DEVELOPMENT, VALIDATION AND EVALUATION OF THE MODIFIED BASIC LIFE SUPPORT TRAINING (MBLST) ON THE KNOWLEDGE, PRACTICE AND CONFIDENCE LEVELS AMONG NURSES IN JORDANIAN GOVERNMENT HOSPITALS

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by

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LIST OF SYMBOLS

α:	Alpha
σ:	Pooled SD
±	Plus, and Minus Symbol, used for changing value
n	Number
Ave	Average

LIST OF ABBREVIATIONS

ABC	Airway, Breathing, Circulation
ACLS	Advanced Cardiac Life Support
AED	Automated External Defibrillator
AHA	American Heart Association
ATLS	American Traumatic Life Support
BLS	Basic Life Support
CAB	Circulation, Airway, And Breathing
CPA	Cardiopulmonary Arrest
CPD	Continuous Professional Development
CPR	Cardiopulmonary Resuscitations
CVI	Content Validity Index
DV	Dependent Variable
ER	Emergency Department
HCI	Health Care Institutions
HCP	Health Care Providers
ICU	Intensive Care Unite
ID	Independent Variable
IHCA	In Hospital Cardiac Arrest
M	Mean
MBLST	Modified Basic Life Support Training
MCQ	Multiple-Choice Questions
MD	Mean Differences
OHCA	Out-Hospital Cardiac Arrest
ROSC	Return Of Spontaneous Circulation
SD	Standard Deviation
SPSS	Statistical Package of Social Science
ST	Simulation Training
WHO	World Health Organization

LIST OF APPENDICES

PEMBANGUNAN, PENGESAHAN DAN PENILAIAN LATIHAN BANTUAN ASAS HAYAT YANG DIUBAH SUAI (MBLST) TERHADAP TAHAP PENGETAHUAN, AMALAN DAN KEYAKINAN DALAM KALANGAN JURURAWAT DI HOSPITAL KERAJAAN JORDAN

ABSTRAK

Pendidik cemerlang menggunakan simulasi dan kemudahan moden untuk meningkatkan pengetahuan, amalan, dan keyakinan dalam sokongan hayat asas (BLS) dalam kalangan jururawat baru. Untuk menyokong ini, satu kajian telah dijalankan untuk membangunkan, mengesahkan, dan menilai keberkesanan Latihan Sokongan Hayat Asas yang diubah suai (MBLST) untuk jururawat baru di hospital kerajaan Jordan. Kajian ini mempunyai dua fasa. Fasa pertama melibatkan pembangunan dan pengesahan modul MBLST, berdasarkan kemas kini bahan latihan Persatuan Jantung Amerika tahun 2020, tinjauan literatur, dan integrasi Piramid Miller dan Kitaran Kolb sebagai model teori. Pakar di pusat latihan AHA-BLS Jordan dan pengguna berpotensi menilai kesahan kandungan dan muka kajian ini. Fasa kedua menggunakan ujian kawalan rawak (RCT) dengan dua kumpulan: kumpulan intervensi (n = 51) dan kumpulan kawalan (n = 51). Jurulatih melaksanakan modul MBLST untuk kumpulan intervensi dan menggunakan risalah standard untuk kumpulan kawalan. Selepas kajian, kumpulan kawalan dimasukkan ke dalam senarai menunggu untuk modul MBLST. Penilaian berulang termasuk ujian pra, ujian pos segera selepas intervensi, dan ujian pos lewat tiga bulan kemudian. ANOVA ukuran berulang sehala menunjukkan bahawa modul MBLST meningkatkan pengetahuan BLS dengan ketara ($F(2,182) = 58.514$; $p < 0.001$), amalan ($F(2,182) = 20.134$; $p < 0.001$), dan keyakinan ($F(2,182) = 37.969$; $p < 0.001$) apabila membandingkan keputusan ujian pra dan ujian

pos. Selain itu, penyelidik mendapati bahawa modul MBLST mempunyai kesan besar (Cohen's d >1) apabila membandingkan keputusan ujian pra dan ujian pos antara kumpulan kawalan dan intervensi. Kesimpulannya, modul MBLST adalah kaedah yang berkesan untuk meningkatkan pengetahuan, amalan, dan keyakinan BLS dalam kalangan jururawat baru. Kajian ini adalah yang pertama di Jordan untuk menilai pemboleh ubah ini dan berfungsi sebagai alat berasaskan bukti untuk penyelidikan masa depan mengenai simulasi dalam latihan kejururawatan.

DEVELOPMENT, VALIDATION AND EVALUATION OF THE MODIFIED BASIC LIFE SUPPORT TRAINING (MBLST) ON THE KNOWLEDGE, PRACTICE AND CONFIDENCE LEVELS AMONG NURSES IN JORDANIAN GOVERNMENT HOSPITALS

ABSTRACT

Exemplary educators use simulation and modern facilities to enhance the BLS knowledge, practice, and confidence of newly employed nurses. To support this, a study was conducted to develop, validate, and evaluate the modified Basic Life Support Training (MBLST) for newly employed nurses in Jordanian governmental hospitals. The study has two phases. Phase one involved the development and validation of the MBLST module, based on the American Heart Association's 2020 training materials update, a literature review, and the integration of Miller's Pyramid and Kolb's Cycle as theoretical models. Experts at the Jordanian AHA-BLS training center and potential users evaluated the study's content and face validity. Phase two used a randomized control trial (RCT) with two groups: the intervention group (n = 51) and the control group (n = 51). The trainer implemented the MBLST module for the intervention group and used standard brochures for the control group. After the study, the control group was placed on a waiting list for the MBLST module. Repeated assessments included a pre-test, an immediate post-test after the intervention, and a late post-test three months later. One-way repeated measures ANOVA showed that the MBLST module significantly improved BLS knowledge ($F(2,182) = 58.514$; $p < 0.001$), practice ($F(2,182) = 20.134$; $p < 0.001$), and confidence ($F(2,182) = 37.969$; $p < 0.001$) when comparing pre-test and post-test results. Additionally, the researcher found that the MBLST module had a large effect (Cohen's $d > 1$) when comparing pre-

test and post-test results between the control and intervention groups. In summary, the MBLST module was an effective method for improving BLS knowledge, practice, and confidence among newly employed nurses. This study is the first in Jordan to assess these variables and serves as an evidence-based tool for future research on simulation in nursing training.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Lifesaving using a chain of survival is vital (Kose et al., 2020). Basic life support (BLS) is considered the basic lifesaving process if there is a cardiopulmonary arrest (CPA). BLS is defined by the American Heart Association (AHA) as the chain of survival protocols (Sé et al., 2019). BLS and ACLS are fundamental to the future health profession (Puertas et al., 2021). Grasping essential BLS knowledge and practice is imperative for healthcare providers (Isa et al., 2022).

Simulation training (ST) has become a vital teaching methodology in nursing education (Kose et al., 2020). ST in healthcare institutions (HCI) is expected to be highly used in the future (Sørensen et al., 2017). Simulation courses improve nursing staff knowledge and confidence (S. Lee et al., 2021). Human simulation is a strategy that should receive more attention in nursing education (Williams et al., 2016). Many educational methods can be used in nursing education programs, but simulation training using mannequins positively affects nurses' knowledge level and confidence (Higgins et al., 2020; Kuehnel et al., 2020).

By profession, nurses face emergencies such as CPA daily, so nurses should always be ready to face these situations (Rente et al., 2021). Nurses are the first HCPs who should be trained in BLS (Sherwood & Francis, 2018). The nurse is the first witness to CPA (Jang et al., 2021), and the nurse is the first respondent to CPR actions in CPA (Asadi et al., 2021; Dick-Smith et al., 2021). As a result, many Jordanian

universities, hospitals, and the Ministry of Health integrated ST into the educational process in health specialties as a part of health sector accreditations.

1.2 Problem Statement

The AHA updated 250 new recommendations for BLS and ACLS (Panchal et al., 2020). Many healthcare professionals (HCPs) felt dissatisfaction with the change in the Basic Life Support (BLS) protocol in 2015. The order of cardiopulmonary resuscitation (CPR) was altered from the traditional ABC (Airway, Breathing, Circulation) sequence to CAB (Circulation, Airway, Breathing). This change aimed to prioritize chest compressions to improve blood circulation. However, this adjustment caused some confusion and resistance among HCPs, similar to the dissatisfaction experienced when a similar change was made in 2005 (Sé et al., 2019). Moreover, the new modification of AHA BLS in 2020 is due to the COVID-19 pandemic effect (Kei & Mebust, 2021; Laco & Stuart, 2021).

About 290,000 in-patient cases develop cardiopulmonary arrest yearly among adults with a 25% low level of survival (Paddock, 2021). AHA stated that 200,000 patients were admitted to hospitals annually, and their cases developed into CPA. Ineffective CPR leads to failed resuscitation and increases mortality. The AHA stated that there are 4–14 victims whose cases developed to CPA per 1000 patients admitted to the hospitals (Hinski, 2017). Bánfai et al. (2022) noted that, in Sweden, 10% of cardiac arrest victims developed during the COVID-19 pandemic. The COVID-19 pandemic increased the CPA incident by 39% annually (Teoh et al., 2021). The victims of cardiac disease and those diagnosed with COVID-19 have a 36% higher ability to undergo cardiac arrest and an increased mortality rate than those without cardiac disease (Manolis et al., 2020).

CPA increased in developed countries, with an annual rate of 36 to 81 per 100,000 patients (Berden et al., 2019). A study in Jordan mentioned a noticeable increase in cardiac disease cases in the Middle East and North Africa (Oteir et al., 2019). In many countries, renewing the BLS certification is optional, which produces a gap between knowledge updating and practice, directly affecting patient safety (Abelsson et al., 2020; Sachdeva, 2020).

A study conducted in the USA stated that 36% of cardiopulmonary resuscitation (CPR) did not meet the BLS standard. The findings include many participants forgetting to ask for help from the advanced cardiac support team. Some HCPs checked rhythm for more than 10 seconds. Also, chest compression could have performed better in terms of frequency, depth, and mechanism. Moreover, the participant forgot to open the airway during ventilation (Laco & Stuart, 2021). Another study conducted in Brazil by Sé et al. (2019) stated that unsatisfactory BLS could directly affect CPA victims' quality of care. Irfan et al. (2019) mentioned an observable weakness in BLS knowledge of HCP in Pakistan.

The integration of simulation training and preparation of the simulation lab has recently started in Jordan. While the current state of healthcare education and training presents significant challenges, the potential benefits of simulation technology are promising. The Higher Health Accreditation Commission in Jordan articulated 20% of simulation training methods in the year 2013, but it was rarely used in healthcare institutions for contentious education among healthcare providers. Training in hospitals and clinical areas, especially in critical care procedures, is not suitable. Additionally, the educational experiences and learning methods of newly employed healthcare providers vary, leading to inconsistent outcomes of training. These

challenges underscore the urgent need for policymakers in Jordan to prioritize the integration of simulation in training (Akhu-Zaheya et al., 2013).

In 2014, Jordanian policymakers took a proactive step by deciding to increase the use of simulation in medical and nursing schools and focus on establishing simulation training centers to overcome crowded hospital areas and enhance the quality of education. Their role in addressing this issue by implementing simulation-based training in health schools is crucial. However, this teaching method was still not widely used in healthcare institutions during that period (Tawalbeh & Tubaishat, 2014). Toubasi et al. (2015) highlighted the limited nature of BLS simulation training for nurses in Jordan and strongly recommended incorporating simulation in BLS training. In 2017, (Tuatha, 2017) noted that some schools provide simulation training programs that focus exclusively on teaching essential skills.

The delayed integration of Simulation Technology (ST) in Jordanian universities poses significant challenges to the quality and competitiveness of higher education. Despite global trends emphasizing the importance of ST in enhancing educational outcomes, the Jordanian accreditation committee only began mandating its integration in 2020 (Sindiani et al., 2020). In 2020, there will be an increasing need for the integration of simulation technology in medical and nursing training, especially for critical care procedures. The Jordanian accreditation committee should make this integration mandatory and provide support for it. The Jordanian accreditation committee has started mandating and supporting this integration. (The National Strategy for Health Sector in Jordan, 2020) .A study conducted in Jordan in 2022 recommended that policymakers should implement controversial professional

development of BLS training using simulation, particularly for nurses (Kasem & Abuhammad, 2022).

The integration of simulation technology in education and training in Jordan has progressed slowly despite recognizing its importance in 2013. Efforts to increase simulation training in medical and nursing schools began in 2014, but widespread adoption was still lacking. Studies from 2014 to 2017 emphasized the need for simulation in essential skills and BLS training. While the Jordanian accreditation committee mandated the integration of Simulation Technology (ST) in universities in 2020, implementation in schools and healthcare institutions is far behind, highlighting ongoing challenges in fully adopting this critical educational method. Therefore, transforming nursing education to enhance patient safety necessitated the implementation of standardized methods and advanced technologies like simulation to replicate real-life healthcare environments.

Healthcare institutions in Jordan face specific challenges when it comes to implementing simulation. These challenges include the shortage of human aids, the availability of simulation labs, the cost of purchasing manikins, and the cost of maintenance. These challenges are unique to the healthcare sector in Jordan and require targeted solutions. For instance, there is a pressing need for qualified experts to implement a simulation lab and integrate simulation into healthcare professional training effectively. The unavailability of a professional expert facilitator, the high establishment costs of an educational simulation lab, and the preparation of manikins further restrict the ability to integrate simulation into hospitals. Additionally, technological challenges such as manikin malfunctions, maintenance difficulties, unavailability of expert technical support, and the associated costs also play a

significant role in restricting the integration of simulation manikins in training. Integrating simulation into the current curriculum presents challenges as educators must revamp their teaching methods and assessment strategies to incorporate simulation-based effectively (Benchadlia et al., 2023; EL-Qirem et al., 2020; Kasem & Abuhammad, 2022).

The COVID-19 pandemic affected the quality of CPR because rescuers are concerned about the transmissibility of the viruses by generating chest compression, ventilation, and defibrillation (Wyckoff et al., 2021). BLS training using simulation has a reverse relationship with the mortality rate (Panday et al., 2019) and a reverse relationship with unwanted outcomes (Kim et al., 2019; Laco & Stuart, 2021).

Newly employed nurses have minimal experience (Mante, 2019). Furthermore, the healthcare system and the increase in the population's healthcare needs led to an increasing demand for nurses without adequate knowledge and practice (Cerra et al., 2019). Span (2015) described the nursing shortage as an obligation for institutions to employ this population of nurses in the critical care units without BLS or ACLS training or any specific critical care procedure orientation. Jordan faced an acute shortage in certain health workforces, especially nurses. The government responded to this challenge by establishing new nursing colleges and giving incentives to nursing students, prioritizing employment to cover this shortage (NHRHO, 2017).

Most adverse effects and medical errors occur in the first few years of newly employed nurses due to a lack of exposure to critical situations (Borggreve et al., 2017). The transitional stage of nursing from student to work carries many risks, including mistakes, unsafe patient care, and reality shock between the student period and employment period because novice nurses think they are not prepared well for

direct contact with actual patients (Alqarni, 2018; Ruslan & Saidi, 2019). During the pandemic, most nursing students who are newly employed nurses in hospitals received training through videos and did not attend actual laboratory or hospital training (Mcdermott & Ludlow, 2022).

A cross-sectional study was conducted on Jordanian graduate students to assess their CPR knowledge. The study found a poor knowledge score of CPR among trained and untrained students (Oteir et al., 2019). In Jordan, a study conducted at the "University of Jordan" and "Isra University" in nursing colleges with 4th-year graduate students during the COVID-19 pandemic period reflected that the students had poor practice levels that were met by online training and video-watching and preferred face-to-face learning. Moreover, graduated nurses expressed dissatisfaction with their clinical competencies and worried about not attaining any on-ground hospital learning and not achieving the clinical learning outcomes. Furthermore, they were worried about their safe clinical practice and patient safety, which directly affected their clinical competencies and confidence levels (Suliman et al., 2021).

A quasi-experimental study conducted in Brazil on 123 nurses found unsatisfactory BLS knowledge among nurses (Sé et al., 2019). Another quasi-experimental study in Turkey on 65 nurses found an observable weakness in the knowledge and practice of BLS among nurses. Nursing students received poor knowledge and practice during the COVID-19 pandemic due to decreased face-to-face training in the lab and only using online learning (Elgohary et al., 2022). Sachdeva (2020) said that the nurses knew about and didn't practice well enough with the most important parts of BLS, like recognizing CPA, checking the carotid pulse, changing the compressor, the location of chest compression, giving breathing with the wrong

depth and rate, and knowing when to defibrillate. Lack of nursing practice in BLS leads to no spontaneous circulation return among CPA victims (Bissenbayeva, 2019).

In a study conducted in Jordan, nursing students expressed dissatisfaction due to the lack of clinical training attachments and started online distant clinical learning during the COVID-19 pandemic (Shorey et al., 2022). BLS knowledge and practice rapidly decreased over time (Partiprajak & Thongpo, 2016; Zhou et al., 2020). Knowledge score was minimized after three months of BLS training (Partiprajak & Thongpo, 2016). Furthermore, without BLS re-training, BLS knowledge and practice will be minimized, affecting the nurses' confidence level (Abelsson et al., 2020; Abelsson & Nygårdh, 2019).

Dick-Smith et al. (2021) mentioned in their study that BLS practice declined rapidly after 8–12 weeks after training and added that a few participants' BLS practice declined after 12–22 weeks after training. The BLS practice will decline after three months of training (Laco & Stuart, 2021). A similar study showed that BLS practice dropped 3-6 months after training (Martínez et al., 2019). A quasi-experimental study conducted on nurses in Korea stated that nurses had a significantly low confidence level before BLS simulation training, which improved after the training (Park & Lee, 2021). Nurses' confidence level was minimized due to no scheduled BLS training (Abelsson et al., 2020).

The COVID-19 pandemic in Jordan affected many sectors, including education. Higher education suspended direct education and started activating the e-learning process and using e-learning tools (Haider & Al-Salman, 2020). In the first quarter of 2020, the Prime Minister of the Hashemite Kingdom of Jordan obliged all higher education universities to start online teaching for both basic science and clinical

science due to the COVID-19 pandemic effect (Sindiani et al., 2020). In March 2020, the Ministry of Higher Education in Jordan responded to the Prime Minister and suspended basic and clinical learning in the universities, and nurse educators started to use online teaching and training, which led to a loss of classroom control (Nabolsi et al., 2021; Suliman et al., 2021).

Distance education in Jordan was started in all universities as a response to the spread of COVID-19 (Muflih et al., 2021). However, a literature review shows that no such MBLST module exists, and more specifically, no module addresses improving the BLS knowledge, practice, and confidence of this population of nurses in the Middle East, particularly in Jordan. BLS knowledge is considered poor among nursing and other HCPs (Aliyari et al., 2019). Newly employed nurses and nursing students must improve their CPR competencies (Charlier et al., 2020).

In summary, Jordanian hospitals did not receive third- and fourth-year students from nursing colleges for clinical training; those nurses were employed recently during the pandemic. Those nurses did not attend any clinical training in hospitals, and were engaged in the work directly in emergency departments (ER), intensive care units (ICUs), and respiratory triage centers without specific nursing orientation due to nursing shortages during the pandemic period. They interacted with CVOID-19 patients from mild to severe cases without any practical training. Therefore, it will reflect unsafe and unsuccessful patient care, so there is a high recommendation for these students to undergo BLS training and ACLS training using simulation.

1.3 Significance of the Study

The current study offers a valuable chance to enhance our comprehension of BLS simulation training. This training can improve nurses' knowledge, practice, and confidence levels. Non-directly, nurses' satisfaction will increase, improving patient satisfaction and enhancing patient discharge and CPR outcomes. Simulation training is becoming a key instrument in nursing education in schools and professional development at hospitals, and it is considered the safest area for training in critical procedures.

Sørensen et al. (2017) expressed that we should make simulation manikins more accessible and available in HCI to develop the healthcare profession, and many researchers encourage the use of simulation in healthcare professional education. Furthermore, health institutions must use innovative teaching methods like simulation to overcome the increase in trainees (Gutiérrez et al., 2021; Rushton et al., 2020). Just as important, the simulation was an effective learning method during the "COVID-19 pandemic" (Ekert et al., 2021). On the other hand, the need for SBLS re-training for HCP is due to the different training methods during the study period in the health schools (Cerra et al., 2019).

The simulation improves competency and permits the trainer and trainee to differentiate between normal and abnormal patients (Laco & Stuart, 2021; Sherwood & Francis, 2018). Simulation is a safe and realistic method to accommodate critical hospital situations and improve real resuscitation situations (Etlidawati & Ilinia, 2021; Ryan et al., 2019). Simulation in BLS training minimizes medical errors (Piryani et al., 2019). HCI must prepare annual BLS sessions to decrease mistakes and dissatisfaction among nurses and HCPs (Sé et al., 2019).

Simulation training enhances decision-making compared to traditional learning methods in the nursing curriculum (Lawrence, 2018; Mentzelopoulos et al., 2021; Sherwood & Francis, 2018). ST enhances welfare and hospital discharge outcomes (Knipe et al., 2020) and cost-effectiveness for patients (Christmals et al., 2018). ST enhances communication skills between HCPs (Abdullah et al., 2020; Ruslan & Saidi, 2019). Moreover, training in BLS using simulation positively affects the number of successful CPRs worldwide annually (Rente et al., 2021).

ST can accommodate the nursing shortage, control the attrition rate of nurses, and identify enough space for training for many nurses (Jung et al., 2017). Simulation plays a vital role in learning and helps acquire knowledge (Zavotsky et al., 2016). BLS training should be a priority condition in clinical practicum (S. Lee et al., 2021). Handeland et al. (2021) expressed that simulations significantly affect the development of psychomotor skills. (Nusser, 2021; Ryzner & Kujath, 2018) stated that the participants' confidence in BLS was increased after simulation training.

1.4 Research Questions

The research questions of this study are as follows:

1.4.1 Phase 1: Development of the MBLST Module

i. How does the MBLST module conceptualize in the context of NEN in governmental hospitals?

1.4.2 Phase 1: Validation of the MBLST Module

ii. Is the developed MBLST module a valid intervention module for NEN in governmental hospitals?

1.4.3 Phase 2: Evaluation of the Effectiveness of the modified basic life Support training (MBLST)

iii. Is the modified basic life Support training (MBLST)effective for educational intervention for newly employed nurses in Jordanian government hospitals?

iv. Does the modified basic life Support training (MBLST) module for newly employed nurses in Jordanian government hospitals effectively improve BLS knowledge and practice?

v. Does the modified basic life Support training (MBLST) module improve the confidence level in BLS among newly employed nurses in Jordanian government hospitals?

vi. Is there a difference between pre-test before MBLST scores and post-test scores among newly employed nurses in Jordanian government hospitals after the MBLST module intervention?

1.5 Objectives of Study

1.5.1 General Objective

The general objective of this study is to develop, validate, and evaluate the effectiveness of modified basic life Support training (MBLST)among newly employed nurses in Jordanian governmental hospitals.

1.5.2 Specific Objectives

1.5.2(a) Phase 1 Objectives

i. To develop a modified basic life Support training (MBLST) module for newly employed nurses in Jordanian government hospitals.

ii. To validate the modified basic life Support training (MBLST) module for newly employed nurses in Jordanian government hospitals.

1.5.2(b) Phase 2 Objectives

iii. To evaluate the effectiveness of the developed modified basic life Support training (MBLST) intervention in improving knowledge levels for newly employed nurses in Jordanian government hospitals.

iv. To evaluate the effectiveness of the developed modified basic life Support training (MBLST) interventions in improving practice for newly employed nurses in Jordanian government hospitals.

v. To evaluate the effectiveness of the developed modified basic life Support training (MBLST) interventions in improving confidence levels for newly employed nurses in Jordanian government hospitals.

1.6 Research Hypotheses

The following five research hypotheses are relevant to the three phases of this study:

H1: There is a significant difference in the pre-test mean of newly employed nurses between the interventional and control groups in all dependent variables.

H2: There is a significant mean difference in the post-test results between the intervention and control groups among newly employed nurses in all dependent variables.

H3: The modified basic life Support training (MBLST) intervention effectively improves knowledge among newly employed nurses in Jordanian governmental hospitals.

H4: The modified basic life Support training (MBLST) intervention effectively improves practice among newly employed nurses in Jordanian governmental hospitals.

H5: The modified basic life Support training (MBLST) intervention effectively improves the confidence level among newly employed nurses in Jordanian governmental hospitals.

1.7 Definition of the Study Terms

1.7.1 Basic Life Support (BLS)

BLS is the primary step of first aid that can be given to the victims before the advanced HCP arrives, and high-quality CPR requires high-quality performance. Furthermore, BLS is defined as a chain that aims to maintain the return of spontaneous circulation (ROSC), an open airway, spontaneous breathing, and normal neural function. Moreover, high-quality CPR requires high-quality CPR practice (Burkart et al., 2021; Isa et al., 2022; Lakshmi, 2020; Park & Lee, 2021).

In this study, the operational definition of BLS is the basic nursing knowledge and practice required to save life non-invasively, including recognizing CPA, performing chest compression and breathing, using automated electrical defibrillators, choking relief, and recognizing stroke and chest pain.

1.7.2 Simulation

WHO defined simulations as a pedagogical strategy that uses one or more educational methods to provide practice and move the profession from novice to expert (Martins et al., 2018). The major types of simulation are: (1) high-fidelity simulation, which is used in advanced training, such as endotracheal tube intubation and ACLS algorithms. It is also used for comprehensive patient care and medication administration (Wilmoth, 2016). (2) Medium-fidelity is the most common manikin used for BLS training (Rushton et al., 2020). (3) Low-fidelity simulations are also called partial task trainers (Cura et al., 2020) and low-cost models (Piryani et al., 2019). Simulation manikins with low fidelity are considered suitable and comfortable for performing BLS (Ryzner & Kujath, 2018). Low-fidelity manikin is small and can be handled and transferred anywhere for training.

In this study, low-fidelity simulation was defined as a simple method used in the learning process to facilitate understanding of the practice. Low-fidelity simulation has some simple tasks that are not complicated, such as chest compression and inflated-deflated lung to give respiration. The chest compression performed on the chest includes a spring inside to facilitate chest recoil. Moreover, the trunk consists of two plastic, inflated bags that permit the trainees to get ventilation.

1.7.3 Knowledge

Knowledge is the theory and principles that reflect applicable concepts in practice (Britton, 2017; Shrestha et al., 2020). BLS knowledge is the major factor in effective resuscitation outcomes (Gutiérrez et al., 2021).

In this study, *knowledge* is operationally defined as the theoretical and fundamental part of BLS training that prepares the participants to partake in BLS skill training proficiently. The knowledge domain in this research is the first part of the MBLST module intervention and consists of seven components: (1) The adult and child chains of survival. (2) BLS for adult and pregnant women, including the use of AED. (3) BLS for infants and children, including the use of AED. (4) Alternative breathing techniques (5) Choking relief for adults, pregnant children, and infants. (6) Other life-threatening problems, including recognizing the signs and symptoms of stroke and myocardial infarction. (7) Team Dynamic in CPR (AHA, 2020b; Panchal et al., 2020; Wyckoff et al., 2021).

1.7.4 Practice

Practice is clinical competency and the ability of nurses to integrate knowledge into practice (Anderson, 2016). In this study, *practice* is operationally defined as performing the knowledge learned using simulation manikin. The practice domain in

this research is the second part of the MBLST module intervention and consists of five components: (1) The adult and child chains of survival. (2) BLS for adult and pregnant women, including the use of AED. (3) BLS for infants and children, including the use of AED. (4) Alternative breathing techniques. (5) Choking relief for adults, pregnant women, and infants (AHA, 2020b; Panchal et al., 2020; Wyckoff et al., 2021).

1.7.5 Confidence

Anderson (2016) defines confidence as the building and accomplishment of the nursing profession through knowledge acquisition, practice, and critical thinking. In the first year of nurses' employment, nurses should build confidence by maximizing their knowledge and practical level (Ruslan & Saidi, 2019). Hamilton (2020) defined confidence as the ability of nurses to perform optimal patient care after simulation training and improve their knowledge and practice. Wilmoth (2016) defined confidence as the ability and power to use policies, procedures, and equipment. In this study, *confidence* is operationally defined as the positive feeling of faith and dependability to perform BLS knowledge and practice components without fear and free from risk to the patient. Confidence assessment depends on participant knowledge and practice level.

Hamilton (2020) defined confidence as the ability of nurses to optimize knowledge and practice in patient care. Conversely, Zavotsky et al. (2016) define poor confidence as delaying patient care. Anderson (2016) stated that confidence in nursing comes from increased knowledge and practice. Ruslan & Saidi (2019) remarked that building the confidence level of newly employed nurses is accomplished by building knowledge and practice among these nurses.

The assessment tools measure the nurses' confidence in their knowledge and practice. These tools consist of seven statements (Bissenbayeva, 2019): two statements measuring the participant's confidence level in BLS knowledge by asking (I know...) and five statements measuring the participants' confidence level in BLS practice ability by asking (I would perform, I would give, I would use). The participants should respond by rating these statements over 100%.

1.7.6 Training

Training is an effective method to acquire knowledge through hands-on practice of BLS on mannequins (Morton et al., 2019). In this study, training is operationally defined as giving the participants enough knowledge and practice about BLS and repeating the activity on a simulation using a low-fidelity manikin until knowledge mistakes and malpractice are minimized and excluded.

1.7.7 Newly Employed Nurses

Newly employed nurses had less than one year of work experience (Alqarni, 2018; Anderson, 2016). The newly employed nurses had less than two years of experience (Mante, 2019). In this study, the researchers defined newly employed nurses with less than 24 months of working experience in governmental hospitals in Jordan.

1.8 Chapter Summary

This chapter introduced important aspects related to the topic under study and explained the significance of this study. More specifically, this chapter described the problem statement that this study addresses, outlined the research questions, objectives, and hypotheses, and presented the definitions of terms. Chapter 2 presents a review of earlier literature that is relevant to this study's contents.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter summarizes the literature on cardiopulmonary arrest prevalence, provides an overview of basic life support training, and discusses its benefits. The third subtopic includes the use of simulation in basic life support training history, the type of simulation, and its effect on nursing education. Lastly, this chapter determined the effectiveness of simulation on knowledge, practice, and confidence levels. At the end of the chapter, the researchers presented the theoretical framework used in training in the current study. The study's conceptual framework was synthesized based on the described literature review.

2.2 Cardiopulmonary Arrest Prevalence

2.2.1 Cardiopulmonary Arrest and Its Impact on Mortality Rates

CPA is the absence of the heart's mechanical activity, loss of circulation signals, and cessation of ventilation, neural function, and consciousness (Tobase et al., 2017). Labored or gasping breathing is also a sign of CPA (Olasveengen et al., 2021). Cardiac diseases account for approximately 15-20% of sudden CPA among all ages (Isa et al., 2022; Kose et al., 2020). In middle- and upper-middle-income countries, ischemic heart disease is the primary cause of cardiac arrests (Ounprasertsuk & Wongthong, 2020). Numerous factors contribute to CPA, particularly respiratory issues in children (Kendir et al., 2021). Pakistan has one of the highest mortality levels of CPA and RTA (Irfan et al., 2019).

CPA has become a major health problem facing laypeople and HCPs (Suárez et al., 2019). CPA deaths are frequently seen in many countries (Pehlivan et al., 2019). Sudden CPA is the leading cause of increased mortality (Abelsson et al., 2020). A study by Jarrah et al. (2018) stressed that out-of-hospital CPA is the major cause of increased mortality globally. Sudden CPA is the third leading cause of death globally (Mullor et al., 2021). Furthermore, in Europe, CPA is the third leading cause of death (Gräsner et al., 2021). Sachdeva (2020) stated that cardiovascular disease in adults is the biggest killer globally.

In Pakistan, Irfan et al. (2019) stated that 92% of victims worldwide lost their lives outside the hospital after sudden CPA due to the limited resources and unavailability of qualified BLS providers. Most CPA cases occur outside hospitals and arrive at the hospital dead (Mullor et al., 2021). On the other hand, Jang et al. (2021) stated that sudden CPA causes 80% of deaths inside hospitals. Boucher (2017) added that 6.65 adults per 1000 patients were admitted to hospitals, their health deteriorated, and their status developed to CPA.

2.2.2 The Impact of COVID-19 on Cardiac Arrest

There is a significant gap between CPA and the COVID-19 pandemic. Many patients diagnosed with COVID-19 develop CPA. COVID-19 adds a new risk to rescuers when resuscitating cardiac arrest victims. The rescuers must balance resuscitating the CPA victims and protecting themselves from CVOID-19 infection by performing the best BLS practices (Goodloe et al., 2021). In the first COVID-19 wave at the beginning of April 2020, the CPA increased to 23%. In the second wave of COVID-19 in December 2020, the CPA increased to 19% (Holm et al., 2021).

At the beginning of the pandemic in Paris, the CPA doubled from 13.42 to 26.64 per one million (Marijon et al., 2020; Perkins & Couper, 2020). In Sweden, CPA two to three doubled during the COVID-19 pandemic (Holm et al., 2021). Furthermore, the number of deaths caused by CPA in hospitals increased during the pandemic period from 4.6 before the pandemic in 2019 to 6.6 during the pandemic in 2020 per 1000 admitted to hospitals (Roedl et al., 2021). Admission of patients to the ICU during the COVID-19 pandemic declined by 23% compared with the previous year, and many victims of cardiac arrest and those diagnosed with COVID-19 had low survival rates due to low levels of CPR quality (Lauridsen et al., 2021).

2.2.3 Conclusion Regarding Cardiopulmonary Arrest Prevalence

The literature review has confirmed that the mortality rate of CPA is a significant health concern worldwide. However, the increase in the prevalence of CPA, along with the shortage of qualified resuscitation providers, has added alarming challenges for healthcare professionals. Moreover, with the outbreak of COVID-19, the prevalence of CPA has doubled or tripled, and this has also added new challenges for rescuers in performing effective CPR.

Despite the rising prevalence of CPA, there is an evident gap in the number of trained BLS providers. The current training infrastructure is insufficient to meet the increased demand, exacerbated by the COVID-19 pandemic. The pandemic has introduced unique challenges for CPR performance, highlighting a gap in specific training that addresses infection control while ensuring effective resuscitation. Many hospitals lack comprehensive BLS training programs, which is crucial for ensuring all healthcare professionals are adequately prepared to manage CPA cases.

Therefore, it is imperative to train more qualified BLS providers who can recognize CPA and activate CPR early. Additionally, it is critical to educate the HCP on how to balance the risk of COVID-19 infection while providing effective BLS to save the lives of CPA victims. Hospitals must also have adequate BLS training programs to prepare the staff to handle CPA cases and provide high-quality CPR to increase survival rates.

2.3 Basic Life Support Training

2.3.1 Basic Life Support Overview

The foundation of CPR is the BLS (Tobase et al., 2017). The stress in real CPR causes HCP deviation from the correct BLS algorithm and increases medical errors (Sarvan & Efe, 2022). Therefore, permanent learning of BLS promotes health qualifications and increases professionalism in all healthcare delivery systems (Sé et al., 2019). There is a growing demand to train laypeople and HCPs in the BLS (Iserbyt et al., 2017). It is imperative to develop trainees in BLS courses and maintain victims' survival by running BLS training in HCI and social life (Sharma et al., 2021).

Lifesaving training includes BLS. Furthermore, BLS has become vital, and periodically improving knowledge and skill training in BLS is a demandable and essential issue for the HCP (Isa et al., 2022). Nurses must be knowledgeable and skilled in BLS (Rushton et al., 2020). High-quality CPR enhances the victims' survival (Laco & Stuart, 2021; Oermann et al., 2020; Tobase et al., 2017). BLS knowledge and practice can maximize lifesaving results (Isa et al., 2022). However, nurses' practical training in BLS is considered successful in minimizing mortality (Abelsson et al., 2020; Kose et al., 2020).

International health guidelines recommend frequently assessing BLS knowledge and practice among nurses (Sachdeva, 2020). Successful CPR depends on enough knowledge, practice, and self-esteem (Kose et al., 2020). Sachdeva (2020) mentioned that CPR is considered the core skill in an emergency, and all HCPs should be proficient in BLS knowledge and practice. Furthermore, BLS has been considered an essential skill for all HCPs, especially nurses and doctors (Rente et al., 2021). Other studies mentioned that healthcare professionals, including nurses, should receive annual BLS training (Jang et al., 2021; Sé et al., 2019).

2.3.2 Benefits of Early Cardiopulmonary Resuscitation

Early initiation of CPR plays a significant role in the success of resuscitation and patient outcomes in emergencies (Sherwood & Francis, 2018). Resuscitations need rapid recognition of the situation, effective CPR, and rapid defibrillation. Also, the CPA requires immediate action within minutes from the HCP nearest to the event (Nusser, 2021). The early activation of the BLS chain of survival is the key to saving the lives of the victims (Sachdeva, 2020). The early activation of the emergency response team, brisk initiation of CPR, and defibrillation all play an essential role in decreasing mortality (Irfan et al., 2019). Kim et al. (2019) believed that reduced collapse time would improve survival. Moreover, CPR success depends on high-quality chest compression and early defibrillation (Panchal et al., 2020).

Effective CPR in the first few minutes would increase the chance of survival (Partiprajak & Thongpo, 2016), and early CPR and defibrillation from 3-5 minutes would increase the survival rate among CPA victims (Chowdhary et al., 2020). On the other hand, Sharma et al. (2021) stated that being one minute late to initiate chest compression reduces a victim's chance of survival by 7–10%. Correct CPR is essential to double or triple the survival rate (Zhou et al., 2020). Early CPR can quadruple the

survival rate (Iserbyt et al., 2017). As a result of immediate CPR, we can decrease the hypoxemic effect of CPA and increase the chance of survival (Abelsson et al., 2020). Additionally, it's crucial to start CPR right away in order to shield the body's vital organs from the hypoxemic damage that long-term CPA causes (Kim et al., 2019).

2.3.3 Basic Life Support Re-training

Many studies concluded that cardiopulmonary resuscitation did not meet the BLS standard guidelines, and many BLS critical steps were forgotten (Irfan et al., 2019; Laco & Stuart, 2021). The missed steps of BLS guidelines could affect the quality of CPR and increase the percentage of unsuccessful attempts (Sé et al., 2019). The COVID-19 pandemic affected the CPR quality because the rescuers were concerned about protecting themselves from the transmissibility of the viruses during chest compression, ventilation, and defibrillation (Wyckoff et al., 2021).

The infrequent BLS training will directly affect the quality of healthcare providers' CPR. The BLS knowledge scores declined within six months after the BLS training compared with the immediate post-test follow-up (Paliatsiou et al., 2021). BLS practice becomes ineffective after six months of training (Bhavar et al., 2018; Paliatsiou et al., 2021). The main activity in BLS declines after 3-6 months, such as chest compression and breathing performance (Zhou et al., 2020). BLS practice only improves with practice (Knipe et al., 2020). Finally, the confidence level is minimized for nurses if there is no schedule for BLS re-training (Abelsson et al., 2020).

Bánfai et al. (2022) noted that CPR training and certification are obligatory for all HCPs, students of health educational institutions, and educators in Hungary. Another study in the USA confirmed that formal training in BLS and advanced cardiac

life support (ACLS) is part of HCI accreditations (Parsons et al., 2018). Recertification of BLS and ACLS training is mandatory for all HCPs (Knipe et al., 2020).

The training program and justification for BLS updates are needed to prevent any dissatisfaction like what happened in 2015 while changing the order of CPR in 2005 from (ABC) airway, breathing, and circulation to (CAB) circulation, airway, and breathing in 2015 (Sé et al., 2019). The need for re-training in BLS using simulation is related to changes in BLS guidelines from international associations like AHA, which changed the ABC chain survival in 2005 to the CAB in 2015. Moreover, the new justifications in the AHA BLS about the chain of survival in 2020 were because of the COVID-19 pandemic (Kei & Mebust, 2021; Laco & Stuart, 2021).

Frequent and refresher BLS training, focusing on practice and self-confidence, should be carried out every three months due to decreased nurse practice competency (Abelsson et al., 2020). CPR training is required once per year (Wilson et al., 2021). So, updating the knowledge and practice of BLS and ACLS will save the victims' lives (Isa et al., 2022). Moreover, all HCPs, especially nurses, should re-train and recertify BLS every two years by international institutions (Knipe et al., 2020). Similarly, a study by AHA recommended renewing BLS certification every two years, which may be insufficient to deal with CPA victims (Nusser, 2021).

2.3.4 Basic Life Support Competencies According to BLS Guidelines 2020

2.3.4(a) The Chain of Survival

According to Lakshmi (2020), it is important to logically reason through each step of Basic Life Support (BLS) to enhance trainees' knowledge and practical skills. The American Heart Association (AHA) first used the chain of survival concept in