REVIEW ARTICLE

INFLUENCE OF SIMULATION BASED EDUCATIONAL STRATEGY ON A LIFESAVING SKILL OF NEONATAL RESUSCITATION AMONG STUDENT NURSES (FUTURE OF NURSING)

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KEYWORDS

Simulation-based education, neonatal resuscitation, student nurses, skill acquisition, nursing education

ABSTRACT

Background:
The advent of simulation-based learning has been a game-changer in the healthcare industry, providing future nurses with a chance to hone their life-saving abilities in a safe and controlled setting. Traditional educational techniques alone do not adequately prepare students for neonatal resuscitation, a crucial operation that ensures the survival of compromised babies. This procedure of neonatal resuscitation requires competency, fast decision-making and collaboration among members of health team. In this study, we look at how several simulation-based tactics have assisted student nurses in improving their new born resuscitation abilities.

Aim:
This study aims to evaluate the effectiveness of using simulations to teach new born resuscitation to nursing students, with the ultimate goal of improving their competence and readiness for actual clinical situations.

Objective:
Specifically, we want to know how much student nurses' new born resuscitation abilities improved after participating in a simulation-based training program.

Method: Several studies have been conducted on teaching neonatal resuscitation to student nurses using simulation, the results of which are summarized in this review. The study's aims, the articles' methodological rigor and their relevance were the determining factors in their selection. Qualitative evaluations of student perspectives and comparison between simulation and conventional approaches are also part of the investigation.

Results: Simulation-based instruction can greatly enhance the skills necessary for new born resuscitation, both technical and non-technical, such as communication and collaboration. Students' self-assurance and preparedness to deal with real-life new born situations improved after receiving training via simulation. In comparison to more conventional approaches, frequent simulation sessions also improve long-term skill retention.

Conclusion: Improving student nurses' competence and self-assurance in performing new born resuscitation is a primary goal of simulation-based instructional initiatives. When nursing programs use simulation, students are better prepared for high-stakes situations and the gap between theory and practice is narrowed. Making simulation an essential part of nursing programs and studying its long-term effects on students' clinical competence are two suggestions for the future.

I. INTRODUCTION

Neonatal resuscitation and other potentially life-saving nursing abilities have greatly benefited from the rise of simulation-based teaching. Simulation-based educational method provides an opportunity to student nurses to practice crucial lifesaving skills in a real-life clinical setting.

A. OVERVIEW

Surprisingly, around 1 out of 500 infants need resuscitation at delivery [1]. Babies die every year from causes such as birth asphyxia, preterm birth problems and infections, which affect 2.7 million babies worldwide [2]. The vast majority of these fatalities happen in places where resources are scarce. To boost trust in healthcare providers, start resuscitation and improve neonatal outcomes in nations with limited resources, an on-going neonatal resuscitation training tailored to local requirements is crucial [3-5]. There is a significant need to determine the type of simulated setting, trainee characteristics, training duration and training frequency in reference to simulation-based training related to neonatal resuscitation in order to reduce the neonatal mortality rate. Approximately 5%-10% of newborns require some assistance in adapting to the extra uterine environment in order to establish regular respiration. It is already known that neonatal resuscitation training (NRT) of birth attendants using mannequins improves the knowledge and skills needed for resuscitation [6]. Some resuscitative steps, including tactile stimulation, airway clearance or positioning, is necessary for 5–10% of newborns delivered in facilities and for 3–6% of those newborns, basic neonatal resuscitation, which includes these early procedures and aided breathing, is necessary [7]. The incidence of birth asphyxia was greater in the at-risk deliveries group than in the no maternal and obstetric risk factor group (34.2% vs. 18.9%), according to research [8]. Developing nations account for an estimated 99 percent of the 3.8 million infant fatalities annually, according to the World Health Organization (WHO) [9].

Members of the new born resuscitation team may include respiratory therapists, paediatricians, anaesthetists, family doctors, midwives / nurses and neonatologists [10]. The proper execution of system integration is the foundation of simulation-based training (SBT) [11]. Sufficient resuscitation at birth not only can lower neonatal mortality rates, but also can improve neonatal survival [12].

Deep suctioning, overstimulation, failing to communicate heart rate, failing to re-evaluate bag and mask ventilation were the common resuscitation mistakes identified in observational research [13]. There has been no discernible decline in the neonatal death rate despite improvements in neonatal resuscitation training [14]. Researchers in Eastern Ethiopia found that nurses and midwives surveyed, knew very little about basic newborn resuscitation techniques [15]. Hypoxic damage and newborn mortality significantly increased by inefficient heart rate (HR) evaluation, according to a review by Johnson PA and Schmölzer GM [16].

The use of medicines and chest compressions decreased significantly ($p < 0.001$ for both), whereas the use of bag and mask ventilation increased, indicating a move toward more reasonable resuscitation procedures [17]. Continuous refresher training focusing on practical skills is necessary for birth attendants since knowledge retention does not always deteriorate at the same pace as practical skill retention [18].

Birth asphyxia accounts for about 25% of all new born fatalities worldwide. The inability to start and maintain breathing during delivery is called birth asphyxia. Many of these fatalities may be avoided with better resuscitation measures used at delivery [19]. Sudden stoppage of heart function or cardiac arrest, is a leading cause of death and severe illness in premature infants. Hospitals account for about 40% of cardiac arrests, with a reported survival rate of approximately 27%. One of the most critical aspects, shown by research studies is providing high-quality resuscitation to those neonates who require resuscitation, impact the neonatal survival rates [20], [21]. Training opportunities are necessary for paediatric health care practitioners / nurses and student nurses to get the information and skills necessary to handle children with critical illness and cardiac arrest effectively. At facilities of neonatal essential care, nurses often find newborns experiencing cardiopulmonary arrest before anybody else. They must be competent in cardiac resuscitation since it is a critical component in deciding the probability of neonatal survival [22]. Paediatric

cardiopulmonary resuscitation is a technique that helps babies who have stopped breathing (respiratory arrest) or whose hearts have stopped beating (cardiac arrest) [23]. One of the crucial components of bringing theoretical recommendations into practical practice is providing fast and effective resuscitation training to nursing personnel [24]. This training is essential to provide high-quality care in complicated conditions like cardiopulmonary arrest. It should be kept in the mind that high-quality therapies may increase the newborn survival rate by a factor of two or three [25]. The purpose of clinical simulation is to "allow for better understanding and management of the clinical situation when it really happens in clinical practice by simulating some or almost all of the essential aspects of the situation" [26].

Recent research has shown that simulation may enhance clinical decision-making, critical thinking, communication skills, self-confidence and clinical practice among nurses and student nurses. Nurses and interns may learn regarding newborn resuscitation and hone their psychomotor abilities through simulation training, which incorporates real-life clinical scenarios in a controlled setting [27].

ROLE OF SIMULATION IN CIRCLE OF LEARNING

Simulation is a step in the circle of learning that follows knowledge acquisition, skills proficiency and critical thinking / decision-making. Simulation is a technique for practice and learning that can be applied to many different disciplines and types of trainees. Simulation technique promotes experiential and reflective learning. Simulation replaces and amplifies real experiences with guided ones, usually “immersive” in nature, that replicate substantial aspects of the real world in a fully interactive manner.

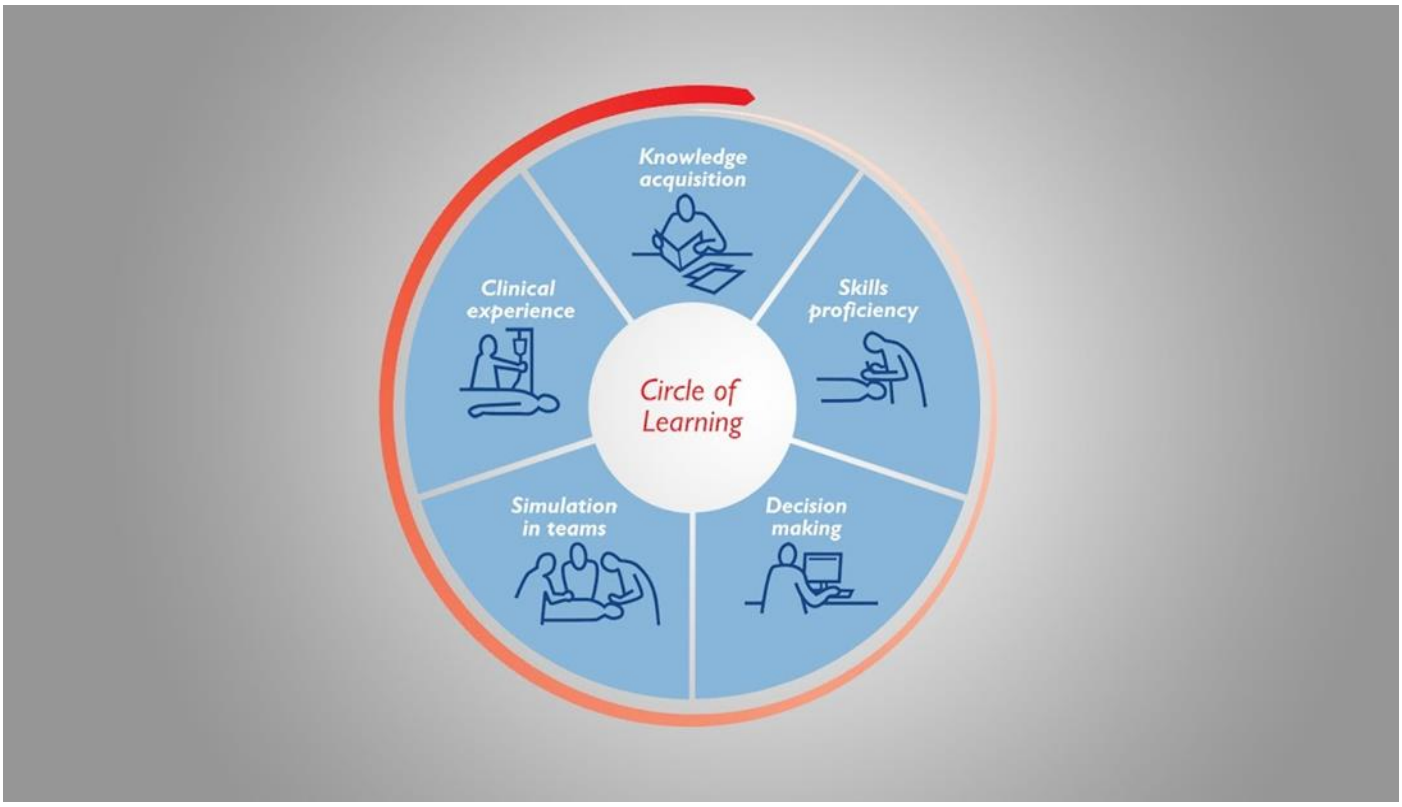

FIGURE 1 - CIRCLE OF LEARNING

FRAMEWORK OF SIMULATION

Structure of simulation consist of following three phases.

1. PRE-BRIEFING PHASE 2. SIMULATION SCENARIO 3. DEBRIEFING PHASE

1. PRE-BRIEFING PHASE

Facilitator introduces learners regarding the concept of simulation and orients them about simulation environment and equipment. Purpose of the simulation scenario is disclosed here.

2. SIMULATION SCENARIO

Facilitator provides signal to start simulation scenario. Learners perform simulation scenario independently (In team) according to their assigned roles. Facilitator keeps the flow of simulation scenario in line with objectives of simulation session. Facilitator provides signal to stop SBES

3. DEBRIEFING PHASE

It is an after-event discussion regarding the performance and thought process of the team during the scenario to promote reflective learning and improve clinical performance among participants in team. It is an intentional discussion that allows participants to gain a clear understanding of their actions and thoughts process. This promotes learning outcomes and enhances future clinical performance of learners.

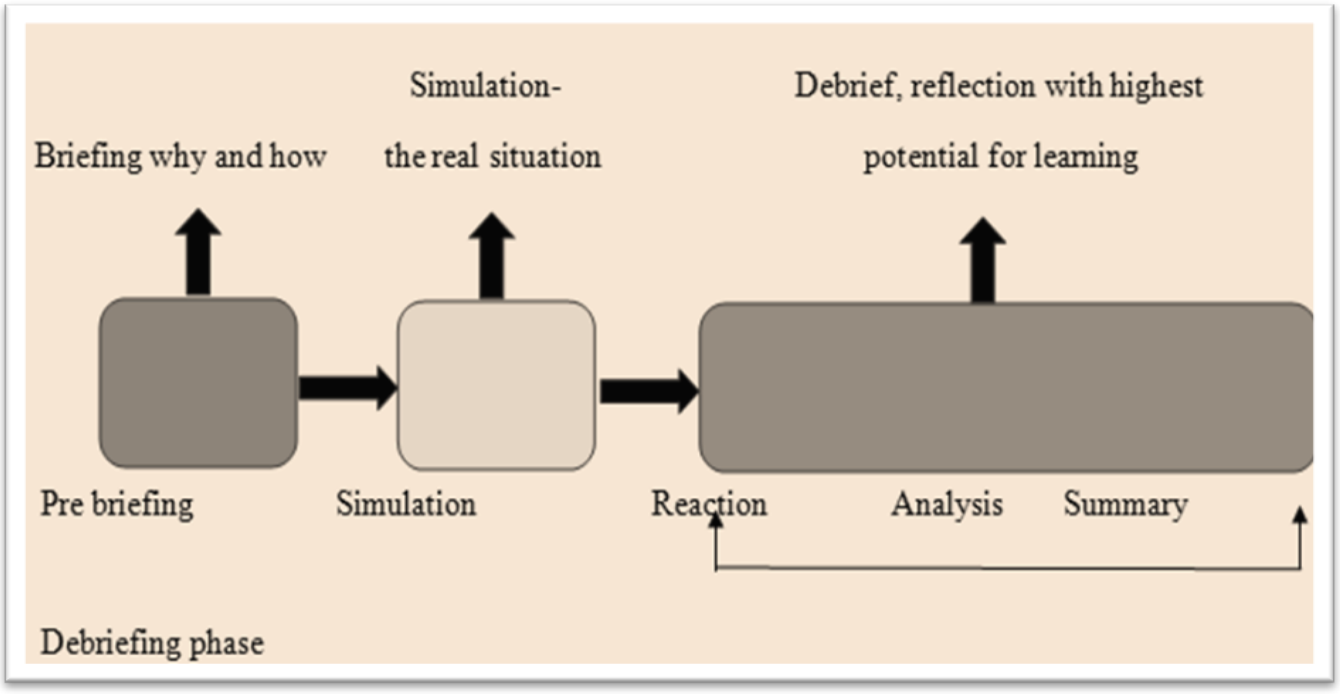

FIGURE 2 - STRUCTURE OF SIMULATION ILLUSTRATING PHASES OF SIMULATION

B. BACKGROUND

As a result of its ability to provide learners with immersive, realistic learning environments that closely resemble the real-world clinical circumstances, simulation-based training (SBT) has revolutionized medical and nursing education. By practicing in a controlled setting, students may hone their technical and non-technical abilities, making themselves more equipped to handle real-life clinical emergencies. The apprenticeship concept, in which aspiring doctors worked side by side with more seasoned doctors to gain clinical experience, was central to medical school curricula for a long time. Variability in clinical experiences and possible danger to patient safety are intrinsic weaknesses in this concept [28].

The need for regulated, repeatable training techniques became apparent as medical knowledge developed and healthcare became more complicated [29]. Simulation has been used in medical education since the creation of the Resusci Anne mannequin for cardiopulmonary resuscitation (CPR) training in the 1960s [30]. Till present time, hybrid simulations, high-fidelity mannequins, virtual reality (VR) settings,

standardized patients and other modalities all have been developed in the realm of simulation-based educational system. Learners may practice to become perfect in a wide range of clinical skills using these tools, from the most fundamental operations to the most advanced surgical procedures [31], [32]. Realistic mannequins called "high-fidelity simulators" can simulate a wide range of physiological reactions and diseases. By simulating real-world situations, these simulators allow students to practice critical clinical skills, including intubation, chest tube insertion and advanced cardiac life support [33].

When compared to more conventional forms of training, studies reveal that high-fidelity simulation significantly enhances both the learning and retention of skills [34]. Simulation helps students in feeling more secure and confident, which is essential for doing well in clinical settings where patient outcomes are at stake [35]. Virtual and augmented reality (VR/AR) tools are also becoming more popular in the field of clinical education. This software eliminates the limitations of physical simulators by creating interactive, immersive worlds where students may handle critical care situations, practice surgical skills and learn more complicated anatomical systems [36], [37]. In surgical education, virtual reality training has proven very useful because it offers a safe environment in which students may practice complex operations over and over again until they reach a high level of competence. Virtual reality (VR) training has the potential to lessen the learning curve for complicated operations and increase surgical performance, according to a research study [38].

Another important part of simulation-based training is standardized patients, who are people who are taught to regularly and properly mimic genuine patients [39]. Students may hone their abilities in obtaining a patient's history, doing a physical examination and communicating with these standardized patients in a safe, supportive environment [40]. Research has shown that using standardized patients enhances trainees' diagnostic accuracy, communication abilities and the overall clinical competence. In addition, it enables standardized, controlled assessment of learners, which in turn allows for the provision of useful feedback and the identification of development areas [41], [42].

In order to provide thorough and realistic training situations, hybrid simulations integrate many simulation modalities. To mimic a real-life clinical emergency, a hybrid simulation may use a combination of a standardized patient and a high-fidelity mannequin. Students are able to practice both technical and non-technical abilities, such as communication and collaboration, in a clinical setting using this method [43]. Researchers have shown that both performance and capacity of students, to handle complicated clinical scenarios can be improved by using hybrid simulations [44], [45].

The advantages of SBT go beyond the teaching new skills. Learners may practice tasks frequently and improve their abilities without putting patients in danger, which is one of the biggest benefits. In order to become proficient and make sure that abilities will be maintained throughout time, repetition is essential [46]. Learning from errors is an essential part of any educational process and simulation provides a risk-free space for students to do just that [47].

An important part of SBT is the systematic debriefing and immediate feedback. Students take part in debriefing meetings after each simulation to discuss what they did well and what they might have done better and get comments on their performance [48]. This is an essential step in fostering reflective practice, fixing mistakes and re-establishing learning [49]. According to the studies, debriefing increases clinical performance and learning outcomes among students [50].

Despite its many benefits, SBT encounters a number of obstacles. The need for specialized facilities and qualified staff as well as the high expenses of buying and maintaining simulation devices, is a major obstacle. Particularly in contexts where resources are few, this may place a heavy financial strain on educational institutions [51]. In addition, even while simulations have come a long way, they still can't capture all the nuances and unpredictability of actual clinical settings [52], [53]. This makes one wonder how well one can apply knowledge gained from simulations to real-life health care [54]. There is also an issue exists regarding how to train and update faculties of medical and nursing education regarding advanced technique of simulation-based education.

For SBT, to be effective in medical and nursing education, faculties need to know their way in the context of simulation on technical level, as well as how to facilitate debriefing and provide constructive feedback. This calls for faculties to have access to resources like continuing education [55], [56]. Notwithstanding these obstacles, there are strong evidences that SBT is effective. Research shows that when compared to more conventional training techniques, simulation improves clinical skills, increases patient safety and produces better clinical results. For instance, compared to students who got conventional training, those who participated in simulation-based training performed much better during assessment of both technical and non-technical abilities [57], [58]. Advanced technical innovations led to more sophisticated simulation-based education and this in turn expanded the possibilities for learning of both basic and advanced clinical skills among medical and nursing students. Opportunities for adaptable training programs and individualized learning experiences are opening up thanks to artificial intelligence (AI), which has a major impact on the future of simulation [59]. Use of AI in simulation allows more personalized and effective training by providing real-time feedback, tracking learners' progress and adjusting scenario complexity depending on the performance of learner [60]. Better virtual reality (VR) and augmented reality (AR) applications are under development, which will provide more real and immersive training settings.

By providing students unparalleled access to complicated clinical settings, typical clinical emergency situations and uncommon medical disorders, these simulation-based advanced technologies have the potential to facilitate learning among students [61]. A more well-rounded and extensive learning experience may be achieved by combining simulation with other training modalities, including problem-based learning and multidisciplinary training programs [62], [63]. One of the most important destinations in medical and nursing education is yet to achieve and that is to implement SBT as prime method in current trends of educational methodology, at global level.

Simulation is being dominantly used in high-income nations, while low- and middle-income nations are still slower to adopt it due to infrastructure and budgetary limitations related to SBT [64]. All efforts for improving skills among health care professionals at global level may only be fruitful if proper infrastructure, adequate budget, dedicated and qualified staff will be available for simulation-based training [65].

To ensure access to this top-notch training (SBT) among health care professionals, cross-cultural adaptations of simulation scenarios and the creation of affordable simulation solutions are necessary. Medical and nursing students' knowledge, skills and capacities may be enhanced through simulation-based medical and nursing education, which is learner-centred and experiential. Furthermore, SBT makes easier to practice clinical skills among medical and nursing students and this improves patient’s safety and lowers healthcare expenditures [66]. SBT enables medical and nursing students to take patient's history, conduct a thorough physical examination, diagnose and treat medical conditions, administer CPR, work in a team and communicate effectively [67]. Students may learn clinical skills in a risk-free setting using simulation-based education (SBE), which is especially useful in crisis resource management [68].

Inter professional communication, collaboration, situation awareness, task management, leadership and decision-making are all examples of NTS that can be enhanced by effective SBT [69]. The clinical abilities of medical and nursing students may be further improved by the enhancement of their NTS [70]. Prior research studies have shown that simulation-based training / education enables the students for making priority-based clinical judgments during their practice sessions. Student nurses have to make priority-based nursing diagnoses while caring the patient. Hence, simulation-based education is becoming more crucial for student nurses. Lifesaving is one of the most important priorities for nurses and also for the student nurses who are the future of nursing. In case of newborn suffering from birth asphyxia or compromised respiration, a vital emergency procedure, neonatal resuscitation is of prime importance. This procedure requires trained health care professionals to conduct it efficiently. SBT is the method of choice here to provide newborn resuscitation skill to student nurses. Newborn resuscitation program (NRP) based on simulation technique is an excellent strategy for improving lifesaving skill of neonatal resuscitation among student nurses.

Intermittent positive pressure ventilation (IPPV), intubation, chest compressions and medicine delivery are the primary technical components of NRP. Students can learn both technical skills (TS) and non-technical skills (NTS), including leadership and collaboration in simulation-based team training related to neonatal resuscitation. Learning of both TS and NTS through SBT related to neonatal resuscitation by student nurses assist them in carrying out professional responsibilities, such as exchanging information and assigning roles appropriately, which in turn reduces the time required to resuscitate babies [71].

Learners may improve their knowledge and performance through self-reflection by debriefing after the simulation [72]. However, further investigation regarding the efficacy of learner-led debriefing is needed, even though continuing studies on successful debriefing strategies and several approaches have been proposed so far [73]. Finding out whether students can objectively assess themselves is the first step in determining if learner-led debriefing is helpful.

Student nurses have traditionally worked in small groups in a controlled laboratory environment using simulation as a pedagogical tool. In order to bridge the gap between theory and practice, clinical simulations conducted in a laboratory provide students with possibilities for hands-on learning. As a means of practicing psychomotor skills, the majority of instructors feel that clinical simulations help students develop and hone their critical thinking abilities. Using simulation in the classroom is one of the best practices set forth by the International Nursing Association for Clinical Simulation and Learning. Still, strategy of clinical simulation requires more careful planning and resource allocation [74]. The nursing profession has long made use of simulation as a means of educating students nurses (future nurses) in a variety of areas, including psychomotor skills, critical thinking, competency evaluation, clinical performance improvement, clinical judgment and the handling of rare, high-risk clinical scenarios [75].

Use of simulation in nursing education has been suggested by the World Health Organization (WHO), which has also produced criteria for nursing education. Simulation provides the optimal learning setting for paediatric nurses and interns to learn neonatal resuscitation. Research has shown that simulation is a very effective teaching tool for improving the learning experience, self-confidence and skill performance of nursing students and interns [76]. Healthcare providers may learn the necessary skills and get the expertise required to care patient with safety using simulation [77]. Clinical Simulation is an essential tool in the classroom for preparing students for the real world of clinical setting and easing their transition from student to practitioner.

Research by Sanford [78] and the Qualitative Report [79] support the use of simulations to help students in developing their skills of critical thinking, self-reflection and readiness for the complicated clinical setting. Researchers concluded that there is a growing need for better healthcare at global level and the use of simulation would lead to this better healthcare. Student nurses may learn new clinical situations, critical thinking skills and new ways to reflect on their practice using the simulation-based education.

A "high fidelity" manikin allows the learner to get immediate feedback. There has been a recent uptick in the use of simulation-based training in newborn units. Across all of the network hospitals in the East Midlands, efforts are being made to increase neonatal high-fidelity simulation training. Student nurses may practice assessment skills and treatments, participate in critical thinking exercises and get instant feedback through simulated experiences using high-fidelity simulation [80].

The link between the simulation and the growth of self-confidence has been established by several research studies [81]. Among the beneficial effects of simulation on nursing students, another research found that they felt more confident and satisfied with their learning experiences through simulation-based educational approach. The American Association of Colleges of Nursing (AACN) found that reality-based simulation assisted participants to enhance their professional roles, improve their psychomotor abilities and boost their confidence in communicating with patients.

C. AIM
This study aims to evaluate the effectiveness of using simulations to teach newborn resuscitation to nursing students, with the ultimate goal of improving their competence and readiness for actual clinical situations.

D. OBJECTIVE
To evaluate the effectiveness of simulation-based training in improving neonatal resuscitation skills among student nurses.

E. RATIONALE
Resuscitation is necessary for around 6% of newborns and this number rises dramatically if the baby weighs less than 1500 grams at birth. Worldwide, 5-8 million neonates need moderate resuscitation, 5% require intensive resuscitation and 1% require moderate to extreme resuscitation. Improved techniques of resuscitation have the potential to lower newborn mortality rates significantly [82]. Before beginning their clinical rotation, interns must pass a new born resuscitation course. It is not uncommon for nurses to be among the initial responders to a cardiac arrest. Therefore, before interns start their clinical experiences, most clinical agencies require them to complete a new born resuscitation course. However, studies show that all medical professionals, even nursing interns, forget important details about new born resuscitation [83]. Due to facility of repeated practice and feedback, the National College of State actively endorses the use of simulation-based education [84].

II. METHODOLOGY
This systematic review assesses how well student nurses have learned new born resuscitation using simulation-based instructional methodologies. To teach new born resuscitation, a thorough literature search was undertaken, with emphasis on research studies that investigated the use of simulation in nursing education. Research quality, relevance to review aims and methodology were all considered while evaluating the included papers.

A. INTRODUCTION
Training tactics that produce competent and confident healthcare workers are of the utmost significance, particularly in high-stakes fields like newborn care. Babies in respiratory or cardiac distress at delivery may be stabilized using the life-saving expertise of neonatal resuscitation. In present time, students need more practical knowledge and instant feedback which are essential for true mastery. A game-changer in nursing education, simulation-based learning has just surfaced. Student nurses are able to do experiment, make errors and learn in a secure setting that mimics real-life events, all without putting patients in danger. The purpose of this study is to shed light on the ways through which simulation-based training may improve clinical outcomes by examining the effects of SBT on student nurses' competence, self-confidence and readiness to perform new born resuscitation.

B. STUDY DESIGN
This review uses a systematic narrative methodology to compile results from studies that used quantitative, qualitative and mixed-method approaches to assess the efficacy of simulation-based newborn resuscitation training. Student nurses' confidence, skill development and retention are just a few of the many educational outcomes that this design aims to study.

C. SEARCH STRATEGY
Searches were made in several databases to find English-language relevant studies published in the last ten years. These databases included PubMed, CINAHL, Scopus and Google Scholar. Among the search queries, multiple word combinations were:

- ✓ "simulation-based education"
- ✓ "neonatal resuscitation"
- ✓ "student nurses"
- ✓ "nursing education" and
- ✓ "lifesaving skills."

The inclusion criteria were:

1. Studies involving nursing students as participants.
2. Research focusing on neonatal resuscitation training using simulation-based methods.
3. Peer-reviewed articles with a robust methodological approach.

The exclusion criteria were:

1. Studies involving non-nursing populations or professionals.
2. Research focusing on non-simulation teaching methods alone.
3. Articles with inadequate methodological descriptions.

III. FINDINGS

A. WHY SIMULATION?

The most important thing is that medical and nursing education based on simulation technique is logical. Simulation and debriefing are practice and coaching, according to Louis Halamek [85]. Maintaining a focus on patient safety is essential for providing top-notch healthcare. To provide an excellent possible result, appropriately qualified staff should be present throughout the delivery.

Preparing junior trainees / student nurses to attend newborn resuscitation in real clinical setting without first exposing them to different circumstances in a virtual setting seems unreasonable. Neonatal resuscitation puts doctors under a lot of stress due to the high-stakes, high-pressure nature of the circumstance. Before sending junior trainees / student nurses into the delivery room, it is crucial to properly guide them. Senior physicians and senior nurses must give priority to acquire competency in new clinical procedures and maintain their competence in providing high-quality newborn resuscitation. There has been a dramatic increase in the number of neonatal residents and paediatric nurses in the last few years. New practices in neonatal care, such as non-invasive ventilation for premature babies and the elimination of endotracheal suctioning for non-vigorous newborns with meconium-stained liquor at birth, have reduced the need for some procedures. To guarantee that suppliers maintain their competence, other approaches must be put into place. Structured simulation sessions provide this possibility. Improving one's skill set through simulation is a great idea. The ancient (1890) Halsted mantra of "See one, Do one, Teach one" is neither practical nor acceptable anymore in present time. Simulation starts from classroom theory session and impacts on student nurses in real-world where learned knowledge and learned skills are applied by them.

Simulation provides a safe space to student nurses for learning. Simulation also removes the worry of making errors or harming patients and this in turn leads to better skill development and self-confidence. Also, before implementing novel management strategies, gadgets or procedures in a clinical context, physicians with varying degrees of expertise may get a feel for them through simulation. The term "inflation" in the medical field refers to the rapid expansion of approved innovations in treatment methods and tools for patients. Randomized controlled trials (RCTs) of novel technologies in the operating room may be challenging. Therefore, new approaches for evidence-gathering and intervention studies are necessary. Simulation offers the perfect setting for study because it has potential to reproduce events in a systematic and organized way with no adverse effect on patients' well-being. Similarly, simulation is crucial for keeping professionals competent. Neonatal care should integrate simulation since it enables refresher training and maintenance of basic abilities of health care professionals including student nurses. New born resuscitation training emphasizes the need for collaboration among the members of health care team. A multidisciplinary team is usually needed for resuscitation. Simulation in teams makes it sure that everyone knows what they're responsible for and what they need to do.

While most people draw parallels to the airline sector, there's a lot to be gleaned from professional sports teams as well. They usually work out almost daily. They practice both attacking and defending techniques. To become perfect, they repeat these techniques again and again. They document their performance in

training and sports on camera and examine it collectively and individually. Improving performance requires debriefing and feedback. These groups "train to win." "Game day" for them is once every seven days.

They track and analyse their performance using a plethora of analytics on game day, always looking for ways to do better. Applying this comparison to the process of resuscitating a baby reveals that, while there has been considerable progress in the last two decades, there is still much opportunity for improvement [85].

B. TECHNICAL SKILLS

The resuscitation algorithm relies on each individual step. Further actions may not be necessary if the current one is finished quickly and efficiently. Because of this, honing each skill to become perfect is essential, but it can be challenging to anticipate when advanced resuscitative measures will be needed. Achievement of new born stabilization is the essential instruction of technical skills and the key criteria for evaluation of proficiency among student nurses. Student nurses must hone their abilities regarding each step of newborn resuscitation including medicine delivery, chest compressions, intubation and intermittent positive pressure ventilation (IPPV). By methodically accomplishing each step or task of newborn resuscitation and providing timely feedback, learners are driven to develop via deliberate practice, which leads to the advancement of their concerned skills and knowledge [86]. Simulation-based education related to newborn resuscitation makes this possible by making precise observation and providing immediate feedback regarding these abilities by student nurses.

C. NON-TECHNICAL SKILLS

Experts at the very top of the health care field's traditional hierarchical structure prefer to operate independently. Crews who excel in "behavioural markers," such as communication, leadership, management and situational awareness, perform better in high-pressure scenarios, as we learned from the aviation sector [87]. We all make mistakes. Evidence suggests that medical mistakes may be decreased via efficient cooperation, which was initially brought to light in Building a Safer Health System [88], [89]. The concept of "Making a Team of Experts into an Expert Team" was therefore born [90]. These more theoretical abilities, as well as self-confidence and general knowledge, may be honed by simulation. Leadership, cooperation and good communication are crucial components of a high-performing team. Multiple studies have shown the positive effects of inclusion of component of team training in resuscitation courses. Members of the team showed considerable improvement in areas including communication, mutual support and situational monitoring after participating in the Team STEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) program. Team training, when included in the NRP, improved participants' ability to manage their workload, finish the resuscitation in less time and demonstrate more vital teamwork, including information sharing. Using high- or low-fidelity mannequins is an interesting low-cost, high-yield intervention but it does not affect the development of behavioural or collaboration abilities [91]. The use of standardized methods of communication, exact language seems reasonable. Yamada et al. evaluated the results of using standardized methods of communication.

In a study, using neonates and computer simulations, researchers discovered a tendency towards a reduction in the mistake rate regarding the time it took to start positive pressure ventilation (PPV) and the time it took to start chest compressions [92]. Importantly, roles should be assigned before resuscitation begins. Sawyer et al. assessed task-oriented role assignment (TORA), which is the practice of designating each member of the resuscitation team with a particular function, a set of responsibilities and a designated spot to stand. Results from simulated new born resuscitation showed that trainees who had received TORA training performed better behaviourally. Projects like TORA training may be crucial if the neonatal and obstetrical teams work together more closely. For instance, it could be crucial to provide assisted ventilation assistance to the depressed term newborn and postpone cord clamping. In this case, participation from a diverse team is necessary for this. Basically, this is pre-task briefing, role assignment and backup preparation. This strategy may be tested via simulation training.

It is also crucial to recognize the significance of positive debriefing. Both a video and an oral debriefing have their own uses. A practical component of the NRP, video debriefing has the potential to boost collaboration. In theory, the best way to learn and remember new abilities is to combine oral and video-assisted feedback. In theory, it is possible to give due weight to both good and bad performance metrics. After seeing how they do on camera, trainees may be able to enhance their performance [93]. Combining visual and verbal communication can help trainees to realize where they may make improvements and reinforce their success. Finer et al. discovered regarding the videotaping of resuscitations in clinical settings [94]. Leone has reviewed the literature regarding the use of video in healthcare and teaching [95].

D. HIGH FIDELITY VS. LOW FIDELITY SIMULATION

Simulating real-world events means imitative representation of occurrences of the real world. Although it might be challenging to recreate the same stress, intricacy and intensity of a genuine new born resuscitation, advancements in technology have made it possible to create simulation models and experiences that are more precise. There are a variety of simulation devices available, with prices ranging from $200 for a simple resuscitation doll that can be used for practicing IPPV and CPR to over $80,000 for a high-fidelity model that can be used to perform procedures like intubation and has an audible and palpable pulse. When discussing fidelity, it can be related to three areas: the environment (how realistic the simulation environment is), the technology (how well the tools and software mimic real-world clinical practice) and lastly, the psychological fidelity (how well the simulation mimics real-life emotional and behavioural aspects). The results of the many investigations that have contrasted high and poor fidelity have needed to be more consistent [96]. Out of the five studies that compared the two methods, three indicated no significant difference in performance metrics [97], while one suggested that high-fidelity simulation led to better collaboration ratings.

The use of the high-fidelity simulator was favoured in all investigations, which was a consistent conclusion. High-fidelity mannequins and resuscitation equipment are expensive, limiting their availability and accessibility. With the advent of eye-tracking software, technology has advanced to the point where it may be helpful in simulation training [98] and in the delivery room [99]. Wearing spectacles during simulated new born airway care improved comprehension of clinicians' gaze and viewpoint, according to related research by Wagner. Researchers in one research tracked how long neonatal team leaders stared at a preterm new born and the monitor while doing CPR in the delivery room [99]. Additional evaluation is required for the integration of eye-tracking software.

E. CHEST COMPRESSIONS

In order to restore spontaneous circulation, it is essential to do high-quality chest compressions. Although doing chest compressions is a fundamental competency in neonatal resuscitation, it is only necessary in as little as 0.3 percent of births. Hand placement, compression rate, depth, timing with IPPV breaths and allowing for complete chest recoil are all aspects of chest compression that must be tuned for optimal effectiveness. Chest compression rates and methods have been the subject of several simulation studies, the results of which have guided contemporary practice. Wyckoff showed in mannequin research that the two-thumb method outperformed the two-finger method, producing more consistent depth with each compression while reducing variability. When the heart rate stays below 60 beats per minute despite sufficient breathing, the National Resuscitation Protocol (NRP) and the International Liaison Committee on Resuscitation (ILCOR) advise to start chest compressions at a ratio of three compressions per breath.

Additionally, simulation has been helpful in evaluating more recent methods of administering compressions; for example, a novel two-thumb technique (two thumbs perpendicular to the chest with fist-clenched fingers) was compared to the conventional two-thumb method (thumbs on the sternum with fingers encircling the chest and back for support) and the two-finger method. Result of this comparative study was very difficult to evaluate in a natural clinical setting owing to intervention infrequency and the urgency of the situation but simulation-based research effort showed novel two-thumb technique as better approach for chest compression in terms of required depth of compressions and degree of chest recoil. Simulation-based education provides an opportunity to learners for practice skills under close supervision.

By receiving immediate feedback via simulation technique, chest compression providers may significantly refine their performance in terms of hand location, compression rate and percentage of complete release.

F. ENDOTRACHEAL INTUBATION

The most common alternative airway technique utilized during newborn resuscitation is endotracheal intubation. There has been a dramatic decline in the number of newborns eligible for intubation due to recent revisions in protocols for the treatment of premature babies and those born with meconium. Regardless, neonatal trainees still need to be able to intubate. The amount of time it takes for a trainee to try intubation in the delivery room exceeds existing norms, and they often fail. In addition, many newborns deteriorate during intubation efforts, which may cause severe impact on the baby overall [100]. Through the use of simulation, students become able to hone their intubation skills in a controlled setting, free from the distractions and perform newborn resuscitation in a simulated setting within time constraints. In a study conducted by Miller et al., trainees who were learning intubation were randomly assigned to either a video station or a station with photographs and mannequins. Those who had access to video were able to intubate patients more quickly and with fewer tries and this advantage remained even after three months of follow-up [101], [102].

It is remarkable that new born mannequin airway measurements may be somewhat different and that most intubation models are also not very accurate [103]. This may be one reason why trainees in one trial shows much better intubation abilities right after the intervention, but they do not carry those gains over into better clinical performance [104]. In a simulated setting, other approaches have also been tested. Using a mannequin model, it was discovered that adding a training app (NeoTube) improves procedural knowledge and performance while decreasing the time of successful intubation [105]. Intubation abilities may be enhanced by the use of video laryngoscopy in a simulated setting. Video laryngoscopy increased trainees' success rate with intubation and decreased the number of attempts needed to successfully intubate a mannequin, as compared to direct laryngoscopy [106].

Some have studied different types of airway devices. One such substitute is the laryngeal mask airway (LMA), which has recently been praised for its prospective application in newborn care. Their use in new born care has the potential to grow in the next decade. All the healthcare professionals (Doctors, Nurses and Student nurses), have to show that they can perform well in reference to LMA intubation and simulation is a key way to accomplish just that. Excessive pressure applied to the epiglottis and dental arches during an improperly conducted laryngoscopy may potentially cause local damage. One research based on simulation technique evaluated the intubation pressure imposed by the laryngoscope and offered real-time auditory feedback. There was a significant decrease in trauma on the second try as a consequence of the reduced pressure.

G. RETENTION OF SKILLS

So far, we have covered that how simulation assists in skill acquisition and development. Nevertheless, there is still an issue with remembering these abilities. As early as two months after NRP, a considerable decline in abilities begins, according to studies [107]. This is significant since doctors, nurses and student nurses often fail to see their own declining competence [108]. In addition, senior doctors are often expected to oversee and instruct less experienced personnel regarding newborn resuscitation techniques at the bedside, which may lead to subpar performance overall [94]. Although booster sessions are beneficial for retention [109], they need to be done often. A variety of retention enhancement strategies have been investigated.

Here, it may be more practical strategy to have shorter, frequent and more focused SBT sessions regarding newborn resuscitation while still getting the benefits [110]. Neonatal task training should occur more often than every 2 years, according to the latest ILCOR recommendations.

As simulation-based education enhance the retention of active learning among peers, board games can do the same. Using a board game as an evaluation tool, Cutumisu et al. [111] discovered a 12% improvement in information retention. Neonatal resuscitation-themed computer games have also been created. They

inspire learners for learning and also promotes retention of learning in an interesting manner. Student nurses are expected to complete an online simulation session prior to the practical, hands-on simulation session regarding newborn resuscitation. This is a vital approach for better retention of learning among student nurses. Additionally, Bulitko et al. created the RETAIN video game (based on simulation technique), which increased retention of learning after resuscitation classes among student nurses [112].

IV. LITERATURE REVIEW

In order to improve the competency among student nurses, strategic approach of Bachelor of Science in Nursing (B.Sc. Nursing) program is shifting away from a content-based curricular approach towards a competency-based approach, with more emphasis on experiential learning for prelicensure nursing students [113]. Recent efforts to ensure patient safety and safeguard their rights have resulted in fewer possibilities for nursing students to get practical experience in the clinical field, forcing them to rely more on observational learning [114]. Because of the specific technology and the sensitivity of the neonates in the neonatal intensive care unit (NICU), trainees are not allowed to touch patients during their clinical rotations [115]. Same situation aggravated during COVID-19 era [116].

Reducing rates of neonatal mortality and morbidity requires efficient responses to neonatal crises. The stress that doctors, nurses and student nurses feel during newborn crises may impair their decision-making skills, which in turn may adversely impact the neonatal survival rate [117]. Due to the impossibility of providing direct training on high-risk babies, many studies have shown that SBE helps in improving prelicensure nursing students' emergency-response skills. The resource-intensive nature and spatial-temporal limits of in-person simulations, however, make them constrained [118].

One low-cost and widely available simulation option that can boost knowledge, skills and clinical performance abilities among health care professionals especially among student nurses is gamification program [119]. In addition, gamification system facilitates learning and application of knowledge in practice through the educational concepts such as iterative learning, constant feedback, motivating effects and user-oriented education [120]. The use of gamification techniques in virtual reality (VR) to teach newborn CPR among student nurses removes the limitations of time and space related to learning process [118].

Nevertheless, virtual reality programs have their limitations, one of them is lack of immersion in learning. Immersion may be improved among student nurses during learning with the ability to pique learners' interest and motivate them for study [121]. Drawbacks of gamification programs related to clinical education have been also observed. Indeed, some students feel threatened by a game's intrinsic competitiveness and a negative response may result from unclear game rules [122]. According to Westera, learners may only be able to learn in pieces if there is no precise framing to guide their thinking [123].

Consequently, a theoretical framework that enhances motivation for learning and tackles the shortcomings of gamification learning should be used as an intervention technique when creating a virtual reality gamification program. Developing instructional virtual reality systems to improve learning effects needs consideration of theoretical application, according to Radianti et al. [124]. Several educational programs make use of Keller's ARCS (Attention, Relevance, Confidence and Satisfaction) model [125], which was created to initiate and sustain learning motivation [126]. Four parts to this model were suggested for use in virtual reality instructional design: Attention (A), which catches and keeps learners' attention; Relevance (R), which allows learners to recognize that the content they learned is consistent and helpful for reaching their goals, Confidence (C), which ensures that learning can be accomplished and Satisfaction (S), which gives pleasure to learners when their expectations is matched [125]. Learners' desire to study and the educational outcomes were enhanced in prior research studies that used the ARCS paradigm for web-based instructional design [127]. Educational games based on the ARCS paradigm may boost skill development, enthusiasm for learning and desire to study, as pointed out by Qian [128].

According to Bae et al. [129], a systematic debriefing strategy is crucial for student nurses to improve their clinical reasoning skills because it allows them to reflect on and self-evaluate in response to simulated

events. The importance of purpose-oriented debriefing and other organized reflection procedures was highlighted by Watts et al. [130]. More exposure to different types of clinical situations also improves clinical reasoning abilities. It is possible that nurse students may have urge to enhance their critical thinking, reasoning and decision making in varied clinical situations as this study mainly covers basic newborn resuscitation scenarios. In establishing virtual reality programs, it is essential to consider more than just incorporating new techniques into the curriculum such as consideration should be made regarding essential presence of immersion of student nurses in their assigned roles during learning. Learners should be able to participate in simulations of different scenarios and get debriefing in accordance with the International Nursing Association of Clinical Simulation and Learning (INACSL) Standards of Best Practices [131].

V. CONCLUSION

There is a high-risk but low-incidence scenario with neonatal resuscitation. More than 90% of the time, even at the most seasoned tertiary care facilities, the resuscitation protocols are not followed to the letter [132]. Since abilities start to decline towards an inadequate level right after training courses, we can't assume that resuscitation certification and competence are synonymous. It might be challenging to have all staff members well-trained in resuscitation procedures in busy neonatal hospitals. Evidence suggests that simulation-based clinical education is an improvement over more conventional methods of clinical instruction and this shift has revolutionized the way through which we educate our student nurses (The Future of Nursing) [133]. Nowadays, simulation is an integral part of neonatal resuscitation program. Simulation-based education provides focused practice and immediate feedback to learners without putting patients in danger. Last but not least, we, all the health professionals, current medical and nursing educational system all are indebted to simulation-based educational technique which is the core factor / boon for providing the best possible clinical education to medical and nursing students. By integrating advanced simulation technologies, diverse simulation modalities and a patient-centred approach, simulation-based education (SBE) prepares student nurses (future nurses) to become competent and compassionate to meet the complex needs of the community. Before proceeding forward, we should take a pause here to figure out how to become better at these rare but significant events (neonatal crises requiring instant intervention such as newborn resuscitation), both as individual and as a team. Concept of “We will train to win” is significant here and must be opted by our generation especially the younger ones such as student nurses who are the future of nursing.

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