead to the reduction of errors in the healthcare industry. As there are myriad contributors to

the commission of medical errors, resuscitative training is one of the more prolific and consistent formats employed in the realm of healthcare simulation (Kardong-Edgren et al., 2020; Mariani et al., 2019).

The first in this set of questions sought to further identify the interval of practice by asking how often they were afforded the opportunity to participate in healthcare simulation. In an effort to avert ambiguous responses (i.e., not very often), the question asked the respondent to quantify the interval (e.g., weekly, monthly, quarterly, etc.), to better understand a potential barrier to non-participation resulting from a lack of opportunity to partake in the training.

The subsequent two narrative questions targeted life-support training. First by asking the participant to use their lived experience as the basis for their response regarding the processes to improve life-support training. This speaks to the andragogical aspect of each professional and their necessity to be involved in the planning and subsequent evaluation of their instruction (Knowles et al., 2015). The next question in the set addressed the aspect of efficacy as it relates to life-support training in their respective facility.

The remaining two narrative questions on the survey addressed the frequency interval of healthcare simulation at their respective facility, and from their experience, how often should they participate in simulation-based learning to maintain their clinical acumen. As this survey was researcher designed and developed, no psychometric testing had been performed on this instrument.

Human subject protection

No identifiable personal information was retained to ensure confidentiality of the participants. All surveys were coded with a study number only and participation was voluntary and anonymous. The completed electronic version of the surveys was extracted from the secure

survey website and transferred into a password protected computer by the researcher. The raw data will be secured and preserved for a minimum of five years upon completion of the study.

Data analysis

The concept of data analysis is in many ways more suited to a quantitative, empirical style of study, as the term invokes the meaning to break or separate it into parts, whereas in a phenomenological study, the intent is to understand the whole of the phenomena under investigation (Polit & Beck, 2017). Regarding the quantitative section of the survey, the demographic data was analyzed with descriptive statistics, utilizing IBM SPSS 27 Statistical software, to examine group characteristics and provide a contextual reference of the participants' experiences.

As for the narrative portion of the study, the intent of the study was to illustrate the lived experience of the participants. To accomplish this a thematic cross-reference of the narrative responses was utilized, searching for commonalities among the answers to the survey questions. To recognize any bias that the researcher could hold, throughout the analysis phase a process of reflective journaling will be employed to acknowledge and possibly alter the researcher held biases, as left unchecked they can represent a distraction to the interpretation of the message conveyed by the participants (Nestel et al., 2019; Polit & Beck, 2017). The process of a hermeneutical circle was used to record and possibly revise assumptions retained by the researcher, and thereby established the opportunity for discovery.

Trustworthiness

The traditional criteria to validate qualitative research includes credibility, dependability, transferability, and confirmability (Polit & Beck, 2017), with these conditions forming the foundation of trustworthiness.

Credibility refers to the amount of confidence in the truth of the presented data, coupled with the interpretations of the data through the reflexive lens of the researcher. The responses to the survey were electronic via a secure on-line survey site, with the responses being unalterable as the 3rd party survey site permitted one response per internet address and the member had an individually assigned survey control number. The interviews were audio and video recorded, then transcribed by 3rd party transcription service, obtained by the researcher. The transcribed and raw data were shared with the principal investigator's dissertation chairperson, which also fostered the validation of themes as they surfaced from the responses of the participants.

Dependability alludes to the reliability or generalizability of the findings, and if they were replicated by an independent researcher, similar results would be realized. In this study all the data was retained in its raw form, along with the notes from the researcher, in electronic format on a password secured computer. Through the exploration of the participant's lived experiences, as noted from the survey responses and interview sessions, the frequency of rehearsal as well as multiple potential error reduction tactics were revealed.

Transferability seeks to connect the processes utilized in this study to other researchers to explore this and other related events. As the survey demographic questions and subsequent short answer questions were not altered throughout the study, they can easily be adopted to investigate associated phenomena. The same process was used for each participant and interviewee, as the researcher employed the same interview guide (see Appendix C) for each interview.

Confirmability requires the researcher to accurately reflect the voice of the participant, as well as reconcile their own biases that is fostered through reflection and regular journaling of the research study. All the responses to the on-line survey and the audio and video recordings of the

interviews were retained and secured by the principal investigator in electronic format on a password secured computer.

The intent of the research study was to analyze the phenomena from the perspective of the healthcare professional, as held in the context of healthcare simulation. The transcribed content of the interviews, coupled with the survey responses are provided to the reader through quotations and referencing in chapter four of this study. Trustworthiness of the gleaned data was sustained by the individual responses to the survey questions and reconfirmed via the transcripted audio recordings of the interviews.

Summary

This chapter delineated the methodology, research design, philosophical background, as well as describing the context of the researcher and identified some of the embedded biases held by the researcher, which will exert at least a modicum of influence on the interpretation of the results of the solicited surveys and is integral to the process of hermeneutic or interpretive phenomenology. The sample population was identified, along with the process of collecting the data from the participants. Of course, this could not be accomplished without some form of inquisition and in this study the investigator designed survey was the instrument employed. The survey was developed to better understand the perspective of the lived experiences of those patrons of healthcare simulation, across the continuum, from the participants, to the facilitator / educator, and those of the key-stakeholders involved in governance of the assets of the healthcare facility (i.e., directors of simulation centers, medical directors, and managers). The data analysis, with a broad definition of the process employed, incorporates elements of quantitative along with qualitative properties. The demographic data illuminated the essence of the themes that were identified via the qualitative process.

It is the author's contention that the iterative rehearsal and reflection of simulated patient care events, particularly those situations that involve communication skills with a pseudo patient and the healthcare team, can serve as a significant antidote to complacency and incompetence. This study sought to understand those factors that may impede or foster the frequent utilization of healthcare simulation as a conduit to positive patient outcomes, by examining and interpreting the results of the respondents, through the adjusted lens of the researcher.

Chapter 4

Results

In this chapter the participants of the study have been defined, including their current role and area of professional practice. Additionally, the results of the surveys, along with the content of the follow-up interviews were examined and interpreted, through the lens of this researcher. Through the analysis phase of this study, themes and subthemes were derived from the responses to the survey questions and the follow-up interviews to address each of the aims.

Purpose

The purpose of the research was to gain insight into factors that impede or foster the frequent iterative utilization of simulation as a modality to rehearse patient care activities for healthcare professionals. This study also had three specific aims:

1. Describe the demographics of the study population.
2. Explore and identify barriers to the frequent practice of healthcare simulation.
3. Identify processes that can lead to the reduction of errors in the healthcare industry.

All three aims were achieved. The following two chapters will afford the reader a unique perspective that being from patrons of this learning modality.

Description of Participants

The participants in this study were healthcare professionals who have experienced a simulation-based learning event in some form or fashion, within the past 24 months. The rationale for the 24-month period was to encompass all healthcare practitioners, not just only of those who regularly rehearse patient care events through simulation, but also for those whose only exposure would be through their basic life support skills; currently projected renewal is every two years. The demographic survey asked the participant to self-identify their profession

and as a result, seven different careers were indicated. Table 1 is provided for the reader to better understand the professional livelihoods of the participants. Over the course of the study 112 healthcare professionals were solicited, and 30 (26.8%) had responded to participate in the study, with 11 (36.7%) of those consenting for a follow-up interview via Zoom.

Table 1

Participant's Self-identified Profession

Profession	*n*	%
Registered Nurse	18	60
Nurse Practitioner	3	10
National Registered Paramedic	3	10
Medical Doctor	2	6.7
Physical Therapist	2	6.7
Registered Respiratory Therapist	1	3.3
Doctor of Dental Surgery	1	3.3
Total participants (n = 30)		

Regarding the gender and age of the participants, all were provided with the option to decline to respond; however, this option was not exercised by any respondent. 22 participants identified as female (73.3%) and eight who identified as male (26.7%). The participants were asked which of the four separate age groups that they identified themselves as a member, as well as their current educational level. Table 2 illustrates these demographical aspects of the study participants.

Table 2

Participants' Age Grouping and Education Level

Age	*n*	%
21-35	3	10
36-50	10	33.3
51-64	17	56.7
65+	0	0
Education Level		
associate's	1	3
bachelor's	1	3
master's	17	57
doctorate	11	36
Total participants (n = 30)		

Each of the participant was asked to indicate their area of specialty within the healthcare profession and the responses are illustrated in Table 3. The participants were also asked to quantify their time in profession and the results varied from five years to 49 years of individual experience with an average of 22.07 years (SD = 10.27). Considering the experiential knowledge of the study participants, it is also helpful to recognize the time each participant has spent in their current role at their place of employ. When asked, the participant's responses varied from a half-year to a maximum of 24 years, with an average of 7.66 years (SD = 6.91).

Table 3

Participants' Area of Specialty

Area of Specialty	*n*
Anesthesia	1
Case Management	1
Dentistry	1
Emergency Nursing	1
Family Medicine	2
Healthcare Simulation	9
Labor & Delivery	3
Military Medicine	2
Nurse Education	1
Occupational Nursing	1
Pediatrics	3
Physical Therapy	2
Staff Development	3
Total participants (n = 30)	

Healthcare professionals work in various areas and each clinical or academic practice environment has its own respective protocols, particularly when it comes to implementing staff development modalities. To better understand the lived experience of the survey respondents and gain clarity on their daily professional life, Table 4 identifies the participants' regular work environment. On the same table, the operational setting is identified as either clinical or in academia, further delineating the diverse work environments of many healthcare professionals.

Table 4

Work Environment of the Participants

Operational Setting	Clinical	Academia	*n*
Simulation Center	8	2	10
Nursing	3	6	9
Labor & Delivery	4		4
Physical Therapy	1	1	2
Pediatrics	2		2
Anesthesia	1		1
Critical Care	1		1
Dentistry		1	1
Total participants (*n* = 30)	20	10	

To aid in the exploration of the varied participants' perspective, their role within the context of healthcare simulation was categorized into one of three groups, either as a participant of a SBLE, as a facilitator, or as a director of a simulation program; the latter role encompasses those persons whose duties include the governance and administration of a simulation program. The number of study participants was closely distributed between the roles, affording relative equanimity in representation from each interactive role, as Table 5 demonstrates.

Table 5

Primary Interaction Role with SBLE

Profession	Participant	Facilitator	Director	*n*
Registered Nurse	8	5	5	18
Nurse Practitioner		2	1	3
National Registered Paramedic			3	3
Medical Doctor	1	1		2
Physical Therapist		2		2
Registered Respiratory Therapist		1		1
Doctor of Dental Surgery			1	1
Total participants (n = 30)				

A primary qualifier for participation in the study was that the member had experienced a simulation-based learning event, at least once in the past 24 months. The survey responses

reflected a broad range of SBLE engagement, from the minimum of once every two years to a maximum of 100 (M = 53.23, SD = 43.41), during the timeframe. The most frequent answer was noted as 100 with 13 participants responding at this level of frequency of skill development.

To gain a better understanding of the experiential level of the study participants, descriptive statistics were calculated for each group. Starting with the members of the Participants group, whose minimum number of SBLEs was one with a maximum of 50 over the two-year period. The average for this group was 12.56 SBLE experiences over two years (SD = 15.26). The members in the Facilitator group reported a greater number of experiences, with a minimum of eight SBLEs to a maximum of 100 over the period. This group averaged 60.36 experiences in two years (SD = 45.72), possibly owing to their role as a facilitator of SBLE. The third group consisted of those who are in governance and administration of healthcare simulation, and in this study are identified as directors of simulation programs, were grouped into the Director section. This group was the most active of the three for interaction with simulation, with an average of 82.0 SBLEs over a two-year period (SD = 30.11).

Setting

The participants had the opportunity to select where they would complete the survey, as it was offered in an on-line format. The healthcare professional was able to participate in the study, at a time and place of their choosing, providing they had access to the internet.

The follow-up interviews were conducted via a secure third-party video service, and held at the convenience of the participant, between the hours of 0700 and 2200, Monday through Sunday. The interviews were recorded and directly transcribed; consent was obtained prior to engaging each interview.

Data Collection

The on-line surveys were collected using a paid, secure, survey site that permitted only one response per IP address. The website was also configured to accept only one user per assigned survey number. This number was assigned to each participant upon a positive reply from the recruitment email, ensuring response integrity. The interviews were conducted with participants who had completed the survey and were held at a mutually agreed upon date and time via a secure, third party video service.

Findings

Themes of practice and experience were derived from the content of the survey questions and from data obtained from the follow-up interviews, to further explore the lived experience of healthcare professionals and their interaction with healthcare simulation.

The interviews were recorded and transcribed verbatim and then later analyzed according to the methodologies of Benner (1994). The course of transcription and reflection was repeated for each interview. As meaningful patterns emerged from the responses to the survey questions, along with the information gleaned during the interviews, themes were derived. Throughout the thematic development, data was shared with the dissertation chairperson, affording an objective perspective to the data. Impactful phrases, similarities, and distinctions were identified through the analysis phase that fostered further thematic development. The process was fulfilled when theoretical saturation was achieved, and no additional relevant data was discovered. Themes derived include time, cost, paucity of qualified facilitators, space and access, diversity, belief in the modality of simulation leadership buy-in, and clinical confidence versus insecurity.

To provide the reader with a richer experience, quotes from the three groups of study participants have been identified as P# for Participant, F# for Facilitator, and D# indicating Director.

Barriers Identified

The results of this study do share levels of applicability for the varied patrons of this learning modality, whether it be directed toward identifying barriers to the rehearsal of patient care situations, or posing solutions for healthcare deficiencies, several of these themes do share pertinency for both aims of this research.

Time

Whether the study member's interactive role with simulation was as Director, Facilitator, or Participant, the element of time appeared to be equally impactful. This invaluable commodity has also been significantly affected by the unique and ongoing effects to the healthcare system in response to the current pandemic. As an example, "…when we are short-staffed, administration needs us at the bedside to take care of the patients, education then is not the priority, and the time previously allocated [for training] is lost" (D4), and "COVID has prevented us from holding regularly scheduled sim education at [facility's name omitted]" (F3).

The aspect of time as a barrier goes beyond simply just the learning event whereas indicated by one of the subjects who responded, "I help facilitate PALS courses and I need to budget a couple of hours for prep, teaching, and evaluation, and that's time away from patients" (F9). It also impacts the chance for healthcare providers to engage in SBLE, as noted by the responses of "a lack of opportunity, due to work schedule" (P9), as well as "have to do it [training] on my own time" (P5), and "one of the biggest barriers is the time, in order to have

people to be able to participate in simulation" (P4), further illustrating the conflict that exists between preparing for patient care and delivering patient care.

Cost

The topic of finances and budgets many times dominates the conversation when education and healthcare discussed. For most users of healthcare simulation, not unlike those professionals who were represented in the Participant group, the aspect of cost rarely impacts their use of the modality. The results of the survey support this view, in that 40% of those in the Director role identified costs and budgets as a barrier, 27% of those in the Facilitator role, and zero percent of the Participant group indicated this as an impediment to utilizing healthcare simulation.

Costs related to a simulation program are multi-faceted. Considering there are expenditures for realistic equipment, high-fidelity patient simulators, and if utilized standardized patients, along with the salaries of those staff needed to implement a program, the costs can be challenging. As articulated by one of the participants "We're measured on keeping budget, not spending money, producing results, but ultimately a lot of it comes down to the finance… internally funded or externally through grants" (D1). This was particularly relevant for one of the participants who stated, "initially when our building was established, it was based on a grant, but our grant has run out, so we are becoming more judicious with how we proceed, specifically with the more expensive standardized patient option" (F1).

The healthcare industry has shifted gears in response to the pandemic and simulation education has been fully impacted, as exemplified by a respondent, "since March 2020, all simulations are now being conducted virtually; however, this is not ideal and limits the interactivity and quality of the simulations" (D3). When asked to clarify the virtual format, the

participant stated a brand-name, third-party video meeting medium, but went on to add that "budget considerations also limit and or prevent the purchasing of new platforms such as VR, and we are then forced to use technology that is not necessarily designed to be used for education" (D3).

Paucity of qualified facilitators and support staff. Through the iterative analysis phase, a sub-theme of cost was identified as the investment in human capital necessary to produce SBLEs. Unfortunately, this translates into the paucity of experienced facilitators and support personnel, exemplified by one of the participants as, "that it comes down to hiring and maintaining qualified educators, preferably CHSE, and good support staff, preferably CSHOS" (D1). This sentiment was echoed by other participants, "obstacles include the lack of resources, designated personnel to run simulation, and facilitator development" (D8), and "there's a lack of qualified or experienced facilitators in using sim[ulation]" (D5). A unique fact of this industry is that not all facilitators of simulation are doing so as a paid position, particularly in the clinical sector where at times "hospital staff are recruited to hold a resuscitative training event" (P1) and often due to budgetary constraints, "there was no support for staff to be relieved of duties for educational purposes" (F2). The lack of experienced and qualified personnel in simulation is not new knowledge to the healthcare industry (Al-Ghareeb & Cooper, 2016; Beroz, 2017; Jeffries et al., 2015), yet the drought of simulationists continues to impede the realization of safe and meaningful learning opportunities for healthcare professionals.

Space and Access

The concern for space has been an on-going issue within the simulation education community and reinforced by a statement from one of the participants, "as anyone knows any hospital setting, space is a premium" (D6). This sentiment was repeated by several of the

participants, impacting both clinical and academic settings, as noted by a clinical facilitator, “our courses are sometimes cancelled due to the lack of space, because of a high census in the clinical unit where we had planned to train” (F56). Healthcare simulation is often a shared asset of departments within a hospital or university and access to the equipment and space can pose a significant barrier. An educator in an academic setting had stated, “we have several programs on campus and nursing primarily uses the space, but when another program comes in and wants to use that space, there’s a real competition for the schedule and that can put faculty at odds sometimes” (F71).

The need for space and access has only been exacerbated by the impact of the pandemic. With the desire for safety and social distancing healthcare simulation programs were dramatically reduced or otherwise significantly altered, as noted by a clinical simulation director, “moving an interactive simulation that was designed to be face-to-face into a virtual platform has been very difficult, time consuming and sometimes impossible to replicate” (D3). The question of access and an area to conduct learning continues to be an issue for the simulation community.

Diversity

The qualitative nature of this study afforded the emergence of themes that were not initially anticipated, but through the iterative nature of transcript review and personal reflection additional nuances to the barriers of simulation were revealed. The lack of diversity of healthcare professionals who are engaged in facilitating simulation, as noted by one participant, “as a physical therapist I’m really rare in healthcare simulation, and that’s one thing I’d like to see change, as well as even ancillary professions being more involved in simulation, than just medicine and nursing” (F1). As shown in Tables 1 and 5, most of the respondents are in the nursing profession.

Another facet of diversity was identified during the interview process addressing the topic of manikin skin tone. As noted by an educator in an academic setting when considering improvements to life-saving techniques their response was “one thing that I have noticed is that there is a lack of diversity in the manikins, which makes it difficult for students to assess signs of hypoxia, bruising, or other disorders in people with darker skin tones” (F8).

A different aspect of diversity was raised and that of gender diversity in simulation-based learning events. This was noted in one participant’s response to the inquiry of how an SBLE enhanced clinical judgement, “even though it was just BLS, the manikin had breasts and caused a few to pause, a good discussion was held after the class” (P5).

Processes to Reduce Errors

The third aim of this study was to identify processes that can lead to the reduction of medical errors by soliciting the input from healthcare professionals who have experience with simulation. Earlier in this chapter the average frequency of interaction in a SBLE for the participants was noted as 53 times over a two-year period, indicating that these healthcare professionals have experience with simulation. Essential to the success of a SBLE is the belief that the effort expended to rehearse patient care events will be beneficial to their respective professional practice. The responses garnered from the study participants yielded the following themes.

Belief in the modality

Going into this research, it was an assumption held by the author that most healthcare professionals have a belief that the modality of simulation is beneficial for them and ultimately their patients, although the results of this study indicate that there are several of our colleagues who do not yet see the advantage of rehearsing patient care events. It is possible that a previous

less-than-positive experience with healthcare simulation had skewed the member's perception of the experience with the rehearsal of patient care events, as noted by as director of a simulation center as, "I think it might be historical and their experiences and the type of training that they've had in the past may be influencing their decisions for their teams and their staff members" (D1). Another participant provided some insight on the disbelief model as, "at times the simulated patients' response were not realistic, so the team members did not treat the scenario as real" (D7). Reflecting on my own experience, once the learner loses faith in the relevancy of the event to their professional practice, the opportunity for meaningful learning to occur is severely diminished.

These examples of disbelief were in the minority, with many more responses to the contrary. The vast majority of the responses made by the participants across the three groups were encouraging, such as "It has helped me and my team practice real-life protocols and scenarios. We do a lot of in situ simulation, so this is also helpful in improving teamwork, communication and identifying latent safety threats" (P4). The perspective from a facilitator in an academic setting was noted as, "It really brought to life nursing concepts and disease processes for the nursing students and helped to illustrate their gaps in knowledge" (F10), and from a facilitator in a clinical setting, "clinical judgement was enhanced by them working through problems in a safe environment. Practicing the pieces and skills allowed them to understand the 'why's' of best practice" (F2).

Reinforcing this belief is the response from a participant involved with governance as, "SBE enhances clinical judgement for prelicensure through ongoing continued competency for all disciplines" (D55). Holding the belief in the benefit of this modality is one of the first steps in

recognizing and preventing errors in the healthcare arena through processes that lead to the enhancement of clinical judgement.

Leadership Buy-In. Through the iterative process of transcript analysis, a sub-theme emerged emphasizing the necessity of the support of leadership, otherwise known as buy-in. Whether in a clinical or academic setting the support of leadership is key to the success of any program and yet without that support, the efficacy of our healthcare delivery system can be in question, as indicated by a participant from a clinical setting as,

> Honestly, the facility that I currently work at does not conduct regular simulations and instead focuses on quarterly training on various topics that are more lecture or computer based. The lack of regularly hosted simulations is greatly hindering nursing growth and effectiveness in the workplace. My military experience prior to becoming a civilian proved that continuous simulation exposure is best (P8).

According to one of the participants in a governance position as, "leadership support equates to funding, which allows me to purchase equipment and hire staff" (D10). The question of how to develop and secure the necessary buy-in from leadership could be related to how clearly the proponents of SBLE can demonstrate the benefits of this modality. As noted in an interview with a participant in the Director group, "we got buy in because we proved that this is the way people wanted to learn, we provided leadership with the desires of the staff", and when pressed further to explain the participant responded with "you gotta communicate, provide them with safety reports, staff surveys, and code blue outcomes" (D2). Another participant added, "we used risk management data and patient events to drive the development of the objectives and scenarios" (D5), providing relevance of the modality to governing bodies.

There is also the bonus of those leaders who already grasp the relevance of skill rehearsal as noted by a clinical facilitator as, “we are fortunate that the CEO we now have, came from an institution that used a lot of simulation, so he’s super bought in, he’s encouraged other parts of administration to use us more” (F11). A top-down approach can be efficient, although not everyone has the benefit of a leadership who directly embraces simulation. For those simulationists, a grass-roots approach through documentation and recruitment of other motivated healthcare professionals to participate, host, and advocate for simulation-based learning events. By letting the participants know ahead of time as to what will be expected of them in a SBLE, they are better prepared to learn and less likely to feel threatened or intimidated by the practice session, “when they are comfortable, they are more willing to learn” (F11). Additionally, from my personal experience as a simulationist, when the participants of a SBLE are satisfied with their learning experience, it is essential to the success of a simulation program to raise awareness of this aspect to leadership.

Clinical Confidence vs Insecurity

Building clinical confidence in healthcare professionals takes time and experience, simulation can be an effective format to gain the much-needed experiential knowledge. However, without regular usage our skillsets can wither over time and can cause even an experienced professional to question their capability, thereby negatively impacting their confidence level. Consider the potential chaos that can ensue with a resuscitative event, even within the context of a practice setting, can be intimidating to some healthcare professionals, so much so that they set the stage where errors can occur. As noted by one facilitator from the clinical setting “they’re scared of just coming to a code because they don’t feel prepared, and the ‘every two-years’ recertification is not good enough for them”. When asked to clarify scared, the

member responded, “many of them are intimidated by the equipment itself and especially in a chaotic and stressful situation like a code, it’s going to be worse” (F6). A similar perception was held by several other participants, with one response noted as, “…providers cannot rely on their capability by rehearsing [resuscitative skills] only every two years. If we could set aside time per week or even per month to practice our skills, we will get better” (P1).

Practice fosters confidence, which in-turn can lead to practitioner competency (Chan et al., 2019). Another participant related the value of rehearsing as, “simulations allow me to have hands-on exposure to various situations I may be exposed to at work.” The member went on to add, “As a labor and delivery nurse practicing neonatal resuscitation made me more comfortable in high-risk situations and decreased the likelihood of panicking during an emergency” (P8). This response from another clinical participant, “training in teams does help us work more efficiently. Clinical judgement is enhanced through familiarity with the processes” (P1). Comfort and confidence are bolstered through regular practice, leading to the next theme.

Practice, Practice, Practice

Infrequency of use and lack of familiarity with the materials and procedures of a resuscitative event can be catastrophic, for both patient and staff. The frequency of the rehearsal of patient care events varies from person to person, and as demonstrated by the modest representation of healthcare professionals in this study (n =30). When asked how often each participant considered the minimum amount of practice time to maintain clinical acumen, the responses were almost split between monthly and quarterly. The information in Table 6 indicates the frequency rehearsal time preferred by the healthcare professionals in this study. Additionally, this reflects what is being promoted in the literature with a preference for monthly, and yet at a minimum recommended of quarterly practice (Oermann et al., 2020).

Table 6

Acceptable frequency of SBLE to maintain clinical acumen

Time Interval	*n*	%
monthly	13	43.3
quarterly	13	43.3
semi-annual	2	6.7
annual	2	6.7
Total participants (*n* = 30)		

The responses from several of the participants are particularly noteworthy, providing a voice for our peers. This from a clinical participant, "high frequency, low dose regular mini simulations, regular shorter sims are better than big infrequent and more complex scenarios, try every two weeks, but at least monthly" (P2). Another clinical participant responded with,

> I believe simulations should be held at a minimum monthly, which would include larger situations, like post-partum hemorrhages. I also believe quicker simulations could be completed biweekly, such as neonatal resuscitation, to ensure nurses can perform the basic steps comfortably before NICU arrives (P8).

A clinical simulation director had a similar response, "high frequency, smaller bites. At least monthly, more frequently depending on how loosely you define simulation" (D9). The perspective from a facilitator in a clinical setting was noted as, "more than annual practice and review of skills and workflows is important. I would say quarterly activities would be best for staff to retain knowledge" (F2).

The results of this study indicate that these healthcare professionals prefer frequent rehearsal of patient care events. This frequency of practice is not limited to the first-person practice level such as a SBLE participant, but also applies to those that facilitate learning. The perspective from a clinical simulation director was noted as, "for the simulation

facilitator/debriefer to remain proficient in their skills, they must conduct simulations at least quarterly. For those newer to simulation, this should be more frequent as they are still learning and perfecting this art" (D3).

Summary

This chapter afforded the reader insight into the professional lives of the study participants. Several professions in the healthcare community were represented, albeit some with the need of additional representation. The participants were not grouped by profession, but rather by the three separate roles that they performed, in relation to their interaction with healthcare simulation. The setting was at the discretion of the participant, as all data collection was done remotely. Using the hermeneutic circle, the discovery of several barriers to the frequent practice of simulation were recognized, with some anticipated and some not. Additionally, multiple processes were identified that can lead to diminishing the medical error rate for our colleagues and peers. In the upcoming chapter, the significance of these findings will be further explored.

Chapter 5

Discussion

Service is the rent you pay
for your room here on earth
Muhammad Ali

Those who choose a career path in healthcare do so with a sense of selflessness and service to others. The underlying theme for engaging in this research study wass rooted in the desire to serve our fellow healthcare professionals, enabling them with the tools and skills to maintain and enrich their ability to deliver quality healthcare, and is applicable in both the clinical and academic realm.

Despite our well-intended efforts, things do not always go as planned. It is sobering to recall that annually in this country, almost a half million premature deaths are attributed to medical errors (James, 2013), and mistakes for the most part are preventable. Healthcare simulation provides the learner with experiential knowledge and skill enhancement, without risk to actual patients. The purpose of this study was to gain insight into those factors that encumber or promote the iterative utilization of simulation as a learning modality to rehearse patient care activities for healthcare professionals.

The research was accomplished through an on-line survey of free-text responses that included demographic data to gain a better understanding of the subjects, giving context to their responses. There was also an option for the participants to engage in a follow-up interview that was conducted via third party password secured video service. Barriers and promoters to the utilization of healthcare simulation were explored, along with processes identified that can lead to the enhancement clinical acumen. The results of this study will add to the growing body of healthcare simulation literature and can be used to counter the scourge of medical errors.

Significance of Findings

Through the analysis of the responses of the survey and by employing the process of a hermeneutic circle, themes and sub-themes emerged that were explored and interpreted through the lens of the researcher.

Demographics

This hermeneutic phenomenological study utilized descriptive statistics to provide context of the participants, who were all licensed healthcare professionals. Representation was obtained from active operational settings, with one-third hailing from academia and two-thirds practicing in a clinical setting. Additionally, the participants were grouped according to the role of interaction that they had with healthcare simulation, whether as a Participant of a SBLE, or as a Facilitator, or as someone in the role of governance and administration of healthcare simulation such as a Director. Grouping them by their interaction role, afforded a deeper appreciation for their perspective.

Barriers

Several barriers to the frequent and iterative practice of healthcare simulation were identified from the participants.

Time, Space, Access, and Costs. These vital components of healthcare simulation are well documented in the literature as elements that have plagued simulation programs across the continuum (Al-Ghareeb & Cooper, 2016; Chan et al., 2019; D'Souza et al., 2017; Gaba, 2007). The responses from the study participants re-affirms the lack of these key elements as barriers. The significance of these findings is that by restating the impediments in the voice of users, it serves to keep these issues relevant and renews the call for solutions. Additionally, the impact of the current pandemic has had an acute negative effect on the availability of these elements in

both clinical and academic settings. In particular, the aspect of access has been severely hampered, as key resources have been reallocated or in some cases even eliminated. The results of this study perpetuate the awareness of these key elements as obstructions to the delivery of effective learning. When they are then viewed in the light of having an adverse effect on the quality of healthcare delivery, solutions to these barriers can be discovered.

Paucity of qualified facilitators and support staff. The paucity of qualified facilitators and support staff in the learning modality of healthcare simulation has again, been identified as a significant impediment to learning. It is also closely linked to the barriers of costs and time, which only compounds the magnitude of this drought of human capital. The results of this study serve to energize awareness of the issue.

Diversity. The forementioned barriers have been indicted in the literature as obstacles to simulation-based learning. Yet, this researcher did not anticipate the aspect of diversity to be realized as a potential barrier to engaging in a SBLE, as most simulationists strive to imitate patient care activities that are as close as practical to what healthcare professionals would experience in the clinical environment. The American Association of Colleges of Nursing, defined diversity is as,

> A broad range of individual, population, and social characteristics, including but not limited to age; sex; race; ethnicity; sexual orientation; gender identity; family structures; geographic locations; national origin; immigrants and refugees; language; physical, functional, and learning abilities; religious beliefs; and socioeconomic status (2017, p. 1).

This study shed light on an aspect of healthcare that the world of simulation can be uniquely poised to tackle, nevertheless, it continues to represent an impediment to learning (Bryant et al., 2020). It is possible that some persons in this field may avoid the topic, as it can spawn

uncomfortable feelings among participants or stimulate difficult conversations. However, unique opportunities abound in this arena to address sensitive topics such as health equity (Buchanan & O'Connor, 2020), inclusion, heterogeneity, as well as to guard against the formation of racial essentialism (Braun & Saunders, 2017).

Healthcare simulation is an ideal environment to hold meaningful learning events and subsequent discussions where elements of diversity, equity, and inclusion can be further explored in a psychologically safe environment. It is impingent upon every simulationist to strive toward providing our fellow healthcare professionals with the practice tools that accurately reflect our patient population.

Processes to reduce errors

There is no panacea that will bring medical errors down to zero; however, as noted earlier, the learning modality of healthcare simulation can and does serve as a potent antidote for incompetence and complacency.

Belief in the modality & clinical confidence. Both processes have similar etiologies, sharing the aspects of relevancy and experience. The participants in the study were all seasoned professionals, with an average of two decades and more of experience in their respective field (M = 22.06). Despite the relative level of experience, it is not surprising to realize that some healthcare professionals find practicing SBLE an intimidating event, as it can present situations where an adult learner, who is also a healthcare professional, may feel challenged or that peers may question their clinical judgement. However, healthcare simulation is the ideal venue to rehearse and refine our clinical acumen, all the while practicing in a psychologically safe environment. A healthcare professional can quickly build their confidence level via SBLEs, providing they are relevant to their occupation (Cheng et al., 2018; Jeffries et al., 2015). The

results of this study add to the growing body of evidence that SBLEs can and do serve as an effective conduit for learning.

Leadership buy-in. It is safe to say that without the buy-in from leadership to support healthcare simulation learning events, the future of this effective learning modality would be in jeopardy (Kirkham, 2018; Morfoot & Stanley, 2018). Communication with leadership is the first step in developing the support needed to host healthcare simulation. A full 40% of the participants had cited as the primary solution to the resolving the barriers that were previously identified, would be through obtaining the support or the buy-in of the facility's leadership. As noted by one of the participants "go grassroots-style" (F11). When pressed for clarification, the same member went on to indicate that an effective tactic would be to collaborate with area subject matter experts (SMEs) on scenario planning, including when and where the SBLE would be held. The member also indicated that it can be useful to consider the opinion from unit managers, because "no one likes surprises" (F11).

Demonstrating the usage of simulation for elements of the leadership at your respective facility, such as inviting them to observe or even participate in a SBLE, is the next step in securing the necessary support. Leadership is the key to obtaining the necessary funding, materials, and most importantly, the time to conduct learning events (Gaba, 2007). This study reinforces that model.

Measuring efficacy of life-support training. The low-hanging fruit of healthcare simulation has been perceived as the resuscitative disciplines, BLS, ACLS, PALS, etc., and typically is the minimum threshold where healthcare providers interact with simulation in either certifying or recertifying their skillsets, every two years. However, when it was asked of the participants regarding life-support training, how efficacy is measured a full one-third of the

participants had indicated that it was not being measured at their facility. This aspect should serve as a clarion to all simulationists, here is an opportunity ameliorate a knowledge deficit.

The remaining participants provided responses that were much more encouraging to this researcher, including from one of the facilitators from a clinical site who responded to the efficacy question as, "best measure of efficacy and standardization in our facility is the use of CPR manikins with a program that measures how well the learner is performing" (F2). Another participant offered this response,

> "Efficacy is realized through high-fidelity simulators that are equipped to measure psychomotor inputs by participants, who are allowed to view their real-time delivery of compressions and are then encouraged to meet the four-key-metrics of high-quality CPR. In addition, the choreography of high-functioning teams are introduced to reduce delays in care due to poor communication or any other measurable activity" (P3).

The application of a tool that provides feedback allows the adult learner to self-correct and adjust their actions as needed to produce the desired results. Through the process of repetition and adaptation of technique the window-of-opportunity for errors to occur begins to close. The results of this study confirm the necessity for frequent rehearsal of patient care activities.

Practice, Practice, Practice. The overwhelming response on how to best reduce the incidence and severity of medical errors was identified as regular and frequent, iterative rehearsal of patient care events works. This aspect is thoroughly supported in the literature (Andreatta et al., 2011; Aebersold, 2018; Chan et al., 2019). The interval between practice events indicated from the participants (see Table 6) loudly echoes what has been reported in the literature (Bradley et al., 2019; Cheng et al., 2018; Mpotos et al., 2014; Oermann et al., 2020) realized as healthcare providers who are asking for frequent opportunities to hone and enhance their clinical

acumen, monthly preferred or at a minimum quarterly. Additionally, the use of equipment to provide feedback such as a manikin that can offer real-time responses to the user's actions was found to be an essential element in the development of clinical competency. It could be as straight forward as demonstrating the efficacy of the user's compressions by visual feedback. As noted by one participant from a clinical setting as,

> I think everyone should have to practice their compressions and airway every three months so that they do not forget and can be told if their compressions are effective. People do not learn by being taught every two years; they NEED hands on experience, frequently (P7).

Working in teams, on a regular basis, was extolled by almost two-thirds (57%) of the participants as effective format for maintenance and enhancement of their clinical acumen. The frequency of rehearsal was preferred to be monthly, but at a minimum of a quarterly basis.

Another process integral to life-support training, as well as to most of healthcare simulation, and that is to debrief the participants after each learning event, while maintaining psychological safety for all involved. The topic of debriefing has been extensively covered in the literature and was not a focus of this study; nevertheless, is an essential aspect for the healthcare provider to better improve their skillset(s). This study has directed the spotlight of attention onto the positive impact that frequent practice of patient care events can have on clinical confidence, and particularly with resuscitative medicine events, as voiced by current healthcare professionals. The participants were all currently licensed professionals who have had involvement with simulation-based learning, experienced its benefits, and as a result are requesting for an expansion of practice events.

Strengths & Limitations

A recognizable strength of this study is that it has provided a forum for healthcare providers to express their thoughts and experiences without fear of retribution, as the topics can directly pertain to the security, maintenance, and enhancement of their profession. A potential strong influencer is the anonymity that was afforded to the participants that was enhanced by the on-line format, allowing the member to participate asynchronously from a location of their choosing. Yet another strength is that the results of this study are applicable in both the clinical and academic setting, as both milieus were well represented in the study.

As for limitations, a potentially impactful aspect was that 80% of the participants were recruited from the SSH member listing, introducing an element of bias as the participants are most likely supporters of simulation, potentially affecting their perception. The remaining 20% of the participants were recruited by word of mouth from the other participants. Nevertheless, all of the participants were active healthcare professionals.

Another limitation of the study was the pitifully low response rate for those persons in a position to provide the necessary funding and support; key stakeholders such as chief medical officers, chief nursing officers, chief operating officers, or even deans at an institution of higher learning. Only one member in a chief nursing role had participated in the study. It is quite possible that those in the leadership positions may not maintain their basic lifesaving (BLS) credentials, potentially owing to their primarily administrative role.

Despite the impact of the forementioned, the limitations were led by the ongoing effects of the pandemic, as the availability of potential candidates for this study became a challenge. Additionally, the opportunity to conduct an in-person interview had severely shrunk, as most healthcare facilities and institutions of higher learning were restricting the number of people and

amount time for them to be on campus. Initially, this researcher had planned for a recruitment window of 90 days, the reality was that it took 120 days to attain thematic saturation.

Implications for Practice

As these learning events are conducted under a controlled simulated patient setting, they potentiate the attainment of invaluable experiential knowledge, which will thereby enhance participant confidence, leading to clinical competency; this process can ultimately result in positive patient outcomes. The simulated patient care environment affords the healthcare professional to make mistakes, and then learn from them, in a controlled, confidential, and psychologically safe environment (Bambini et al., 2009; Bryant et al., 2020; Harper et al., 2018; Persky & Robinson, 2017). The desired interval for practice, as indicated by the participants to be monthly, or at a minimum on a quarterly basis. The results of this research further articulate the necessity for frequent and regular rehearsal of patient care events.

Recommendations for Future Research

This study had a modest number of participants (n = 30) and was conducted during a pandemic where healthcare resources had been dramatically shifted to meet the global threat. Therefore, additional studies are warranted that would also include feedback from a larger sample of healthcare professionals, and possibly consider widening the scope of candidates to a nationwide level.

Conclusion

This research study explored the rehearsal of clinically relevant simulation-based learning events by licensed healthcare professionals, whose principal operating environment is either clinical or academic. The study addressed the frequency of practice events and those barriers to the iterative application of healthcare simulation, as well as identifying potential processes that

can lead to reducing the egregious mortality and morbidity rates that are attributed to errors incurred from those who are charged "…to do no harm".

Multiple barriers were identified with the aspects of time, money, personnel, and space being re-affirmed as significant impediments to the rehearsal of patient care events. A component of the personnel barrier continues to be the distinct paucity of experienced and skilled facilitators in the learning modality of healthcare simulation. The results of this study represent a far-reaching call across the continuum for more resources to be allocated to the growth and development of simulationists.

This study was also conducted during a pandemic that directly impacted the healthcare community. The affect was realized in the form of a severe restriction or in some cases the elimination of educational programs, both academic and clinical. The difficulty in surmounting these barriers was that much of these elements are out of the locus of control for most healthcare professionals. This led to the thematic emergence of the necessity for regular communication and engagement of senior leadership in the healthcare realm, as these individuals often do possess the authority to provide the support necessary to overcome those barriers. Additionally, the lack of diversity has been identified as another barrier, including the concern for the appearance of simulated patient to resemble our patient population more closely, particularly regarding sex, gender, and skin tone. Healthcare professionals can do more to demonstrate our emotional intelligence and simulation is an ideal environment to address these issues.

Processes to aid in the reversal of the growing medical error crisis in this country were also identified and include the fostering trust and recognizing the benefit that simulation can offer. This can be realized through the frequent and iterative application of patient care events, preferably held monthly, yet at a minimum of quarterly. Healthcare simulation has been

recognized as useful learning modality, with the application and frequency of practice among the key factors to maintaining clinical acumen. The integration of simulation, as a proactive tool in our regular professional routine, is essential to reverse the egregious rates of medical errors that persist to plague the healthcare industry.

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Appendix A

Survey #_____

Healthcare Simulation Survey

1. Current profession (i.e., RN, MD, NP, PA, etc.): _____

2. Area of specialty: _____

3. Time in profession (years): _____

4. Time in current role (years): _____

5. Educational level: Bachelor's ____ Master's ____ Doctorate ____ Other ____

6. Age: 21-35 ____ 36-50 ____ 51-64 ____ 65 & over ____ Prefer not to answer ____

7. Gender: Male ____ Female ____ (write-in) _____ Prefer not to answer ____

8. Operational setting of your profession (ED, MedSurg, Clinic, etc.): _____

9. Over the past 24 months, how often have you participated in or otherwise engaged with a simulation-based learning event (SBLE)? _____

10. Recalling your experience(s), how did the SBLE enhance your clinical judgement?

11. Please describe any obstacles that may have prevented you from participating in a SBLE:

12. How often do you have the opportunity to participate in simulation-based learning? Please quantify (i.e., weekly, monthly, quarterly, etc.)

13. Reflecting on your experience with healthcare simulation, what do you believe are effective strategies and/or processes to improve life-support training?

14. Considering life-support training, please describe how efficacy is measured in your facility.

15. How often are simulation-based learning events conducted at your facility?

16. What do you consider as an acceptable frequency of offerings of simulation-based learning to maintain your clinical acumen?

17. Would you be willing to participate in a follow-up interview via 3rd party video service?
Yes: _____ No: _____
If Yes, please provide a preferred contact (phone or email): _____

Thank you for participating in this important study

Appendix B

Sample Recruitment Email

Subj: Request from a fellow simulationist

Good day XXXXX,

My name is Roger Lankheet, and I am a doctoral student at the Hahn School of Nursing at the University of San Diego. Currently, I am conducting a study to better understand the factors that impact the utilization of simulation by health professionals. As a fellow simulationist and SSH member, I located your contact information via the Society for Simulation in Healthcare website and am very much interested in learning from your lived experience.

I am looking for licensed healthcare professionals who have had at least one interaction with simulation, over the past 24 months. The participants of the study will be made up of various healthcare professionals, whether their involvement is as a participant, facilitator, or providing governance for simulation-based learning events.

If you decide to participate, you will be asked to fill out a brief on-line survey and have the opportunity to participate in an optional follow-up interview, to be conducted at a later date; the interview will be recorded via Zoom. Your total time involvement will be less than 60 minutes.

The results of this research have the potential to positively impact the healthcare industry across the continuum, and your voice is respectfully solicited; all responses will be kept anonymous.

If you would like to participate in this promising study, please contact me at **rlankheet@sandiego.edu** for more information.

Thank you for your consideration.

Sincerely,
Roger Lankheet
MA Ed, BSN, NPD-BC, CHSE

Appendix C

Sample Interview Guide

Date and time of interview: _____ Participant number: _____

Opening statement:

Thank you for partnering with me in trying to understand your experience with healthcare simulation. I will be asking you questions about the factors that impact the utilization of healthcare simulation by healthcare professionals. The interview will last about 30 minutes.

Query: Tell me what barriers to or promoters of healthcare simulation have you experienced?

Probe: How often is considered sufficient to maintain and enhance clinical acumen?

Probe: Can you tell me more about the barriers to participating in simulation?

Probe: What is the frequency of engagement of healthcare simulation at your facility?

Query: Can you tell me more about those processes that can lead to the reduction of errors in the healthcare industry?

Probe: What are effective ways to improve life support training?

Probe: Can you tell me how efficacy is measured in your facility?

Query: Is there anything else you would like to share about your experience in healthcare simulation?

Appendix D

Nov 4, 2020

Roger Lankheet
Hahn School of Nursing & Health Science

Re: Expedited - Initial - IRB-2021-43, Strategies for the Improvement of Healthcare Through Simulation.

Dear Roger Lankheet:

The Institutional Review Board has rendered the decision below for IRB-2021-43, Strategies for the Improvement of Healthcare Through Simulation.

Decision: Approved

Selected Category: 7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Sincerely,

Eileen K. Fry-Bowers, PhD, JD
Administrator, Institutional Review Board

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