EVALUATING EFFECTIVENESS OF SIMULATION IN LEARNING RESPIRATORY ASSESSMENT AMONG NURSING STUDENTS OF MOUNT KENYA UNIVERSITY, THIKA, KENYA.

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN NURSING OF

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DECLARATION AND APPROVAL

Declaration

This thesis/project is my original work and has never been presented for any academic award in any institution.

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DEDICATION

This piece of scholarly writing is dedicated to my family. Special appreciation is to my late father Mr.Hillary Okoth who believed in girl child education.

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My sincere gratitude is directed to Jehovah God for the gift of life. I am also grateful for training in research that I received from Humberg University sponsored by DAAD. The training helped me to understand more about research. I appreciate my supervisors, Dr. Nilufar Jivraj and Dr. George Njoroge for their guidance and support in developing this thesis. I really appreciate your love and support and that has been a motivation to me. Be blessed abundantly. I really appreciate Mount Kenya University School of Nursing for their feedback and guidance during the presentation. Those feedbacks made this thesis to be a success. Thank you too Mr. Mwambeo and Clement from Mount Kenya University, your assistance was of great help.

ABSTRACT

Simulation allows nursing students to perform skills they have learned in class. It allows them to apply theory into practice. The available manikin for simulation include low, medium and high fidelity manikin. Globally, simulation is among the teaching methods used to train nurses and other healthcare professionals. Despite the benefits of high fidelity simulation illustrated in other studies, there is paucity of research done on the effectiveness of simulation using medium fidelity manikin among nursing students. Currently, the healthcare education system focuses on basic science education and leaves most skills training in an unsystematic process and unstructured. Since the laboratory sessions are not examined or assessed for the students to \be awarded marks, students do not attend laboratory simulation sessions as expected. OSCE motivate students to attend simulation sessions since they will be examined. At Mount Kenya University, students are not examined on their skills in the laboratory. This is because simulation is not incorporated in the curriculum and by the time the researcher was conducting the study, there was no university policy on the need of assessing students in the laboratory. World Health Organization recommended that further research on the effectiveness and cost of integrating simulation into curricula to be done. This study evaluated effectiveness of medium fidelity simulation. It adopted a cross-sectional quantitative pretest-posttest quasi experimental design. It was conducted at Mount Kenya University among undergraduate nursing students. Purposive sampling will be used. Simple random assignment was used to sort out the sample participants into control and experimental groups. Cluster randomization was used to minimize contamination of control group. The sample size was achieved through Yamane's formula. Data was collected through a pretest quiz, Structured Observation Checklist and Questionnaire. Data was analyzed using Statistical Package for Social Sciences. Descriptive statistics was used to analyze data to make meaningful statistics. Preliminary ethical approval was sought from Mount Kenya University School of Postgraduate as well as from MKU Ethical Review Committee. The researcher also seek approval from Thika Level 5 Hospital from the Hospital's research and ethics committee. National Commission of Technology and Innovation (NACOSTI) was also involved in granting ethical approval. Participation was voluntary and study adhered to principles of informed consent among patients before performing chest respiratory assessment. On assessment of knowledge, experimental group had a **mean score of 91.8% with Standard Deviation 9.68**. Control group had a **mean of 88.11% with Standard Deviation of 10.38.** At 95% confidence level, P-value of.**016** suggested that there was difference in knowledge on chest respiratory assessment between experimental and control groups. Clinical competency between the experimental and control groups was compared using an independent sample t-test. Experimental group had a **mean of 92.67** with standard deviation of **6.602**. Control group had a mean of **62.23** with **standard deviation of 12.118**. The **P-value = .001.** With 95% confidence level, there was statistical difference in clinical competency between the two groups. Students who participated in simulation (experimental group) displayed better performance in knowledge and clinical competency than those who did not participate in simulation (control group). Further research can be done determine factors that can motivate nursing students to attend laboratory.

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LIST OF ABBREVIATIONS AND ACRONYMS

MKU – Mount Kenya University

TL5H – Thika Level 5 Hospital

MFS – Medium Fidelity Simulation

WHO – World Health Organization

NCK – Nursing Council of Kenya

USA – United States of America

OSCE - Objective Structured Clinical Examination

ADPIE – Assessment, Diagnosis, Planning, Implementation and Evaluation

DAAD- Deutscher Akademischer Austauschdienst- German Academic Exchange Service.

BScN- Bachelor of Science in Nursing

ERC- Ethics and Research Committee

NACOSTI- National Commission for Science, Technology and Innovation

SPSS- Statistical Package for the Social Sciences

DEFINITION OF TERMS

Simulation – Are procedures in the skills laboratory that represent the realism of the clinical setting and are intended to illustrate methods, judgment and critical thinking using approaches such as utilization of manikins.

Manikin – Is a model of the human body or its parts, used for teaching procedures, clinical skills and cognitive thinking among medical and nursing students.

Medium Fidelity Manikin – Are the manikins that lack physiological functions of a real human being, but can offer breath sounds, heart sounds or bowel sounds.

Assessment – Is the first examination of a patient that allows systematic collection of all information relevant to care of patients, their problems and needs.

Respiratory Assessment – Is the assessment of the respiratory system, focusing only on the chest using the four techniques of inspection, palpation, percussion and auscultation.

Undergraduate Nursing Students – Are the nursing students who are pursuing Bachelor of Science in Nursing without any prior training in nursing at Diploma or Certificate level.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Nursing training needs integration of theoretical knowledge into practice (Shinnick & Cabrera, 2021). Simulation helps to integrate knowledge in to practice before students are allowed to take care of real patients. In the clinical area, students may not be allowed to do some nursing procedures. Other challenges may include fear of caring for a live patient, feeling of time restraints or the inability to ask questions. Laboratory simulation provides an environment that the students can learn without facing the aforementioned challenges.

Globally, simulation is among pedagogical approach in training nurses and other healthcare professionals. A systematic review study done in United States of America by Carrero et al (2021) showed that "training using high-fidelity simulation achieved higher scores in acquired and retained basic life support knowledge and higher self-efficacy perception".

According to study done by Gharibi & Arulappan (2020), participants consistently described the benefits of laboratory simulation using high fidelity such as improved self-confidence and enhances stress management skills. Undergraduate students from high school have no experience in handling patients. Therefore, simulation sessions should be used as a means of training in nursing schools (Mothiba et al, 2020).

The study done in Netherlands by Boos-Boon, (2021) showed that there was improvement on teamwork, communication, collaboration and technical skills among students who participated in high fidelity simulation. The improvement in teamwork and communication was due to assigning leadership role in the scenarios (Boss-Boon, 2021). The study further acknowledged that nursing procedures include risky procedures that can put patients at risk. The purpose of simulation training is to teach students how to intervene health to fix or prevent errors that are unacceptable in clinical practice.

In South Africa, a study by Olaussen et al (2020) found out that "simulation provides a suitable methodology for performing skills necessary to be an effective practicing nurse. Many of these simulation sessions can be done without a costly high fidelity mannequin, but can use medium and low fidelity mannequins that are affordable". One must only be creative and consider the overall purpose of the simulation (Al Gharibi & Arulappan, 2020)

Study done in Tanzania by Marco and Kalolo, (2019) identified barriers that affected performance of nursing students while they were in the clinical area. Students reported that they did not have confidence and were anxious from fear of making mistakes, lack of competency and fear of the clinical environment. The study further acknowledged that laboratory simulation can address this factors before students go to clinical area to handle patients.

A study done in Kenya by Nyamu et al. (2022) stated that to aid nurses in putting theory into practice and expanding the healthcare workforce in low and middle income countries, simulation should be incorporated into training programs. A study done by

Reid et al, (2020) stated that simulation may be used to replace clinical experience in nursing education.

Simulation in nursing education serves as a highly effective tool, providing an environment where students can integrate theoretical knowledge with practical, hands-on application. Simulation gives nursing students a safe and controlled environment that enables them to hone their skills, improve decision-making strategies, and receive valuable feedback. It also serves as a valuable learning tool, allowing students to understand how to apply theoretical knowledge to real-world scenarios. Simulation gives a valuable opportunity for nursing students to gain experience in patient care without any risk to the patient.

1.2 Statement of the problem

Use of technology is on the rise globally. For this reason, nursing as a profession should embrace incorporating use of technology such simulation in training nursing students. Simulation in nursing is a form of learning that offers students with the chance to apply theory into practice by bringing concepts learned in the classroom to near real life. According to study done by Joset, (2019) in the United States of America found out that undergraduate nursing students can experience difficulty in integrating cognitive concepts into practice and this may expose patient to risks by compromising patient's safety. A study done by Jarelnape & Sagiron, (2023) in Asia, Saudi Arabia showed that theory-practice gap remains a challenge in the nursing profession.

There is paucity of research done on the effectiveness of simulation using medium fidelity manikin among nursing students. Currently, the healthcare education focuses on

basic science education and leaves most skills training in an unsystematic process and unstructured. This is according to study done by Silva,.et al, (2021) in Spain. With the growing concern that simulation can be used in place of clinical placements, more-research needs to be done on effectiveness of simulation using medium fidelity mannequins to train nursing students (Reid et al 2020).

Study done in Tanzania by Marco and Kalolo, (2019) identified barriers that affected performance of nursing students while they were in the clinical area as lack confidence and anxiety from fear of making mistakes. The study further acknowledged that laboratory simulation can address this factors before students go to clinical area to handle patients. A study done in Kenya by Nyamu et al. (2022) stated that to aid nurses in putting theory into practice and expanding the healthcare workforce in low and middle income countries, simulation should be incorporated into training programs. The study identified that nursing training institutions in Kenya do not incorporate simulation into the curriculum.

At Mount Kenya University, the laboratory sessions are not integrated into the curriculum, leaving no formal means of following up if students attend laboratory simulations or not. Despite the perceived importance of simulation in nursing, there is no common practice for its integration into different nursing curricula (WHO, 2018). At Mount Kenya University, students are also not examined on their skills in the laboratory because simulation is not integrated into the nursing curriculum and there was no university policy that required students to be examined on the practical or simulation sessions in the laboratory, hence affecting their motivation to attend laboratory simulation sessions. During initial interview with the students, they reported that since there was no

assessment or marks awarded for the practical, they were reluctant to attend the simulation sessions in the nursing skills laboratory. Out of this experience, researcher got an interest to conduct research on effectiveness of medium fidelity simulation among undergraduate nursing students; comparing performance of chest respiratory assessment between students who attended simulation sessions and those who did not attend simulation session.

Patient safety, quality of care and nurses' efficiency are critical in nursing profession. A study done by Meriam., et al (2020) noted that 14% of nursing students who did not attend simulation session on average demonstrated errors in drug administration. Consequently, it is essential that nursing education programs produce graduate nurses who can provide patients with secure and efficient nursing care.

1.3 Purpose of the study

In this study, medium fidelity manikin was used for simulation to evaluate effectiveness of simulation in learning chest respiratory assessment among undergraduate nursing students. According to study done by Silvia et al. (2021), an appropriate training for nursing students before they attend to patients in the clinical area is one that combines theory in class, simulation of procedures in the laboratory and objective structured clinical examination (OSCE). The study further stated that OSCE motivate students to attend simulation sessions since they will be examined.

Today, many nursing students have become accustomed to technology and this can be used to enhance knowledge and safe practice among nursing students (Silvia,et al. 2021). Results of this study can be used as an evidence on importance of simulation in

training nursing students. This can be used by scholars and trainers in nursing schools to integrate simulation into curriculum and also encourage stakeholders to see the need for well-equipped skills laboratory in all nursing training institutions.

Simulation helps students to integrate theory learned in class into practice (Bos-Boon et al. 2021). “Simulation should be integrated into nursing and midwifery curricula, particularly in a constructivist approach, to combine theoretical contents, practice of technical skill to prepare students for future clinical practice” (WHO, 2018). It was reported that simulation in nursing education can effectively replace up to 50% of clinical contact hours.

Despite the benefits of simulation and the recommendation above, many institutions in developing countries have difficulties in integrating simulation into curriculum because of lack of national funding to nursing education (WHO, 2018). World Health Organization also recommends that further research on the effectiveness and cost of integrating simulation into curricula to be done. For this reason, the researcher will conduct the study to evaluate effectiveness of medium fidelity manikin simulation among undergraduate nursing students at Mount Kenya University.

1.4 Significance of the study

This study will further understand on the use and importance of simulation in nursing. From previous studies, high fidelity manikin simulation as shown effectiveness in helping undergraduate students to incorporate theory into practice. However, the role of medium and low fidelity manikin simulation has been poorly understood. This study

will help address the current paucity of research in this area and provide evidence based practice to nursing profession.

It may not be realistic in real life, but simulations encourage a high level of student responsibility in a situation and engage students in learning. Patient safety, quality of care and efficiency and student self-efficacy is vital in working with patients in the hospital (Silvia et al. 2021). An essential component of nursing practice and education is simulation for patient safety. Nursing students can hone their clinical skills and critical thinking abilities by getting practical experience in a controlled setting through simulation. Moreover, simulation offers a secure environment where nurses can grow and make errors without endangering patients. In the end, this results in increased patient safety since nurses are more equipped to manage challenging situations and deliver superior care.

1.5 Objectives of the study

1.5.1 Broad Objective

Evaluating effectiveness of simulation in learning respiratory assessment among nursing students of Mount Kenya University.

1.5.2 Specific objectives

1. To examine effect of simulation to nursing students' knowledge on chest respiratory assessment at Mount Kenya University.

2. To determine effect of simulation to clinical competency on chest respiratory assessment among nursing students of Mount Kenya University.

3. To determine perception on importance of simulation of chest respiratory assessment at Mount Kenya University.

1.6 Research questions

1. How does simulation affect nursing students' knowledge on chest respiratory assessment at Mount Kenya University?

2. How does simulation affect clinical competency of chest respiratory assessment among nursing students of Mount Kenya University?

3. What is the nursing students' perception on importance of simulation of chest respiratory assessment at Mount Kenya University?

1.7 Research Hypotheses

Ho – There is no statistical significant difference in knowledge and clinical competency of chest respiratory assessment between nursing students who participate in simulation and those who did not participate in the simulation.

Hi –There is difference in knowledge and clinical competency of chest respiratory assessment between nursing students who participate in medium fidelity simulation and those who did not participate in the simulation.

1.8 Scope of the study

This study was conducted at the Mount Kenya University School of Nursing. Effect of simulation on knowledge and clinical competency were the major areas that were covered in this study. Mannequin that was used was medium fidelity and assessment of the patient was only focused on the chest respiratory assessment. Total number of participants were

174. Experimental group were 92 participants and control group were 82 participants. Data was collected for approximately 6 months.

1.9 Limitation of the study

Researcher was aware of possibility of performance bias among the respondents. Performance bias refers to the fact that participants can change their responses or behavior if they are aware of which group they are allocated to. To minimize performance bias during observation, researcher used single blinded technique. Researcher did not disclose to the participants which group they belong to; either experimental or control group.

Some patients were not willing to be assessed in the presence of the researcher. This made some of the participants to shy away from patients and did not feel comfortable to ask for consent from other patients. But majority of the patients responded positively and researcher was able to collect adequate data.

The sample selected for this study was specifically undergraduate nursing students who are identified as health science students. For this reason, results obtained from this study may not be applicable to students who are doing other social sciences courses.

1.10 Delimitation of the study

This study assessed the effectiveness of medium fidelity simulation on chest respiratory assessment. Undergraduate nursing students of Mount Kenya University were assessed on their knowledge and clinical competency after experimental group participated on laboratory simulation. This study focused on medium fidelity mannequin

simulation. Effects of high and low fidelity mannequins simulation was not considered in this study.

Single blinded technique was used to minimize performance bias. This is where the respondents are not aware if they are in control or experimental group. In data sampling, researcher used a non-random sampling technique; purposive sampling technique. This is because participants to be included in the study must have specific characteristics, which includes passing all prerequisite units and are eligible for clinical placement.

1.11 Theoretical Framework

1.11.1 Millers Model

Clinical competency is evaluated by Miller's Pyramid of Assessment, which can help clinical teachers to link learning results with expectations of what a learner should be able to achieve at any given level.

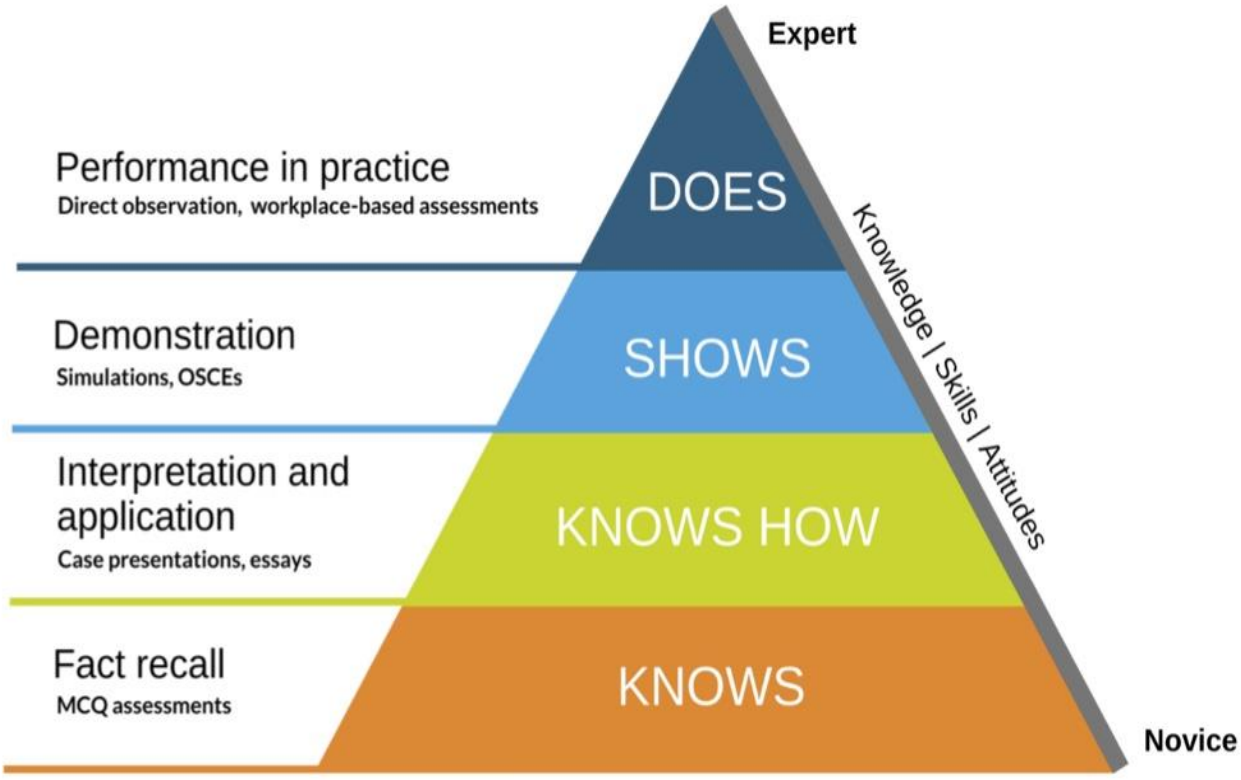


Figure 1. Miller's Model

Source: THE IDEAL BOOK
https://www.tandfonline.com/doi/abs/10.1080/01421590802061613?journalCode=imte20

The clinical competency of nursing students is evaluated using the Millers hypothesis. There are four levels of competence, according to Millers theory: unconscious competence (knows), conscious competence (knows how), conscious incompetence (shows), and unconscious competence (does). This theory assists instructors and preceptors in determining the current learning stage of nursing students and assisting them in reaching a better degree of competency. It is possible to improve a student's learning and skill development by using targeted tactics and interventions after determining the student's present stage.

1.12 Conceptual Framework

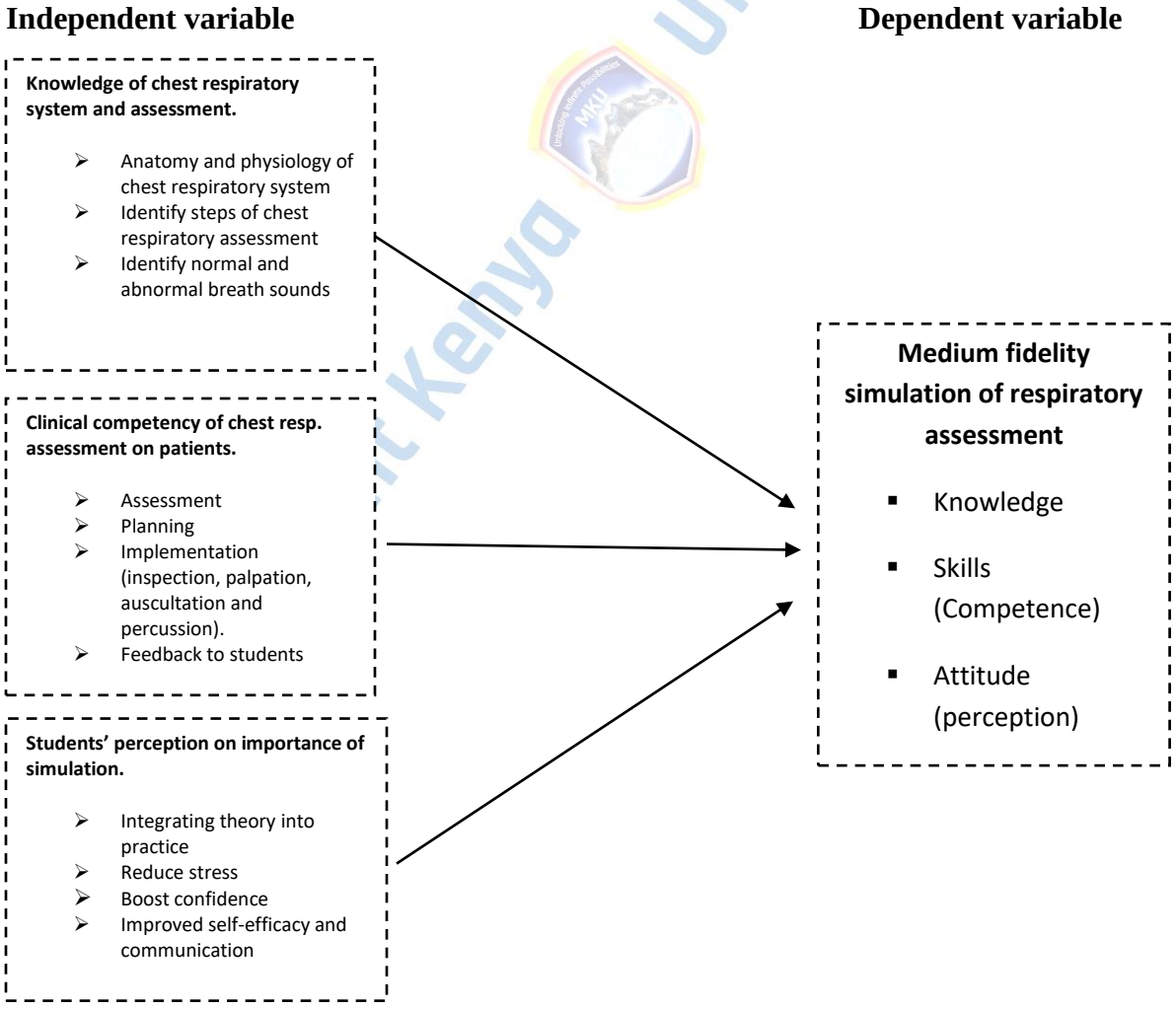


Figure 1. Conceptual Framework

Source: Researcher 2024

CHAPTER TWO

LITRATURE REVIEW

2.1 Introduction

Comprehensive review of literature to explore what other scholars have done on simulation in nursing is incorporated in this chapter. It encompasses an analysis of the different variables contained in the specific objectives. A literature review can be explained as a critical evaluation and examination of previous studies and academic publications pertinent to a specific subject or research question. In order to acquire a thorough grasp of the state of knowledge in the topic at this time, it entails looking over and summarizing the major conclusions, approaches, and theories that are offered in these sources.

2.2 Theoretical Literature Review

Miller's Model

Miller's pyramid was invented in 1990 and it has been utilized by the health related professionals since then. It is a way of ranking clinical competence both in educational settings and in the workplace. As a framework it distinguishes between knowledge at the lower levels and action in the higher levels. It argues that to truly know whether our learners are achieving what we want them to achieve we should assess them in the setting that we expect them to deliver knowledge and skills they have learned in

class. This rationale underpins the concept of assessment in the workplace such as the hospitals. This theoretical model is essential in this study because researchers assessed students' knowledge and clinical competency in the clinical area.

Miller's Pyramid outlines a progression of levels starting with factual knowledge (Knows), which acts as the pyramid's base. The second level of the pyramid is practical knowledge (knows how), and the third tier is clinical skill competency (Shows how). Clinical performance (Does), which reflects putting knowledge and abilities into practice, is the last component of the pyramid and is determined by direct observation of a student doing procedures on actual patients in a clinical setting (Witheridge, et al,. 2019).

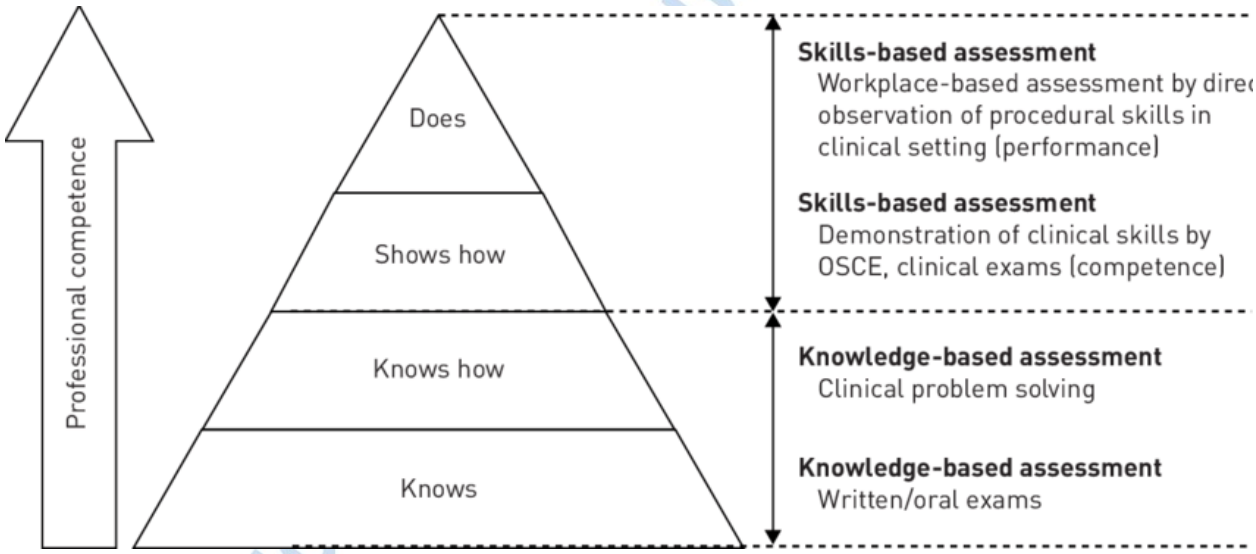


Figure 2. Millers Model

Source: THE IDEAL BOOK
https://www.tandfonline.com/doi/abs/10.1080/01421590802061613?journalCode=imte20

Knowledge is at the base of the pyramid. This represents the cognitive concept of learning. It represents what the student knows and it can be assessed with oral or written exam. To assess knowledge, researcher gave out pretest and posttest.

Nursing students should be able to solve clinical problems based on the knowledge gained in class. Shows how when the nursing students are able to demonstrate clinical skills by practical examination such as OSCE where students demonstrate clinical skills and competencies and the steps are checked off and they can be awarded marks. Does is where skills based assessment is done with a real patient. In this study, respondents were observed performing respiratory assessment on real patients using structured observation checklist.

2.3. Simulation

Simulation imitates of the real-world scenario or a patient, allowing nursing students to integrate the theory into practice in the nursing skills laboratory. (Salameh et al. 2021. Phases of stimulation include preparing, briefing, simulation activity and debriefing/feedback/evaluation.

In preparation the instructor prepares items that will be needed for the scenario and set up the equipment needed prior to the simulation session. Briefing involves telling students what to expect during simulation. It sets up the case scenario, objectives and the expected outcome. Students are set free to make mistakes during the simulation which will later be discussed during the debriefing.

Simulation involves the actual procedure that is carried out on the mannequin. This phase should be clear at the starting point to set up the context for the simulation. The activities are designed to facilitate skills learning and practice that they perform in a clinical situation on a real patient (Shorey et al 2021). The learning objectives should be met at the end of simulation.

Debriefing or evaluation should follow simulation session. During this stage, nursing students receive feedback from their instructor. Mistakes and correction actions are discussed to allow improvement of skills in their next performance. Students are also allowed to reflect their own performance and incorporate theory learned in class in to practice.

2.3 Empirical Literature Review

Nursing training needs integration of theoretical knowledge into practice (Shinnick & Cabrera, 2021). Simulation in nursing education is used to integrate knowledge in to practice before students are allowed to take care of real patients. High fidelity simulation illustrated in other studies shows that simulation is an important aspect in training nursing students. However, there is paucity of research done on the effectiveness of simulation using medium fidelity manikin among nursing students.

Currently, the healthcare education focuses on basic science education and leaves most skills training in an unsystematic process and unstructured (Silva,.et al 2021). Hospital placement experience most of the time does not allow nursing students to perfect their nursing skills or gain new knowledge due to challenges such as feeling anxious, no confidence in performing nursing procedures, fear of making mistakes, lack of competency and fear of the clinical environment. Due to this challenges, simulation is key in training nurses.

Simulation is the imitation of the real-world scenario, allowing nursing students to amalgamate theoretical concepts into practice in the nursing skills laboratory. (Salameh et

al. 2021). Fidelity level in simulation relates to how closely a simulation experience reflects reality. A simulation experience with high fidelity will have realistic sounds, graphics, and physics, as well as the ability to respond to user actions in a realistic manner. On the other hand, a simulation experience with low fidelity will have less realistic sounds, graphics, and physics, as well as an inability to respond to user actions in a realistic manner. In healthcare simulation, fidelity level relates to the degree to which a particular manikin can mimic human physiology (Raid et al.2020). The success of nurses in their profession begins in nursing schools where skills that define nursing practice are learned in skills laboratory via simulation. (Klenke et al. 2020)

Manikins for simulation include low, medium and high fidelity levels. Low fidelity are the anatomical models that are static with limited functionality used by nursing students to practice procedures such as injection (Chabrera et al. 2021). Medium fidelity manikins are those that can offer breath sounds, heart sounds or bowel sounds, but lack real physiologic functions. The high fidelity manikin closely resemble human anatomy and can generate physiologic functions and are programmed to react to interventions in real time and have features such as heart rate and palpable pulse, measurable blood pressure, electrocardiography displays and can die (Ingrid et al,. 2020).

2.4 Conceptual Literature Review

2.4.1 Knowledge on chest respiratory assessment among nursing students

2.4.2 Knowledge Acquisition on Anatomy, Physiology and assessment of respiratory system.

For nursing students and other medical practitioners, learning about the anatomy and physiology of the chest is crucial. In order to diagnose and treat a variety of

respiratory and cardiovascular disorders, it is essential to comprehend the anatomy and physiology of the chest. It helps medical professionals to effectively interpret imaging results and make well-informed decisions about patient care. Additionally, conducting treatments like thoracentesis, cardiac resuscitation, and chest tube insertion requires a fundamental understanding of chest anatomy and physiology.

The act of taking in and keeping in memory new information is referred as knowledge acquisition (Bennett, 2022). The success of knowledge acquisition is estimated by how easily the knowledge can be afterwards brought to mind. Lecturers and trainers of nursing students should use different methods of teaching to enhance knowledge acquisition.

2.4.3 Anatomy and Physiology of chest respiratory system

The upper and lower respiratory tracts make up the respiratory tract. The nose, larynx, and throat are examples of upper respiratory organs that are not part of the thorax. The thoracic organs that make up the lower respiratory tract are the alveolar duct, bronchi, bronchioles, trachea, and alveoli.

The second largest hollow region in the body is the chest cavity, sometimes referred to as the thoracic cavity. It is bounded to the front by the ribs and sternum, to the rear by the vertebral column, and to the side by the diaphragm, which divides it from the abdominal cavity. (Salameh et al. 2021). It includes the middle and lower airways as well as the lungs. The parietal pleura, a serous membrane, lines the chest cavity. The membrane is known as the visceral pleura where it extends over the lungs. The term "pleural cavity" refers to the region between the parietal and visceral pleura.

The lung consists of three surfaces, three boundaries, and an apex. The first rib is situated above the apex. The anterior, posterior, and inferior boundaries are the three borders. Anatomically, the right and left lungs are comparable yet asymmetrical. There are three lobes in the right lung: the right lower lobe, right middle lobe, and right upper lobe. There is only one right upper and lower lobe in the left lung.

Manu et al. (2019), noted in his study that students who practiced problem-based learning/Cooperative learning performed better in examination compared to students who attended deductive lecture. The study concluded that problem-based learning leads to higher knowledge acquisition compared to deductive lecture. It was reported that major limitations of traditional lectures included inability of students to easily transfer cognitive content to hospital settings while caring for the patients, monotony, failure of instructor to effectively demonstrate nursing skills due to large class sizes and limited practice of procedures by individual student (Manu et al,.2019).

The findings of a study by Cabañero (2021) indicated that peer tutoring is an effective means of teaching that promotes knowledge acquisition and facilitating their abilities to learn theory content.

Prerequisite units such as anatomy and physiology, pathophysiology, fundamentals of nursing, medical surgical nursing and health assessment are vital for the students' knowledge to conduct chest respiratory assessment. Preparing nursing students to meet with real patients entails an important part of teaching efforts within the university. (González et al., 2020).

2.5 Knowledge Retention on chest anatomy, physiology and assessment

Movement of information from short-term memory to long-term memory so it may be retrieved later is known as knowledge retention. (Hiromi et al, 2022). Knowledge retention on anatomy, physiology and assessment of chest injuries is crucial for nursing students and other medical professionals, especially those working in emergency medicine. Understanding the intricate structures and functions of the chest allows healthcare providers to accurately assess and diagnose potential injuries or abnormalities. Additionally, being well-versed in the assessment techniques ensures that prompt and appropriate interventions can be implemented, ultimately improving patient outcomes. Continuous education and staying up-to-date with the latest research and advancements in this field are essential for maintaining a high level of expertise and providing optimal care to patients.

For nursing students to be motivated to learn, it depends on their interests and environment. Intrinsic motivation allows students to take deeper interest in learning and retain knowledge even when facing challenges. Learners are more motivated to learn and retain knowledge that is directly relevant to them (Hiromi et al,.2022). There are several things that can inspire nursing students to learn. A desire to positively influence people's lives and assist others drives some nursing students. They are motivated by the urge to help patients in need and give them high-quality care. Other nursing students might be inspired by their own health-related experiences or by seeing the kind attention that nurses give to patients. Furthermore, the potential for job security and career progression can be powerful incentives for nursing students to learn and do well in their coursework.

Adult learning theory states that learning is a self - directed activity requiring motivation, desire and effort on the part of the student (González et al., 2020).

2.6 Knowledge Evaluation/ Assessment on chest anatomy and physiology.

Miller's pyramid states that the two lower level procedures, which require classroom-based evaluations, account for the cognitive components of competence (Cabañero et al 2021). Written tests are an essential component of medical education assessment which include multiple choice questions and short answer questions.

To make sure that nursing students have a firm grasp of the material covered in their courses, knowledge assessments are essential. Teachers can find any misconceptions or knowledge gaps that need to be corrected by routinely evaluating their students' knowledge. This makes it possible to offer support and interventions that are specifically targeted at the pupils, which eventually improves their learning outcomes. Furthermore, knowledge assessments can assist nursing students in recognizing their own advantages and disadvantages, enabling them to concentrate their study efforts on areas that still need improvement.

Pretest allows nursing students' trainers to find out what the students already know before teaching. Knowledge assessment is also used to gauge what the students have learned at the end of the course or program. Pretest is also used by researchers before treatment/intervention is administered so that effect of treatment can be assessed later on using posttest. Posttest is used to assess knowledge after training. This is used to evaluate effectiveness of the method used in training.

Pretest knowledge assessment among nursing students is used to evaluate their understanding and readiness for the course material (Cabañero et al 2021). By conducting pretests, educators can identify areas of weakness and tailor their teaching methods to effectively address these gaps.

2.7 Assessment of normal shape of the chest.

The normal shape of the chest is typically symmetrical and slightly convex. The ribcage expands outward from the sternum, creating a rounded appearance. The chest should be proportionate to the individual's body size and should not appear sunken or unusually protruding. In a healthy individual, the chest should allow for unrestricted movement of the lungs and diaphragm, facilitating proper breathing.

When sternum is depressed, the shape of the chest is referred to as pectus excavatum or funnel shaped chest. Pectus carinatum or pigeon chest is when the sternum and costal cartilages project outwards. Kyphosis is forward curvature of the spine and scoliosis is the lateral curvature of the spine.

Normally, the ribs fall at a 45-degree angle from the spine, resulting in a symmetrical chest. Both sides of the chest move simultaneously and symmetrically when breathing quietly. The average breathing rate is between 12 and 20 breaths per minute. While expiry is passive, inspiration is active. The typical ratio of inspiration to expiration is 1:2. The diaphragm and external intercostal muscles are the primary breathing muscles during regular silent breathing. During respiratory distress, patient might use other muscles such as sternomastoid, scalenes and trapezii muscles (Nursing Council of Kenya

Procedure Manual, 2019). This is referred to as use of accessory muscles during respiration.

2.8 Assessment of breath sounds

Normal breath sounds are created by airflow in the trachea and large airways. These sounds include vesicular, Broncho vesicular and bronchial breath sounds.

2.9.1 Vesicular breath sounds

Are low-pitched and gentle. They begin in inspiration and last uninterrupted for roughly one-third of the way till expiration. The majority of the peripheral lung fields, where air passes via smaller bronchioles and alveoli, produce vesicular breath sounds. (Raid et al.2020).

Vesicular breath sounds are quiet, low-pitched noises produced during inspiration. The passage of air through the lungs' alveoli and tiny airways is what causes them. It is typical to hear vesicular breath sounds over most lung fields. These sounds are similar to soft rustling or whispering, and the degree of them varies according on how hard a person is breathing. In healthy persons, these sounds are usually loud and clearly heard, and they are a crucial part of a comprehensive respiratory assessment.

2.9.2 Bronchovesicular sounds

It is possible to hear bronchovesicular noises during both inspiration and expiration. With a stethoscope, bronchovesicular breath sounds can be heard in the chest. The combination of vesicular and bronchial noises characterizes these sounds. Usually, they can be heard between the first and second intercostal gaps and over the upper

anterior chest. In addition to signaling adequate lung function, bronchovesicular breath sounds can also be an indication of some respiratory illnesses like pneumonia or bronchitis. (Raid et al.2020). Therefore, it is important for healthcare professionals to carefully assess and interpret these sounds in order to make an accurate diagnosis. The pitch and intensity of these sounds are modest. The majority of these sounds are detected above large bronchi, which are situated anteriorly around the sternum in the first and second intercostal spaces, posteriorly between the scapulae, and where there are less alveoli.

2.9.3 Bronchial breath sounds

Bronchial breath sounds are described as a harsh, high-pitched sound heard during auscultation of the lungs. They are typically heard in conditions such as pneumonia, bronchitis, or bronchiectasis, where there is inflammation or obstruction of the bronchial tubes. These sounds are caused by turbulent airflow through narrowed or obstructed airways and can be accompanied by crackles or wheezing. They are important clinical findings that help healthcare professionals diagnose and monitor respiratory conditions.

Bronchial breath sounds are useful for diagnosis, but they can also reveal information about the severity and course of respiratory disorders. For instance, a more severe blockage or inflammation in the airways may be indicated by a bronchial sound that is louder and more intense. Furthermore, by tracking variations in the strength and quality of these sounds over time, medical experts can assess the efficacy of therapy activities. (Raid et al.2020). All things considered, bronchial breath sound identification and interpretation are essential to the thorough evaluation and treatment of respiratory illnesses.

2.10 Adventitious / Abnormal Breath Sounds

Adventitious breath sound is described as abnormal sounds heard during auscultation of the lungs. These sounds can indicate a variety of underlying conditions, such as airway obstruction, lung inflammation, or fluid accumulation. Adventitious breath sounds can be classified into different types, including crackles, wheezes, and rhonchi. These sounds are crucial in diagnosing and monitoring respiratory conditions and are often an important component of a physical examination. Adventitious or abnormal sounds include crackles, wheezes and pleural rubs.

2.10.1 Crackles

Crackles can be indicative of various respiratory conditions, such as pneumonia, bronchitis, or pulmonary edema. Crackles are characterized by intermittent, high-pitched sounds that resemble the noise made when rubbing hair between fingers. These abnormal breath sounds are caused by the movement of air through fluid or mucus in the airways, highlighting the presence of an underlying lung issue.

2.10.2 Wheezes

Wheezes are described as a high-pitched, whistling sound that occurs during breathing. They are typically caused by narrowed or constricted airways, such as those found in asthma or allergies. Wheezes can be a symptom of an underlying respiratory condition and should not be ignored. It is important to seek medical attention if wheezing persists or is accompanied by difficulty breathing, chest pain, or coughing up blood.

2.10.3 Rhonchi

Rhonchi breath sound is typically characterized by low-pitched wheezing or rattling sounds. It is often caused by the narrowing or blockage of the airways due to mucus or inflammation. Rhonchi breath sounds can be heard during both inhalation and exhalation and are common in bronchitis, pneumonia, or chronic obstructive pulmonary disease (COPD). It is important for healthcare professionals to listen for and recognize rhonchi breath sounds as they can provide valuable information about a patient's respiratory health and help guide appropriate treatment interventions (Raid et al.2020).

2.11 Clinical Competency in performing chest respiratory assessment among undergraduate nursing students.

Miller's model fervently campaigned for the adoption of performance-based evaluations because it claimed that simulated practice offers a good simulation of how students would conduct in a real-world clinical scenario (Cabañero et al 2021). Simulation in nursing and clinical competency are closely intertwined.

Ability of nursing students to apply theoretical knowledge and practical skills in real-life patient care situations is called clinical competency. By demonstrating clinical competency, nursing students show their competence in performing various nursing procedures, such as administering medications, conducting assessments, and providing appropriate interventions.

Clinical competency is often assessed through clinical evaluations, where students are observed and evaluated on their ability to meet specific performance standards. Overall, developing and maintaining clinical competency is an essential aspect of nursing

education and ensures that students are well-prepared to provide safe and effective care to patients.

For undergraduate nursing students to demonstrate clinical competency, they must acquire the abilities and information necessary to carry out regular patient health assessments while they are in school (Ewan et al. 2018). A comprehensive health assessment of patients is an important competency for nurses. Comprehensive chest respiratory assessment follows the nursing process steps of assessment, planning, implementation and evaluation (ADPIE), (Nursing Council of Kenya, 2019). While implementing chest respiratory assessment, four techniques of health assessment are used. These includes inspection, palpation, percussion and auscultation.

2.11.1 Assessment

According to the Nursing Council of Kenya procedure manual (2019), assessment before commencing chest respiratory examination includes assessing patient's understanding of the procedure and readiness to undergo physical examination. Students should also ensure that the equipment / items required for the examination are in good working condition. Patients' social-cultural and religious beliefs regarding physical examination should also be considered. This will help to establish rapport and prepare the patient for the procedure.

Assessment phase may also include a thorough medical history, a physical examination, and diagnostic testing are all reviewed as part of the process. Inquiries on the patient's past medical history may include inquiries about allergies, surgeries, or respiratory ailments. The medical professional will listen to the patient's lung sounds,

look for any unusual breathing patterns, and examine the patient's chest for any indications of respiratory distress during the physical examination. To further assess the patient's respiratory function and find any underlying issues, diagnostic testing including chest x-rays and pulmonary function tests results may also be reviewed.

2.11.2 Planning

In planning stage, goals and outcomes are formulated that are used to take care patient. To guarantee successful outcome, objectives are specific to each patient (Takaedza and Nambuli, 2022). This phase is also called the outcomes phase and it is the stage that helps the nurse to formulate a plan of action for the patient's care.

Planning involves prior preparation of self, patient, environment and assembling equipment to be used for the chest respiratory assessment (Nursing Council of Kenya guidelines, 2019). In self-preparation, nursing students review knowledge on anatomy and physiology of respiratory system, review patient's history and review knowledge on chest respiratory assessment. During patient preparation, nurse establishes rapport with the patient, explain the need, risks and benefit of the procedure to the patient and obtain consent. Environment should be private, clean and has adequate lighting and ventilation.

Planning phase in respiratory assessment also involves gathering information about the patient. This information helps the healthcare provider determine the appropriate diagnostic tests and interventions for the patient. The planning phase also includes setting goals for the assessment, such as identifying any potential respiratory abnormalities or determining the effectiveness of current respiratory treatments. By

thoroughly planning the assessment, healthcare providers can ensure that they are providing adequate respiratory health care.

2.11.3 Implementation

Chest respiratory assessment constitute an essential part of physical examination. For the purpose of diagnosing and treating respiratory disorders, nursing practice must incorporate chest respiratory examination. When examining the chest for anomalies like diminished breath sounds, wheezing, or unusual lung sounds, nurses are essential. Through comprehensive examination, nurses are able to identify respiratory problems early on and start the right interventions, including oxygen therapy or chest physical therapy. To guarantee accuracy and improve the standard of treatment given to patients with respiratory disorders, regular practice and ongoing education in chest respiratory assessment techniques are required.

Chest close proximity and relationship to other organs such as the great vessels, the heart, diaphragm, and esophagus support the need to pay careful attention during assessment of the chest. According to Reyes, Modi, and Le (2022), a comprehensive assessment involves inspection, palpation, percussion, and auscultation.

2.11.4 Inspection

To assess normal circumstances and deviations, inspections make use of senses like vision, smell, and hearing. When evaluating each body system, inspection is utilized to obtain data on things like color, size, position, movement, texture, symmetry, scents, and sounds (Mattos et al, 2021).

This is the initial step of chest respiratory assessment. It yields valuable data on breathing patterns, barrel chest, pigeon chest, presence of thoraco-abominal breathing, and any use of accessory muscles (Nursing Council of Kenya, 2019). The examining medical personnel also collects data on the ability to speak which may be affected depending on the extent of respiratory compromise (Reyes, Modi, & Le, 2022). Additionally, any data on anatomical anomalies of the chest such as kyphosis or scoliosis can be obtained through the observation.

During inspection, a complete assessment of the patient's vital signs is part of the inspection process in nursing. The nurse will also evaluate the patient's overall appearance, taking note of their skin tone, personal cleanliness, and any indications of discomfort or distress. The nurse will also ask about the patient's present symptoms, medical history, and any medications they might be taking. The nurse can obtain crucial information from this thorough inspection that will inform their treatment choices and care plan.

2.11.5 Palpation

An integral component of a physical examination is the palpation of the chest during assessment. The medical professional can obtain crucial details regarding the patient's breathing system and general cardiac condition through touch. The healthcare professional palpates the chest to check for anomalies including lumps, sore spots, or unusual movements. This method helps in the diagnosis and treatment of a number of disorders affecting the chest and lungs and enables a more thorough examination.

According to study done by Schmucker & Abigail, (2021), palpation is incorporated to yield specific data on presence of bony crepitus of masses. The examiner utilizes both hands to assess tactile fremitus, which indicates pathologies such as pneumothorax or pleural effusion. Light and deep palpation of the anterior, lateral and posterior chest helps to note presence of nodules, tenderness and swelling (Nursing Council of Kenya, 2019). Palpation is also used to assess chest expansion of the patient.

Checking for pulsations, soreness, depressions, bulges, and paradoxical movement is the next step in palpating the thorax. Palpate the thorax symmetrically, comparing the chest's left and right sides. Palpation of the anterior chest should begin above the clavicles and proceed down it. The posterior chest will then be palpated, proceeding down and comparing the two sides commencing at the scapula region.

The nurse stands behind the patient and places both thumbs side by side along the spinal processes at the level of the 10th rib in order to measure respiratory expansion. When the patient inhales, the thumbs should spread equally and come back to rest when they exhale. Asymmetry suggests an issue with the thorax on one or both sides.

The last stage of chest palpation is known as tactile fremitus. The palpable vibrating of the chest wall during speaking is known as tactile fremitus. The technique involves asking the patient to utter words like "nighty nine" or "blue moon" while resting the edge or flat of the hand against the chest wall. Vibrations go through the lung tissue and are felt by the hand while the patient speaks. When tactile fremitus occurs, a decrease in vibration can be a sign of fluid or air in the pleural cavity. Additionally, it could be a sign of thickening between the chest wall and lungs. Consolidation may cause more

vibration because solid lung tissue transmits sound waves more easily than does air-filled lung tissue.

2.11.6 Percussion

Percussion elicits sounds along the chest wall that may indicate anomalies with fluid or air accumulation in the chest cavity (Reyes, Modi, & Le, 2022). Therefore, these techniques play a significant role in providing clinical data on an individual's health and should be performed with caution to aid in diagnosis and treatment of conditions associated with the chest. Percussion of anterior and posterior chest wall elicit sounds such as resonance, hyper-resonance and dullness which are used to make nursing diagnosis (Rao, 2021).

In cases of lung consolidation where the lung tissue in dense, percussion will elicit dull sound, whereas air filled lungs will elicit resonance sound, which is the normal sound of the lungs during percussion. Hyper resonance when lungs are hyperinlfated with air. This may occur in patients with chronic obstructive pulmonary diseases or patients with acute asthmatic attack. Hyper resonance on one side of the chest may indicate a pneumothorax.

Healthcare practitioners frequently utilize a technique called percussion of the chest to evaluate the health of the lungs and other organs. The examiner can find any anomalies like fluid buildup or solid masses by tapping on various parts of the chest. Lung cancer, pleural effusion, and pneumonia are among the ailments that this approach is very helpful in identifying. In the physical examination process, percussion of the chest is a useful technique that yields essential information on the respiratory health of the

patient. This approach is quick to execute at the bedside, non-invasive, and reasonably priced.

Percussion of the chest can reveal information about the size and location of the heart in addition to the state of the lungs. By mixing this with technique with other diagnostic tools such as auscultation, healthcare professionals can obtain a comprehensive understanding of a patient's respiratory status. The information gathered from percussion of the chest can then guide treatment decisions and help monitor the effectiveness of interventions over time.

2.11.7 Auscultation

Auscultation is a vital component of the respiratory system assessment during the chest examination. The medical professional listens for unusual breath sounds, such as crackles, wheezes, or reduced breath sounds, using a stethoscope. These results can assist diagnose respiratory diseases including pneumonia, asthma, or bronchitis and offer important information regarding the state of the lungs. Auscultation can also be used to track how well respiratory disorders therapies and treatments are working.

Using a stethoscope, auscultation entails listening for different sounds coming from the heart, lungs, and intestines (Mattos et al., 2021). Using a stethoscope, one can listen for and understand sounds coming from the thorax during a chest auscultation. The stethoscope's diaphragm is used to listen for breath sounds. Asking patients who self-ventilate to breathe with their mouths open will increase tidal volume without raising the risk of hypocapnia or the superfluous upper airway sounds that are frequently produced

while breathing through their noses. In order to identify abnormalities with breath sounds and air flow, it offers a thorough examination of every lung segment.

Auscultation is done from side to side and from top to bottom, starting from the apex of the lungs bilaterally anteriorly. Auscultation then proceeds to superior lobes bilaterally, inferior lobes bilaterally and middle lobe on the right only (Nursing Council of Kenya procedure manual (2019). Both sides are compared looking for symmetry and note the location and quality of the sounds. The same sequence is repeated posteriorly. Patient is assessed in a sitting up position and asked to take deep breaths through the mouth.

When comparing sides, auscultate the lung fields over the anterior chest from the supraclavicular apices to the second, fourth, and sixth intercostal spaces, noting the presence of adventitious sounds such crackles, wheezes, and rhonchi. To listen to the apex of the lungs, perform a posterior auscultation from the scapulae. Next, locate C7 and T3 between the spine and shoulder blades. Finally, compare sides and advance the stethoscope to T10. Throughout both inspiration and expiration, the nurse should listen.

By listening to at least one complete respiratory cycle that comprises inspiration and expiration at each place of the chest wall, the examiner should be able to distinguish four breath sound characteristics, including pitch, amplitude, duration, and specific characteristics of breaths. (Schmucker & Abigail, 2021). Normal breath sounds include vesicular over the lungs, bronchovesicular, bronchial and tracheal sounds. Abnormal or adventitious lung sounds includes crackles, wheezes, rhonchi and pleural rub that the student nurse should be able to identify.

2.12 Students' perception on importance of simulation session.

Perception is an assessment or a personal view about something (Preston et al., 2019). Depending on their unique experiences and preferred methods of learning, nursing students' perceptions of the value of simulation in their education differ significantly. For certain students, simulation can be a very useful tool for practice and skill development because it lets them experiment with various circumstances in a safe environment and makes mistakes that don't affect them. Others, on the other hand, would see simulation as nothing more than a toy, devoid of the uncertainties and difficulties that real-world healthcare providers might encounter.

The ability of simulation to close the knowledge gap between theory and practice and adequately educate students for the intricacies of the healthcare setting ultimately determines the value of simulation in nursing education. Student perceptions are a powerful tool for measuring effectiveness of teaching practices in the classroom, laboratories and in the clinical area. In the nursing skills laboratory, simulated scenarios depend on the learning objectives of a given moment. This allows students to develop the required knowledge, skills, and attitudes before they meet patients in a real clinical situation (Cabañero et al 2021)

According to study done by Meriam., et al (2020), the following themes under students' perception emerged following high fidelity simulation; decreased anxiety, increase critical thinking, enhanced communication skills, improved clinical judgment, boost confidence and performed better in head-to-toe assessment evaluation. A key

component of helping nursing students gain confidence is simulation. Integrating theory into practice

In order to produce competent and highly qualified nurses, the capacity to adapt what is learnt in the classroom to practice is fundamental. A study found out that the relationship between theory and clinical practice, both internationally and nationally has always been a concern in the nursing profession. (Mothiba et al, 2020)

Simulation aids in the development of critical thinking abilities. Students can relate theory to real-world conditions by participating in simulated scenarios. Before entering the clinical field, they can use this hands-on approach to build their confidence and make educated judgments in a controlled atmosphere. Furthermore, simulation affords students the chance to obtain prompt feedback and gain knowledge from their errors, thereby enhancing their overall proficiency in patient care.

According to study done by Li Zeng et al., (2021), 70% of the participants reported that simulation helped them to link theory they have learnt in class to practice. Simulation provide continuity and retention of knowledge. The quality of the simulation experience is reported to give leaners the opportunity to reflect on their knowledge and capacity to transfer cognitive skills into clinical practice (Ayse et al, 2021).

Applying theory to practice is essential for nursing students to become skilled healthcare practitioners. Through application of academic knowledge in real-world scenarios, nursing students can enhance their critical thinking, problem-solving, and decision-making abilities. Because of this integration, students now comprehend the importance of evidence-based practice and how it impacts patient outcomes. In the end,

the cornerstone of a prosperous nursing profession is the capacity to successfully apply theory to practice. High-fidelity simulation was seen by the students as a way to connect theory and practice. Additionally, it promotes collaboration, which gives people security in the face of emergency situations. (Cabrera et al., 2020).

2.12.1 Reduce Stress

Simulation in nursing has grown in popularity as a teaching and training tool for aspiring nurses. Through the use of realistic settings and tools, simulation gives trainees a safe and controlled environment in which to hone their skills (Cabañero et al 2021) Nursing students benefit from this since it not only helps them feel less stressed and anxious but also gets them ready for the high-stress scenarios they might face in actual healthcare settings. Furthermore, simulation gives students the chance to get advice and criticism from knowledgeable teachers, which improves their learning process and self-assurance in their nursing skills.

Memory formation can be increased by stress during the learning process, but stress can also affect the memory and retrieval of the information (Cabañero et al 2021). By allowing them to practice their skills in secure settings where emotions like fear and stress may be worked out and a better learning can be achieved, simulation in the skills lab allows students to emotionally prepare.

Stress can have negative consequences on cognition, including lowered attention and concentration, memory loss, and a higher rate of mistakes. These elements are represented in how students are taught and learn (Cabañero et al 2021). Simulation in the laboratory allows students to repeat procedures and this reduce the stress among students.

Nursing students frequently experience stress in the clinical setting, which can negatively affect both their general well-being and academic performance. A high-pressure atmosphere might result from the difficult nature of nursing education and the duty of providing patient care. Stress levels among nursing students can also be influenced by long hours, lack of sleep, and the psychological cost of seeing suffering and death. It is imperative that nursing schools and other educational institutions place a high priority on their students' mental health and offer them the support systems they need to effectively handle stress.

A research done by Honkavuo (2021) reported that students who did not attend simulation session in the laboratory exhibited nervousness during preparation of medication. This nervousness led to mistakes during the drug administration which were corrected by the qualified nurse before being administered to patient. The strategies that can reduce the stress among the nursing students is a challenge, but simulation can reduce stress significantly and may contribute to the safety of patients that this students will meet during their training process.

Techniques for stress reduction and laboratory simulation are becoming more and more common in the field of psychological research. Researchers can investigate human behavior in a safe and controlled context by modelling real-life scenarios in virtual environments. This lowers the tension and anxiety that are frequently connected to traditional laboratory settings in addition to enabling more precise data collecting. Furthermore, by giving participants a rare chance to practice coping strategies and stress-reduction methods, these simulations enhance their general well-being.

2.12.2 Boost confidence

Confidence is the belief that one can achieve a goal or finish an activity (Shorey et al 2021). Nurses must be competent and able to carry out operations autonomously in the hospital in order to complete a task. Inadequate confidence can quickly jeopardize one's capacity for independence, putting patients at risk. Nursing students' confidence is further boosted by simulation, which lets them make mistakes and grow from them without worrying about endangering actual patients. All things considered, simulation is a crucial part of nursing education that builds prospective nurses' confidence while also improving their practical skills.

Research by Shorey et al, 2021), showed that nursing students reported that "simulation alleviated their fear of confronting challenges at the clinical area while caring for the patient. Students said that practicing in simulated situations, receiving feedback, and engaging in supportive discussion helped them gain the confidence they needed to handle future clinical issues and provide patient care.

According to a study by Fernandes et al. (2020), 45.7% of the students felt that the simulation practice had given them experience, which had boosted their confidence when caring for patients. However, 40% of the students who did not participate in simulation were very anxious while performing dressing on a patient and were unable to do what they needed to.

2.12.3 Improves communication with patient and creating rapport

Effective communication among nursing students is essential for both teamwork and patient care. Nursing students share ideas, information, and experiences through a variety of platforms, including online forums, group projects, and in-person talks. According to study done by Jarelnape & Sagiron, (2023), simulation helped nursing students to improve their critical thinking and enhanced their communication skills. For nursing students, effective communication improves overall learning and creates a supportive learning atmosphere that encourages critical thinking.

Improved communication skills enable nursing students to effectively convey information, provides emotional support, and establish a strong rapport with their patients, ultimately enhancing the quality of care provided. Overall, these advancements in nursing education positively impact patient outcomes and contribute to the professional growth of future nurses. Students can put their knowledge and abilities to use in a controlled setting that resembles actual patient care circumstances by using simulated scenarios.

Through simulation, nursing students can make judgments, develop their self-confidence, and interact with patients and healthcare professionals more skillfully thanks to this practical experience. Effective communication is also key in helping nursing students to establish rapport with their patients.

2.12.4 Contempt

According to oxford dictionary, contempt is defined as the feeling that a person or something is worthless or beneath consideration. It is the action of disregarding someone or something that should be considered.

According to study done in Turkey by Shinnick & Cabrera (2021), simulation gives students the chance to continually practice their clinical abilities until they feel proficient. Additionally, students study at their own pace and are free to err before handling patients. However, since students are allowed to make mistakes freely during simulation, they can carry this attitude to the patient, thinking it is okay to make mistakes while caring for the patients.

5% of respondents in the study by Jarelnape & Sagiron, (2023) believed that making mistakes while providing care to a high fidelity manikin was not a problem. The students admitted that they might behave in this manner when treating patients in the real world. In accordance with the ethical standards and values that safeguard patients, nurses are obliged to uphold patient rights and to provide adequate, safe treatment. As a result, simulation exercises that can accurately represent clinical scenarios while upholding patients' rights should be used in the training process to shape nursing students' attitudes regarding patient rights (Ayse et al.,2021).

2.13 Summary of Literature Review

Simulation is the imitation of the real-world scenario, allowing nursing students to amalgamate theoretical concepts into practice in the nursing skills laboratory. Fidelity level in simulation relates to how closely a simulation experience reflects reality. A

simulation experience with high fidelity will have realistic sounds, graphics, and physics, as well as the ability to respond to user actions in a realistic manner. On the other hand, a simulation experience with low fidelity will have less realistic sounds, graphics, and physics, as well as an inability to respond to user actions in a realistic manner. In healthcare simulation, fidelity level relates to the degree to which a particular manikin can mimic human physiology. The success of nurses in their profession begins in nursing schools.

Ability of nursing students to apply theoretical knowledge and practical skills in real-life patient care situations is called clinical competency. By demonstrating clinical competency, nursing students show their competence in performing various nursing procedures, such as administering medications, conducting assessments, and providing appropriate interventions.

Clinical competency is often assessed through clinical evaluations, where students are observed and evaluated on their ability to meet specific performance standards. Overall, developing and maintaining clinical competency is an essential aspect of nursing education and ensures that students are well-prepared to provide safe and effective care to patients.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

Research design, area of study, target population, eligibility criteria for the participants, data collection tools and methods and data analysis and interpretation methods are described in this chapter. The research methodology and data gathering strategies used in this study are also described. The research design, including the selected approach and the rationale behind it, is outlined at the beginning of the chapter. A thorough description of the data collection techniques such as surveys, interviews, and observations is also provided. The chapter also covers the ethical issues that were taken into account to protect participants' privacy and well-being during the research procedure. All things considered, chapter three offers a thorough synopsis of the research techniques and protocols employed in this thesis.

Research methods refers to how the researcher designed the study systematically to get valid and reliable results that addresses the research aims, objectives and answers the research questions. It involves a variety of methods and instruments, chosen in accordance with the goals and nature of the study, including surveys, experiments, interviews, and observation. Reliability and validity of the methods employed are crucial for achieving precise and objective outcomes.

3.1 Research Design

This study adopted a cross-sectional quantitative pretest-posttest quasi experimental design. In a pretest-posttest design, measurements for both experimental and control groups are taken before and after treatment. To show a cause-and-effect link between an independent and dependent variable, a quasi-experimental design is used (Hennink et al, 2020). Quasi-experimental research designs, in contrast to actual experimental research designs, do not randomly allocate individuals to the experiment or control groups. Rather, groups are formed among participants according to non-random factors. In this study, participants were not randomly assigned to control and experimental group, but were assigned according to their class or year of intake.

Quasi experimental design seeks to answer the question of whether an intervention causes an outcome, by comparing the results of a group that has received the intervention to a group that has not. The groups are carefully selected and compared on relevant variables to reduce the outcome of confounding variables. The outcome of the experiment are then evaluated to determine the impact of the intervention.

3.2 Study location

Study was conducted at Mount Kenya University Nursing Skills Laboratory. Mount Kenya University is a private university in Kenya with approximately 10 satellite campuses in Kenya and within east Africa countries.

Both control group and experimental group attended the skills laboratory session at the Mount Kenya University, Thika. Both groups were then observed assessing respiratory system on patients at the Thika Level 5 Hospital, Kiambu county. Both the control and

the experiment groups were observed performing chest respiratory assessment on patients according to the Nursing Council of Kenya procedure manual guidelines (2019).

3.3 Target population

Undergraduate nursing students at Mount Kenya University who have direct entry to the nursing school after completing high school and have not trained in any course after high school were the target in this study. According to Busetto et al. (2020), the term "target population" in research refers to the specific group of people from which researchers intend to collect data and draw conclusions. Researchers must precisely define their target group in order to ensure the validity and generalizability of their findings. In this study, study population was further divided into experimental and control group. Experimental group are those who participated in simulation in the laboratory, while control group did not participate in the simulation session.

The target population can be described by a number of attributes, including age, gender, ethnicity, occupation, and any other pertinent details that are crucial to answering the research question under consideration. Researchers might extrapolate their findings to a wider context and draw conclusions about the broader group by choosing a representative sample from the target population (Busetto et al. 2020).

3.4 Eligibility criteria

3.4.1 Inclusion criteria

Students who have passed all the prerequisite units in previous semesters in first and second year of study and are eligible for clinical placement. The prerequisite units include anatomy and physiology, pathophysiology, pharmacology, fundamentals of

nursing, medical-surgical nursing and health assessment. Students who willingly consented to participate in the study were included in the study.

3.4.2 Exclusion Criteria

Undergraduate nursing students who were upgrading from nursing or midwifery diploma level to degree level in nursing were exempted from the study.

Undergraduate nursing students who have not passed all the prerequisite units and were not eligible for clinical placement were exempted. Students who differed their studies for different reasons were also not included in the study. Postgraduate nursing students were also excluded from the study.

3.5 Study variables

3.5.1 Dependent variable

A variable that changes as a result of the independent variable manipulation is called dependent variable (Clark et al, 2021). Dependent variable can also be referred to as response variable or outcome variable and it is recorded after the independent variable is manipulated.

In this study, dependent variable were grouped in three categories which included; students' knowledge on chest respiratory assessment, student's clinical competency on chest respiratory assessment and students' perception on importance of medium fidelity simulation. The outcome or response variable that is being measured or observed in a study is referred to as the dependent variable in research. It is the variable that the independent variable is thought to have an impact on or influence.

3.5.2 Independent variable

Independent variable is the cause in studies that test cause-and-effect relationship (Clark et al, 2021). In this study, simulation of chest respiratory assessment on a mannequin is the independent variable since all other variables will be measured in relation to either presence or absences of simulation. Independent variable is the variable that the researcher may change while doing the experiment and has control over. In scientific research, the independent variable is essential to determining the cause-and-effect relationship between variables.

3.6 Sampling technique and procedure

The study employed the non-probability sampling technique known as Purposive Sampling. In purposive sampling, samples are chosen based on demographic characteristics that are consistent with the study's goals and objectives (Andrade, 2021). Researcher only selected participants who have passed all the prerequisite units and are eligible for clinical placement.

Purposive sampling is used to choose participants according to predetermined standards. Purposive sampling, as opposed to random sampling, enables researchers to specifically select study participants who match study-relevant criteria or who exhibit particular characteristics (Clark et al, 2021). In quasi-experimental designs, this sampling technique is frequently employed to guarantee that the chosen participants accurately reflect the target community and can offer insightful information about the study subject

under investigation. Purposive sampling helps researchers get more relevant and useful data, which improves the validity and generalizability of the study's conclusions.

3.7 Sample size determination

Mount Kenya University has three hundred and five (305) direct undergraduate nursing students who were the target population in this study. The sample size was determined using Yamane's formula, as shown by Chaokromthong & Sintao (2021). Yamane sample size determination is a widely used method in research to determine the appropriate sample size for a study. This method helps researchers ensure that their study is statistically significant and representative of the population they are studying.

$$n = \frac{N}{1 + N * (e)^2}$$

Where:

N = Total population (305)

e = Margin of error which is ±5%

n = sample size

1 is the standard coefficient

n = 305

1 + 305 ×(0.5×0.5)

n = 305/1.7625

n = 173

The sample size included a 10% non-response

Where n+10%(n) that is 173+10%×173

173+17= 190.

Therefore, the sample size was 190 students.

3.8 Data collection tools and methods

This study utilized a pretest quiz for both the control and the experimental groups to assess knowledge on chest respiratory assessment before the refresher course. According to study done by Ansquer et al (2019), showed that there was decline in performance of specific procedures among medical students at 6 months, and total loss of skills at 2 years. The study recommended for re-training on specific procedures every 2 years to maintain acceptable performance among health care workers. For this reason researcher conducted refresher course among the participants before data was collected since health assessment is done in first year of their study and data was collected among 3rd and 4th year students.

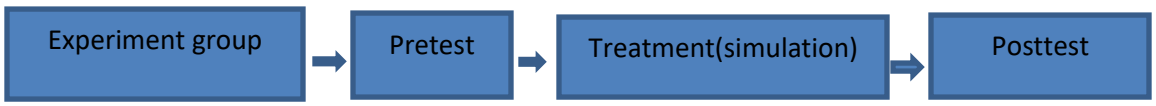
Both groups (Experimental and Control groups) visited the nursing skills laboratory to practice respiratory assessment. Experimental group were taken through chest respiratory assessment using medium fidelity manikin while control group watched a recorded video on chest respiratory assessment. This was done within 3 days following

the refresher course and it was done in a group of ten participants to allow easy follow up during the simulation and observation in the clinical area. After 24 hours, 70% is lost and within one week 90% of the information is forgotten. For this reason, researcher conducted simulation within 3 days post training to enhance knowledge retention among the experimental group.

Control group also attend the laboratory session on chest respiratory assessment. They did not use the medium fidelity mannequin for simulation, however they watched a video on respiratory assessment. Debriefing was done and questions, answers and discussion session was conducted in the laboratory.

Structured observational checklist method was used to check off performance of chest respiratory assessment on real patients for both groups at the Thika Level 5 Hospital. Observation checklist focusing on the four techniques of assessing chest respiration which include inspection, palpation, percussion and auscultation was utilized in the clinical setting. This observation check list was derived from the Nursing Council of Kenya Procedure manual (2019).

Both the control and experimental groups were observed in the clinical area performing chest respiratory assessment on patients within one week of training in groups of ten participants. Posttest to assess knowledge and data on students' perception on importance of medium fidelity simulation was collected using self-administered questionnaire.



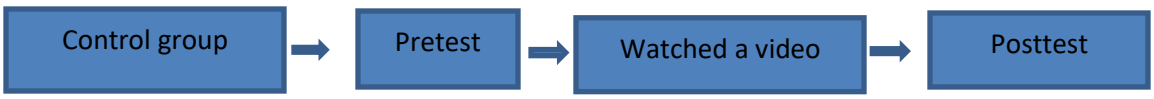


Figure 3. Flowchart illustrating different treatment for experimental and control groups.

Source: Researcher 2024

3.9 Validity and reliability

Validity can be described as measure of what the study intended to measure or measure of the truth or accuracy of the claim (Hennink et al, 2020). To minimize performance bias during observation, researcher used single blinded technique. Researcher did not disclose to the participants which group is experimental and which group is control group. After data was collected, participants were informed which group they belonged to; the experimental group (those who participated in simulation) and control groups (those who did not participate in the simulation).

Data was first collected from the control group before the experimental group attended laboratory simulation session on respiratory assessment. This helped in controlling John Henry effect. When individuals in the control group are aware that they are being compared to the experimental group, this happens. This could lead them to change how they act in an attempt to make up for what they perceive to be a disadvantage. A pilot study involving second year undergraduate nursing student was also done at Mount Kenya University using 10% of the sample size which is 19 students was used to test validity of data collection tools.

3.10 Data Management and Analysis

3.10.1 Data cleaning

Initial stage was to remove incomplete questionnaires or irrelevant observation check list. Researcher ensured that the observation checklist is precise and in line with the study's broad and specific objectives. Researcher ensured that all the questionnaires and observation checklist are well coded and grouped in either control or experimental group. The questionnaires and observation checklist for experimental group were coded blue and for control group were coded red.

Researcher also checked for any missing data from all the questionnaires and observation checklist to ensure completeness of the data collected. Data collected were stored safely in a computer with a password protection. Filled observation checklist and questionnaires were kept in a lockable cupboard safely for reference and future use.

In order to guarantee the precision and dependability of the data gathered, data cleansing is a crucial stage in the research process. Researchers can reduce bias and raise the caliber of their study by resolving these problems. Furthermore, data cleaning makes data more compatible and comparable to other datasets, which helps researchers get deeper meaning from the data and make wise decisions.

3.10.2 Data analysis and interpretation

A T- test analysis was done to compare performance of control and experimental group. Null hypothesis was rejected, meaning there was statistical significant difference in knowledge and clinical competency on chest respiratory assessment between the control and the experimental groups. Measures of frequency (percentages), central

tendency (mean, median, and mode), and dispersion (standard deviation) were calculated in order to further analyze the results. To show the data, graphs, tables, pie charts, and histograms were employed.

Interpreting and analyzing data are essential tasks in research that help make sense of the information gathered. After the data is collected, it must be arranged and scrutinized in order to detect trends, patterns, and connections. This entails analyzing the data and coming to relevant conclusions by applying a variety of statistical tools and procedures. Researchers can learn more about their study issue and make defensible decisions by analyzing the data. Ultimately, accurate and trustworthy results from research investigations depend on the interpretation and analysis of data.

3.11 Ethical consideration

The preliminary ethical approval was sought from Mount Kenya University's School of Postgraduate as well as from Mount Kenya University Ethical Review Committee. The researcher also got approval from County Government of Kiambu and Thika Level 5 Hospital's research and ethics committee. National Commission of Technology and Innovation (NACOSTI) also granted ethical approval. Participants who took part in the study did it voluntarily. The study also adhered to principles of informed consent from patients before chest respiratory assessment was performed.

The procedure that was done on the patients is non-invasive to eliminate risk of injury to the patient and to uphold the nursing code of ethics "doing no harm to patient" during the study. Informed consent from the patients was also obtained. Patients assessed gave consent before the procedure and privacy was also be maintained.

Ethical clearance was received from different institutions as follows;

Mount Kenya University Ethics and Review committee- 27/2/2023

National Commission for Science, Technology and Innovation (NACOSTI) - 4/4/2023

County Government of Kiambu – 18/4/2023

Thika Level 5 Hospital – 21/7/2023

Ethical clearance is an essential step in ensuring the safety and welfare of study participants. An ethical review board or committee must carefully examine the research proposal and weigh the advantages and disadvantages of the project. Obtaining participants' informed agreement, which guarantees their voluntary involvement and comprehension of the study's goals and methods, is another requirement for obtaining ethical approval. In the end, ethical clearance acts as a safety net to guarantee that research is carried out sensibly and ethically, respecting the values of justice, integrity, and fairness.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.0 Introduction

Data analysis, research findings and interpretation of results are discussed in this chapter. Verification of the hypothesis is also described. Questionnaires and observation checklist were carefully analyzed and data gathered was presented clearly with the aid of tables, percentages and graphs.

Evaluating the effectiveness of utilizing medium fidelity simulation manikin on chest respiratory assessment among undergraduate nursing students of Mount Kenya University (MKU) was the aim of this study. Results of this study answered the following questions; 1. What is the level of knowledge on chest respiratory assessment, 2. How the clinical competency on performing chest respiratory assessment was affected by simulation and what was the students' perception on importance of simulation of chest respiratory assessment among undergraduate nursing students at Mount Kenya University?

4.1 Description of respondents' personal data

Table 1

Distribution of Respondents by Age

Age	Frequency	Percent	Frequency	Percent
18-20 years	16	17.4	6	7.3

21-23 years	70	76.1	71	86.6
24-26 years	6	6.5	5	6.1
Total	92	100	82	100

Table 1 shows the age distribution for both the experimental and control groups. Ages between 21 years and 23 years 76.1% and 86. 6 % respectively. Age between 18 and 20 years were 17.4% and age between 24 and 26 years were 6.5% for experimental group, and control group had 7.3% and 6.1% respectively. This suggests that majority of the respondents were aged between 21- 23 years for both the experimental and control groups at 76.1% and 86.6% respectively.

Table 2

Distribution of Respondents by Gender

Respondent's Gender	Experimental Group		Control Group	
	Frequency	Percent	Frequency	Percent
Male	49	53.3	40	48.8
Female	43	46.7	42	51.2
Total	92	100	82	100

Table 2 shows that male were 53.3 % and female were 46.7% for experimental group and control group had 51.2% female and 48.8% male. Both gender were fairly represented in both groups and there was no gender disparity among the respondents.

4.2 Description of dependent variables

In this study, students' knowledge level and clinical competency on chest respiratory assessment was examined. Their perception on importance of simulation was also assessed.

4.2.1 Knowledge on chest respiratory assessment

Pretest was used to assess student's knowledge on chest respiratory assessment. Areas assessed were description of barrel chest, normal ration of inspiration to expiration, identification of muscles used during normal breathing and how to assess respiratory expansion. Participants were further assessed on normal lung sounds on percussion, how to perform tactile fremitus, identify normal sounds heard on auscultation and identify the points and sequence of auscultation comparing left and right lungs. On pretest, experimental and control group scores were 50.0% and 50.5% on average respectively.

On posttest, respondents were asked to describe of barrel chest, normal ration of inspiration to expiration, identification of muscles used during normal breathing and how to assess respiratory expansion. They were also assessed on normal lung sounds on percussion, how to perform tactile fremitus, identify normal lung sounds heard on auscultation and identify the points and sequence of auscultation comparing left and right lungs.

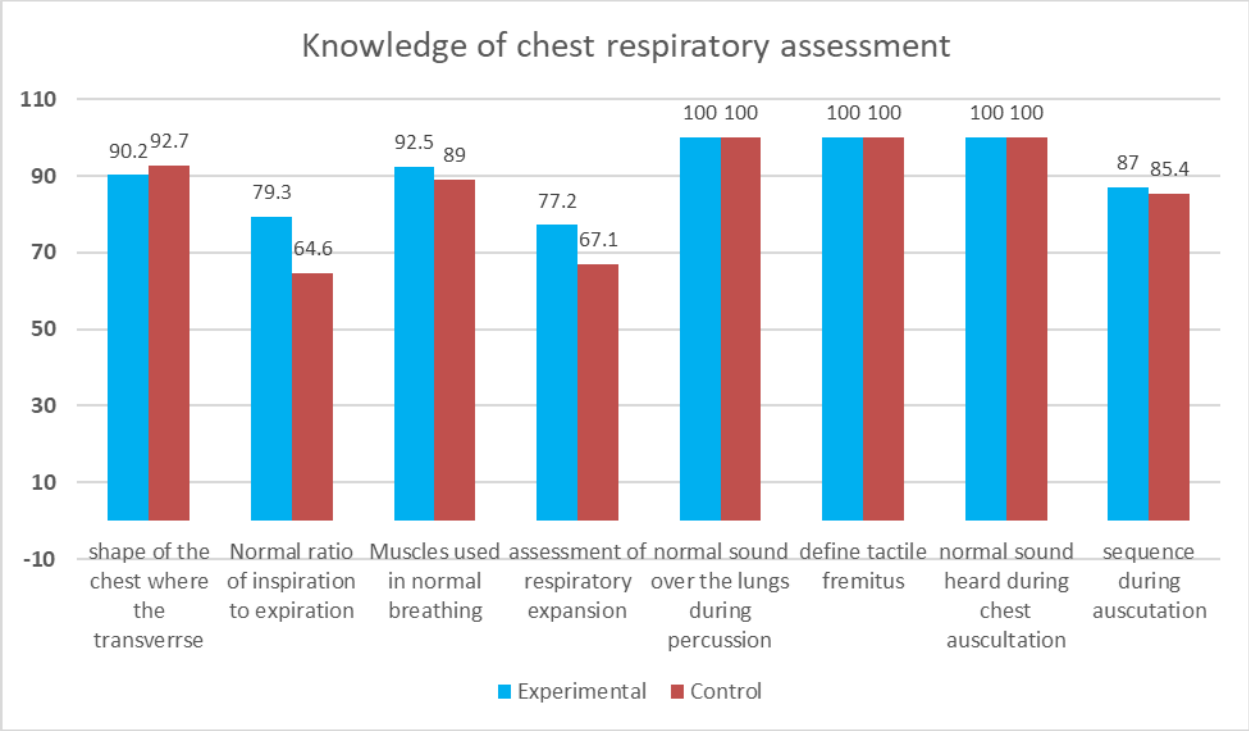


Figure 4. Knowledge Scores Between Experimental and Control Groups

Source: Researcher 2024

The above figure shows the results of knowledge on chest respiratory assessment for both the experimental and control groups. The eight observations that were assessed included description of barrel chest, normal ration of inspiration to expiration, identification of muscles used during normal breathing and how to assess respiratory expansion. They were also assessed on normal lung sounds on percussion, how to perform tactile fremitus, identify normal lung sounds heard on auscultation and identify the points and sequence of auscultation comparing left and right lungs.

Results from the study showed that 92.7% of the control group were able to identify barrel chest where transverse diameter of the chest is equal to anterior-posterior diameter while 90.2% of the experimental group were able to identify barrel chest. In this question control group performed better than the experimental group.79.3% of the experimental group were able to identify normal ration of inspiration to expiration while 64.6% of control group were able to identify ratio of inspiration to expiration. In this observation, experimental group performed better than the control group.

For the normal muscles used for normal breathing, 92.5% of the experimental group got it right and 89% of the control group got it right. Experimental group scored higher than the control group in this observation. This study also showed that 77.2% of the experimental group were able to describe assessment of respiratory expansion while 67.1% of the control group were able to describe respiratory expansion. Experimental group scored higher than the control in this observation. All the respondents (100%) from both the control and experimental groups were able to identify normal lung sounds on percussion, define tactile fremitus and identify normal lung sounds during chest auscultation.

On further assessment, 87.5% of experimental group were able to identify sequence during auscultation while 85.4% of the control group were able to identify the sequence of lung auscultation. Under this objective, in three observations, both experimental and control group scored the same marks at 100%. Experimental group scored higher in four observations and control group scored higher in one observation.

Hypothesis was tested to show if there was statistical difference in knowledge between nursing students who participated in medium fidelity simulation and those who did not participate in simulation session.

Table 3

Group Statistics on Difference in Knowledge between Experimental and Control Group

	Type of data	N	Mean	Std. Deviation	Std. Error Mean
Individual score	Experimental	92	91.832	9.6750	1.0087
	Control	82	88.111	10.3753	1.1458

Table 4

T-test for Equality of Means

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
Individual score	Equal variances assumed	.015	3.7205	1.5204

Equal variances not assumed	.016	3.7205	1.5265

On assessment of knowledge, experimental group had a **mean score of 91.8% with Standard Deviation 9.68**. Control group had a **mean of 88.11% with Standard Deviation of 10.38.** Statistically, if a P-value is less than 0.05 at 95% confidence level, the correlation coefficient is significant. In this study, the **P-value = .016**. This suggests that there was statistical significant difference in knowledge on chest respiratory assessment between experimental and control groups.

4.2.2 Clinical competency on performing chest respiratory assessment

Comprehensive chest respiratory assessment was assessed following the nursing process steps of assessment, planning, implementation and evaluation (APIE) as outlined in the Nursing Council of Kenya Procedure Manual (2019). While implementing chest respiratory assessment, four techniques of health assessment were used. These techniques includes inspection, palpation, percussion and auscultation.

4.2.2.1 Assessment and Planning Phase

On assessment, respondents were assessed if they were able to prepare the patient for the procedure and assemble all the equipment / items needed for the assessment. In planning for the procedure, respondents were assessed on reviewing patients' history, establish rapport with the patient during the procedure. They were also assessed on explaining the procedure to the patient and obtaining consent, explaining the role of the patient during the procedure. Respondents were assessed on ensuring patient's privacy

during the procedure and ensuring that equipment / items are clean and placed within reach.

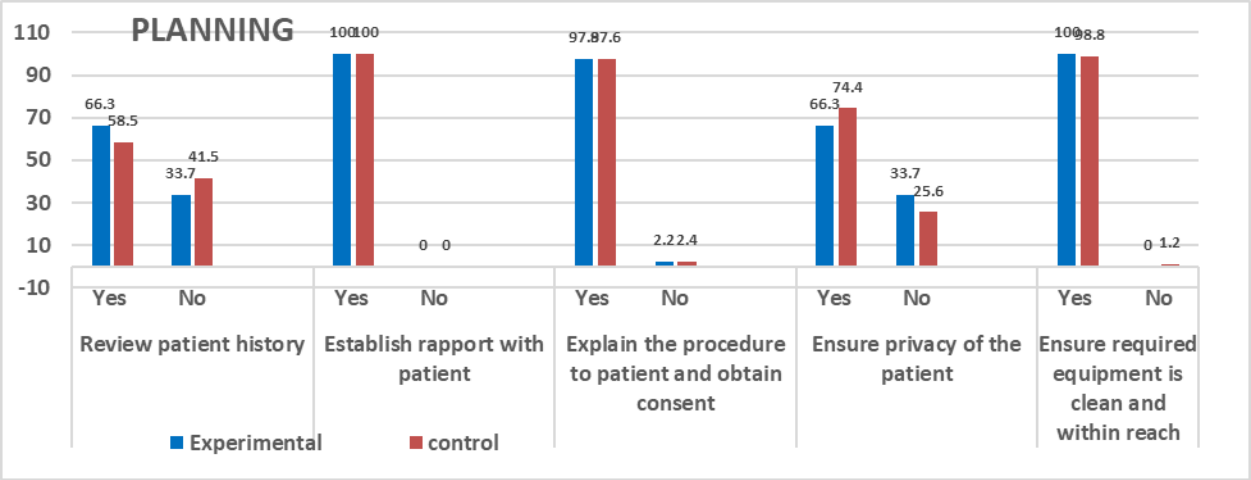


Figure 5. Bar Graph illustrating assessment and planning for chest respiratory assessment to examine clinical competency.

Source: Researcher 2024

In the planning stage, 66.3% of the experimental group and 58.5% were able to review patient history. All participants were able to establish rapport with patients at 100% each. 97.8% of experimental and 97.6% of control groups were able to explain the procedure to the patient. 74.4% of control group and 66.3% of experimental ensured privacy for the patient and all the participants in experimental group at 100% ensured required equipment were clean and within reach while 98.2% of control group ensured equipment were clean and within reach. Average score for experimental group is 86.2% and average score for control group is 84.2%. This suggests that experimental group performed better in planning than the control group.

4.2.2.2 Implementation phase

On implementation, four techniques of inspection, palpation, percussion and auscultation was used. Respondents were assessed on washing hands and donning gloves and exposing chest only during the procedure.

4.2.2.3 Inspection

On inspection, respondents were examined on assessing of thoracic cage noting shape and configuration for example barrel and pigeon chest. Respondents were also assessed on inspecting movement of posterior and anterior chest; noting symmetry and deformities such as scoliosis and kyphosis, skin color and condition and also assessment on use of accessory muscles during respiration.

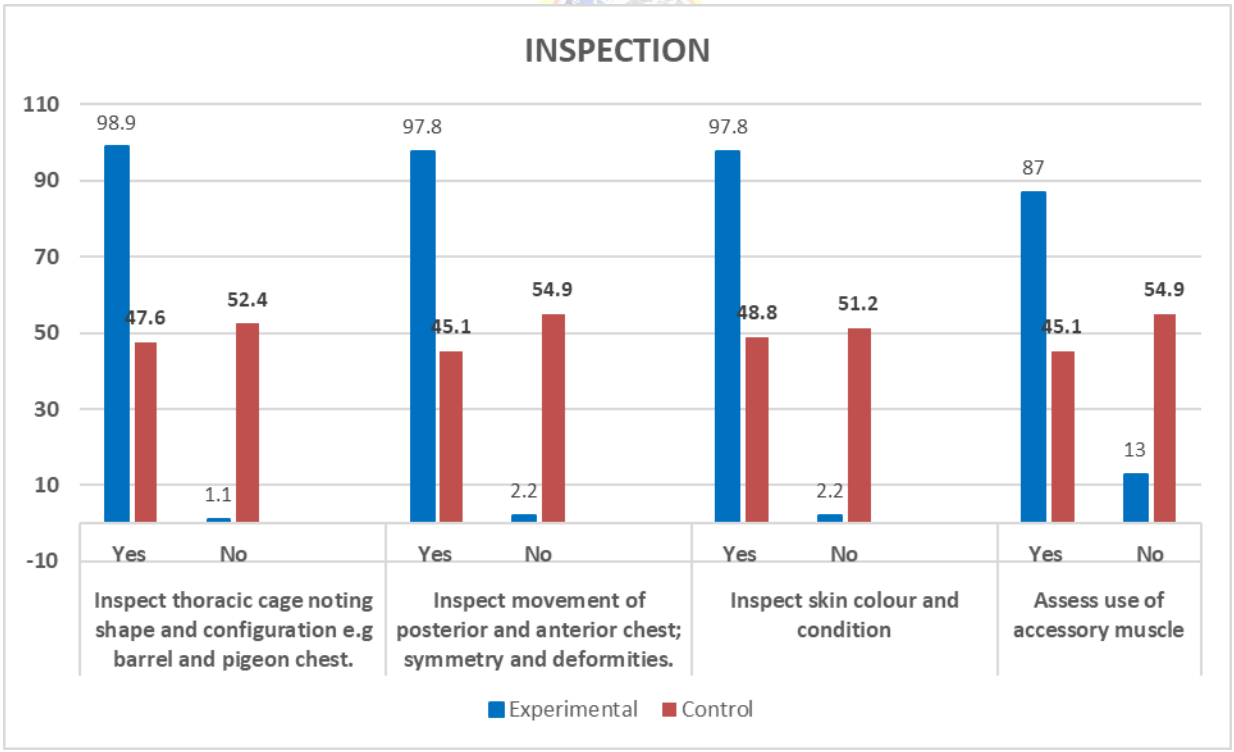


Figure 6. Bar Graph illustrating inspection results on chest respiratory assessment to assess clinical competency

Source: Researcher 2024

On inspection, 98.9% of experimental group were able to inspect the thoracic cage noting shape and configuration while 47.6% of the control group were able to inspect thoracic cage. On inspecting movement of anterior and posterior chest. 97.8% of experimental and 45.1% of control were able to inspect movement of anterior chest, symmetry and deformities. On inspection of skin color and condition, 97.8% of experimental group inspected, while 48.8% of control were able to inspect skin color. 87.0% of experimental group and 45.1% of control group were able to assess use of accessory muscles. On average, experimental group scored 95.4% while control group scored 46.7% on inspection. This suggests that experimental group performed better on chest inspection than control group.

4.2.2.4 Palpation and Percussion

On palpation, respondents were assessed on palpation of the anterior, lateral and posterior chest noting nodules, tenderness and swelling. They were also assessed on performance of tactile fremitus. On percussion, respondents were assessed percussing anterior and posterior chest wall noting sounds such as resonance, hyperesonance and dullness.

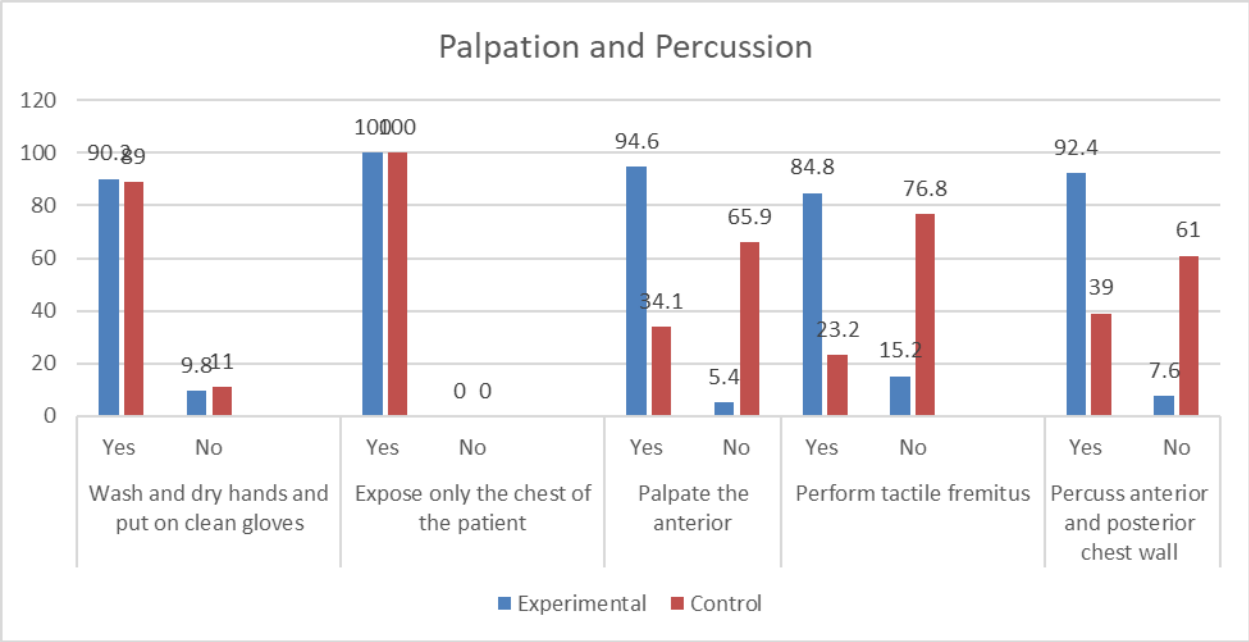


Figure 7. Bar Graph illustrating Palpation and Percussion results on chest respiratory assessment to assess clinical competency

Source: Researcher 2024

On palpation and percussion both experimental and control group were able to wash hands at 90.2% and 89% respectively. Both groups were able to expose only patients' chest at 100% each. On palpating the anterior chest, 94.6% of experimental group and 34.1% of control group were able to palpate anterior chest noting nodules and tenderness. 84.8% of experimental group were able to perform tactile fremitus while 23.2% of control group were able to do so. 92.4% of experimental were able to percuss anterior and posterior chest wall while 39% of control group were able to percuss anterior and posterior chest. Averagely, experimental group scored 92.8% while control group

scored 57.06% on palpation and percussion. This suggests that experimental group performed better in palpation and percussion than the control group.

4.2.2.5 Auscultation

On auscultation, respondents were assessed on instructing patient to breathe through the mouth and taking deep breaths during auscultation. They were also assessed on auscultating lung fields over the anterior chest from the apices in the supraclavicular, to 2nd intercostal space, to 4th intercostal space down to mid-axillary at the 6th intercostal space noting presence of adventitious sounds such as crackles, wheeze and rhonchi, proceeding down from side to side listening to one full inspiration and expiration in each location.

Posteriorly, respondents were assessed auscultating from the scapulae to listen to the apex of the lungs. Then auscultate over Cervical Vertebrae 7, then Thoracic Vertebrae 3 in between the shoulder blades and spine. Finally, respondents were assessed moving stethoscope through to Thoracic Vertebrae10 while comparing sides.

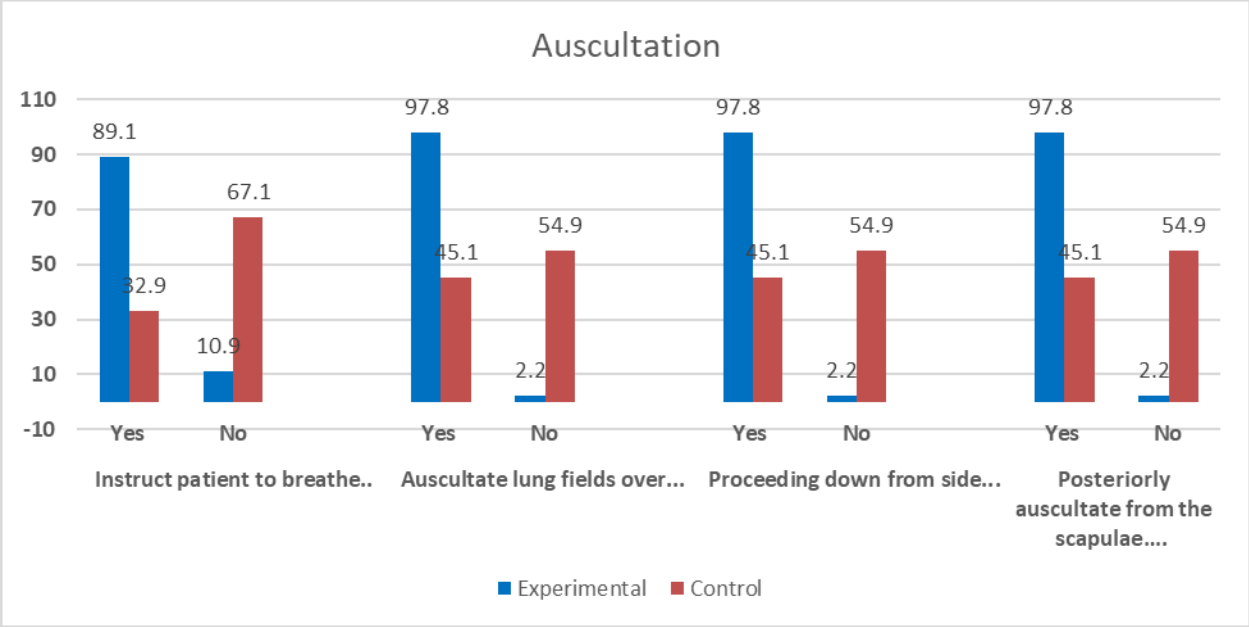


Figure 8. Bar Graph illustrating Auscultation results of chest respiratory assessment to assess clinical competency

Source: Researcher 2024

The above bar graph 10 shows the auscultation results. 89.1% of experimental were able to instruct the patient to breathe through the mouth while performing auscultation while 32.9% of control group were able to do so. On auscultation of lung fields, 97.8% of experimental group were able auscultate lung fields while 45.1% of control group were able to auscultate anterior lung fields correctly and proceed down from side to side comparing sides. 97.8% of experimental group were able to auscultate posteriorly from the scapulae while 45.1% of control group were able to do the same. Averagely, 95.6% of experimental group and 42.1% of control group were able to auscultate the chest correctly.

4.2.3 Hypothesis testing on Clinical Competency between experimental and control group

Table 5

Group Statistics on clinical competency between experimental and control groups

Group Statistics

	responden t	N	Mean	Std. Deviation	Std. Error Mean
ASSEMBLE REQUIRED EQUIPMENTS	experimen t	92	1.01	.104	.011
	control	82	1.02	.155	.017
REVIEW PATIENT'S HISTORY	experimen t	92	1.34	.475	.050
	control	82	1.41	.496	.055
ESTABLISH RAPPORT WITH PATIENT	experimen t	92	1.00	.000a	.000
	control	82	1.00	.000a	.000
EXPLAIN AND OBTAIN CONSENT	experimen t	92	1.02	.147	.015
	control	82	1.02	.155	.017

EXPLAIN TO PATIENT ROLE	experimen t	92	1.34	.475	.050
	control	82	1.26	.439	.048
ENSURES PATIENT'S PRIVACY	experimen t	92	1.00	.000	.000
	control	82	1.01	.110	.012
WASH AND DRY HANDS & WEAR GLOVE	experimen t	92	1.10	.299	.031
	control	82	1.11	.315	.035
EXPOSE ONLY PATIENT'S CHEST	experimen t	92	1.00	.000a	.000
	control	82	1.00	.000a	.000
INSPECTS THORACIC CAGE(SHAPE)	experimen t	92	1.01	.104	.011
	control	82	1.52	.502	.055
INSPECT CHEST MOVEMENT(Symmetry)	experimen t	92	1.02	.147	.015
	control	82	1.55	.501	.055

INSPECT SKIN COLOUR AND CONDITION	experimen t	92	1.02	.147	.015
	control	82	1.51	.503	.056
ASSESS USE OF ACCESSORY MUSCLE	experimen t	92	1.13	.339	.035
	control	82	1.55	.501	.055
PALPATE CHEST NOTING NODULES	experimen t	92	1.05	.228	.024
	control	82	1.66	.477	.053
PERFORM TACTILE FREMITUS	experimen t	92	1.15	.361	.038
	control	82	1.77	.425	.047
PERCUSS ANTERIOR & POSTERIOR CHEST	experimen t	92	1.08	.267	.028
	control	82	1.61	.491	.054
INSTRUCT TO BREATH THRU' THE MOUTH	experimen t	92	1.11	.313	.033
	control	82	1.67	.473	.052

AUSCULTATE ANTERIOR LUNG FIELDS	experimen t	92	1.02	.147	.015
	control	82	1.55	.501	.055
PROCEEDING DOWN FROM SIDE TO SIDE	experimen t	92	1.02	.147	.015
	control	82	1.55	.501	.055
AUSCULTATE POSTERIOR LUNG FIELDS	experimen t	92	1.02	.147	.015
	control	82	1.55	.501	.055

The above table 5 shows the areas that experimental and control groups were observed on to assess clinical competency of chest respiratory assessment. Participants performed assessment on patients. Generally, experimental group performed better than the control group.

Table 6

T-test of clinical competency between experimental and control group (p-value)

	Type of data	N	Mean	Std. Deviation	Std. Error Mean
Individual score	Experimen tal	92	92.67	6.602	.688

	Control	82	62.23	12.118	1.338

4.2.4 Independent Samples Test

Table 7

Independent sample test

Independent Samples Test

		T-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
Individual score	Equal variances assumed	.001	30.442	1.458
	Equal variances not assumed	.001	30.442	1.505

Clinical competency score between the experimental and control groups were compared using an independent sample t-test. Experimental group had a **mean of 92.67** with standard deviation of **6.602**. Control group had a mean of 62.23 with **standard deviation of 12.118**. The **P-value = .001.** With 95% confidence level, p-value <.005 suggests that there is statistical difference between the two groups. With p-value of .001,

there was statistical significant difference between the experimental and control group in clinical competency of chest respiratory assessment. This suggests that simulation helps to improve clinical competency compared to students who watched the video on chest respiratory assessment.

Therefore, null hypothesis is rejected since the P-value = .001. The null hypothesis stated that there was no difference in clinical competency on respiratory assessment between those who participated in simulation and those who did not participate. Alternative hypothesis is supported. It stated that there was difference in clinical competency on respiratory assessment between those who participated in simulation and those who did not participate

4.3 Students' perception on importance of simulation of chest respiratory assessment.

Respondents' perception on importance of simulation of chest respiratory assessment was assessed separately where experimental group and control group had two sets of observations to choose from. Linkert scale between one and five was used (1-5) and the numbers one to five represented strongly disagree, disagree, neutral, agree and strongly agree respectively.

4.3.1 Perception of experimental group on importance of chest respiratory assessment simulation.

Experimental group responded to the following statements; simulation help reduce stress while taking care of real patient, does it improve performance of the procedure, does simulation promotes decision making and critical thinking. Respondents

further responded if simulation helps to integrate theory into practice, promotes confidence during procedure, reduce risks to patients and improve students' self-efficacy.

Table 8

Perception results of experimental group on importance of chest respiratory assessment simulation.

Statement	Disagree		Neutral		Agree		Strongly agree	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Helps to reduce stress during the procedure on a patient	3	3.3	13	14.1	27	29.3	49	53.3
Helps to improve performance of procedures (psychomotor skills)	0	0	0	0	24	26.1	68	73.9

Promotes decision making and critical thinking	0	0	3	3.3	35	38.0	54	58.7
Helps to integrate theory into practice	0	0	3	3.3	3	3.3	86	93.5
Promotes confidence during procedure	0	0	10	10.9	12	13.0	70	76.1
Reduce risks to patients	0	0	2	2.2	20	21.7	70	76.1
Improve students' self-efficacy	0	0	4	4.3	17	18.5	71	77.2

As shown on table 8 above, Majority of the participants at 53.3% strongly agreed that simulation help reduce stress while taking care of real patient. 73.3% strongly agreed that simulation helped them to performance the procedure and 58.7% strongly agreed that simulation promotes decision making and critical thinking. 93.5 % of respondents strongly agreed that simulation helps to integrate theory into practice, 76.1% strongly agreed that simulation promotes confidence during procedure and reduce risks to patients. 77.2% strongly agreed that simulation improve students' self-efficacy while they were taking care of the patient.

4.3.2 Perception of experimental group on importance of chest respiratory assessment simulation.

Control group responded to the following statements; I found it difficult to communicate with patient, I was anxious during the procedure, I found it difficult to explain the procedure to patient, I did not have confidence when performing the procedure and it was difficult to apply what I learnt in class to patient care.

Table 9

Perception results of control group on importance of chest respiratory assessment simulation.

Statement	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent

I found it difficult to communicate with patient	1	1.2	5	6.1	3	3.7	30	36.6	43	52.4
I was anxious during the procedure	0	0	0	0	8	9.8	34	41.5	40	48.8
I found it difficult to explain the procedure to patient	3	3.7	4	4.9	8	9.8	25	30.5	42	51.2
I did not have	1	1.2	5	6.1	10	12.2	27	32.9	39	47.6

confidence when performing the procedure.										
It was difficult to apply what I learnt in class to patient care.	0	0	1	1.2	4	4.9	21	25.6	56	68.3

In the control group, 52.4% reported that they found it difficult to communicate with patient. 48.8% reported that they were anxious during the procedure, 51.2% found it difficult to explain the procedure to patient and 47.6% reported that they did not have confidence when performing the procedure. Respondents who reported that it was difficult to apply what they learnt in class to patient care were 68.3%.

4.4 Discussion

4.4.1 Effect of simulation to nursing students' knowledge on chest respiratory assessment.

On assessment of knowledge in pretest, control and experimental groups did not exhibit difference in knowledge. On pretest, experimental and control groups had mean scores of 50.0% and 50.5% respectively. Researcher used multiple choice question to allow easy analysis of the results.

On the posttest, there was difference in performance between the control and experimental groups. On assessment of knowledge, experimental group had a **mean score of 91.8% with Standard Deviation 9.68**. Control group had a **mean of 88.11% with Standard Deviation of 10.38.** Statistically, if a P-value is less than 0.05 at 95% confidence level, the correlation coefficient is significant. In this study, the **P-value = .016**. Therefore, null hypothesis is rejected. The null hypothesis stated that there was no difference in knowledge on respiratory assessment between those who participated in simulation and those who did not participate in simulation. Alternative hypothesis is supported. It stated that there was difference in knowledge on respiratory assessment between those who participated in simulation and those who did not participate in clinical competency.

This suggests that there was difference in knowledge on chest respiratory assessment between experimental and control groups. Experimental group performed better since they had a higher mean than the control group. This finding agrees with a study done by Klenke et al. (2020) in Kansas, United States of America that showed that

students who were trained using high-fidelity simulation following a normal lecture achieved higher scores in acquired and retained basic life support knowledge than students who did not attend laboratory simulation after the lecture.

This study also supports a different study by Bos-Boon et al. (2021) that found that clinical rotations and lectures alone do not help nursing students retain information or develop their critical thinking abilities. According to the study, using simulation in a safe and secure setting without endangering patients helps student nurses retain information and develop their critical thinking abilities.

4.4.2 Effect of simulation to clinical competency on chest respiratory assessment.

Clinical competency on performing chest respiratory assessment was evaluated using structured observation checklist. Both control and experimental groups were able to follow the nursing process steps of assessment, planning and implementation. Clinical competency score between the experimental and control groups were compared using an independent sample t-test. Experimental group had a **mean of 92.67** with standard deviation of **6.602**. Control group had a **mean of 62.23** with **standard deviation of 12.118**. The **P-value = .001.** With 95% confidence level, p-value <.005 suggests that there is statistical significant difference between the two groups. With p-value of .001, there was statistical significant difference between the experimental and control group in clinical competency of chest respiratory assessment. This suggests that simulation helps to improve clinical competency compared to students who watched the video on chest respiratory assessment.

This study showed that students who attend laboratory simulation perform better in assessing the real patient in the clinical area. This is in agreement with a study done by Olaussen et al (2020) that found out that simulation provides a suitable methodology for performing skills necessary to be an effective practicing nurses. The study further stated that simulation is used to integrate knowledge learned in class in to practice before students are allowed to take care of real patients in the hospital.

Another study by Joset, (2019) found out that without laboratory simulation sessions, undergraduate nursing students can experience difficulty in integrating cognitive concepts into practice and this may expose patient to risks by compromising patient's safety.

4.4.3 Students perception on importance of simulation of chest respiratory assessment.

On assessing the respondents' perception on importance of simulation, both the experimental and control groups agreed that it is vital for the nursing students to attend the simulation sessions before they attend to patients in the clinical area. Majority from the experimental group at 53.3% and 73.9% strongly agreed that attending simulation helped them to manage stress and improve performance of procedure respectively.

In this study, 76.1% reported that simulation helped them to boosted their confidence and reduce risks to patients while attending to the patient. This agrees with the study done by Al Gharibi & Arulappan (2020) where participants consistently described the benefits of laboratory simulation using high fidelity such as improved self-confidence and enhances stress management skills. Another study by Boss-Boon, (2021)

showed that there was improvement on teamwork, communication, collaboration and technical skills among students who participated in high fidelity simulation.

Control group acknowledged that they did find it was not easy to communicate with patients and they were anxious during the procedure at a score of 52.4% and 48.8% respectively. 68.3% reported that and they had difficulty in applying what they learnt in class to patient care (chest assessment). This finding agrees with the study done by Marco and Kalolo, (2019), which identified barriers that affected performance of procedures in the clinical such as low confidence and anxiety that arises from fear of making mistakes, lack of competency and fear of the clinical environment. The study further acknowledged that laboratory simulation can address this factors before students go to clinical area to handle patients.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter has summary, conclusion and recommendation. The researcher evaluates and explains the importance of the study's results in the discussion section. A fuller comprehension of the research findings and their ramifications is made possible by this section. The study effort comes to an end with a conclusion that highlights the key discoveries. Lastly, the recommendations offer viable solutions to the problems raised in the study or potential directions for additional research.

5.1 Summary

In this study, researcher evaluated the effectiveness of simulation of chest respiratory assessment among nursing students at Mount Kenya University. The research answered three questions which included; how does simulation affect nursing students' knowledge on chest respiratory assessment, how does simulation affect clinical competency on performing chest respiratory assessment among nursing students and what is the nursing students' perception on importance of simulation of chest respiratory assessment at Mount Kenya University?

This study adopted a cross-sectional quantitative pretest-posttest quasi experimental design. Study participants were undergraduate nursing students at Mount Kenya University who have passed all the prerequisite units and were eligible for clinical

placement. The study employed the non-probability sampling technique known as Purposive Sampling where samples were chosen based on demographic characteristics that are consistent with the study's goals and objectives.

Data was collected from both control group and experimental group after visiting nursing skills laboratory. Control group watched video on respiratory assessment in the laboratory followed by debriefing and discussion. Experimental group then visited nursing skills laboratory and were taken through chest respiratory assessment using medium fidelity manikin simulation. Both groups were taken through refresher course of chest respiratory assessment. Structured observational checklist method was used to check off performance of chest respiratory assessment on patients in the clinical area to assess clinical competency on both the experimental and control group. Posttest to assess knowledge and data on students' perception on importance of medium fidelity simulation was collected using self-administered questionnaire. Data was analyzed using SPSS version 27 and the presented in tables and graphs.

5.2 Conclusion

Evaluating effectiveness of medium fidelity simulation among undergraduate nursing students at nursing training institution gave more insight in understanding the importance of simulation in nursing training. From previous studies, high fidelity manikin simulation as shown effectiveness in helping nursing students to integrate theory into practice. However, the role of medium and low fidelity manikin simulation has been poorly understood. This study addresses the current paucity of research in this area and provides evidence based practice to nursing profession.

Results of this study showed that there was difference in knowledge and clinical competency of chest respiratory assessment between undergraduate nursing students who participate in medium fidelity simulation (experimental group) and those who did not participate in the simulation (control group) with P-values of .001 and .016 respectively. Therefore, a P-value of less than 0.05 is typically considered statistically significant and null hypothesis that stated that there was no difference in knowledge and clinical competency between control and experimental groups is rejected. Evidence supported alternative hypothesis that respondents who attended laboratory simulation performed better in knowledge and clinical competency than those who did not attend laboratory simulation.

5.3 Recommendation

This study recommends that the Nursing Council of Kenya, management of higher learning institutions and nursing training schools to prioritize incorporation of simulation in the curriculum. This study further recommends relevant ministries such as Ministry of Education and Ministry of Health to equip nursing training institutions with simulation laboratories across the country. This study results can also be used as evidenced based practice by Mount Kenya University management to look for ways to motivate students to attend laboratory simulation sessions.

This research study revealed that simulation in the skills laboratory is a vital prerequisite for nursing students before they attend to real patients in the clinical area. On this basis, further investigation should be done on:

1. Factors that can motivate nursing students to attend laboratory simulation using high of medium fidelity mannequins.

2. Investigate the long-term effects of simulation by conducting a follow-up study with nursing students 6 months to one year after completion of simulation session.

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APPENDICES

Appendix I: Consent form

Dear participant,

I am Vera Akinyi Okoth,, Masters student at Mount Kenya University. I am conducting a study to Evaluate Effectiveness of Medium Fidelity Simulation Manikin on chest respiratory assessment.

Your response will be anonymous, confidential and our participation in this survey is completely voluntary. You are NOT required to write your name or admission number in the pretest examination or in the questionnaire.

Title of the research project: Evaluation of Effectiveness of Medium Fidelity Simulation Manikin on Chest Respiratory Assessment among Undergraduate Nursing Students at Mount Kenya University, Thika.

Thank you.

For further clarification, please call or send a text message to;

Principal investigator: Vera Akinyi Okoth

Contact: 0727710340

Objective of study: The study will evaluate the effectiveness of utilizing medium fidelity simulation manikin on chest respiratory assessment using Miller's Model among undergraduate nursing students at Mount Kenya University.

Procedure: Principal investigator will administer to you a pretest quiz (MCQ's) following a short refresher course on chest respiratory assessment. Later on, you will be observed in clinical area performing chest respiratory assessment on a patient. Questionnaire will also be administered by the principal investigator or Research assistants to fill to the best of your knowledge.

Benefits: Results of the study will be shared with MKU School of nursing and the administration, Nursing Council of Kenya and policy makers to incorporate simulation as a strategy of teaching and look for ways on how to motivate students to attend simulated laboratory sessions.

Costs and Compensation to participants: There is neither cost nor compensation for participation in this study.

Voluntary participation/ refusal/ discontinuation: Your participation is entirely voluntary. You are free to withdraw from the study at any time without any explanation.

Participant's consent statement

I have read and understood this consent form. I understand that my participation in this study is voluntary. The information I give will be confidential and my response will be anonymous. I may choose to withdraw at any time. I freely agree, without cohersion to participate in this research study.

Participant's signature_____ Date_____

Investigator's signature _____Date _____

Thank you

Appendix II: Questionnaire

Instructions:

Please do not write your name or admission number on the questionnaire.

Answer all questions accurately and provide honest answer.

Biographic data.

How old are you……..?

What is your gender?

Male ( )

Female ( )

Students' learning experience and perception on importance of medium fidelity simulation manikin on chest respiratory assessment.

Did you attend the laboratory simulation on the chest respiratory assessment in the laboratory?

Yes ( )

No ( )

Do you think simulation of nursing procedures is important before you attend to patients in the clinical are?

Yes ( )

No ( )

How did attending the laboratory simulation on chest respiratory assessment help you to perform the procedure on the patient (answer if you attended laboratory simulation?)

Use a likert scale of 1-5, where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree.

Statement	1	2	3	4	5
Helps to reduce stress during the procedure					
Helps to improve psychomotor skills					
Promotes critical thinking					
Helps to integrate theory into practice					
Promotes confidence during procedure					
Reduce risks to patients					
Improve students' self-efficacy					

What challenges did you face as a result of not attending the simulation of chest respiratory assessment in the laboratory (answer if you did not attend laboratory simulation)

Use a likert scale of 1-5, where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree.

Statement	1	2	3	4	5
I found it difficult to communicate with patient					
I was anxious before and during the procedure					
I found it difficult to explain the procedure to patient					
I did not have confidence when performing the procedure.					
It was difficult to apply what I learnt in class to patient care.					

Appendix III: Observation checklist

General Objective

S.No.	CRITERION	Y	N	REMARK
ASSESSMENT				
	Patient's understanding of the procedure			
	Patient's readiness to undergo chest respiratory assessment			
	Assemble equipment required for the examination			
PLANNING				
	Review patient history			
	Establish rapport			
	Explain the procedure to patient and obtain consent			
	Explain the role of the patient during the procedure			
	Ensure privacy of the patient			

	Ensure required equipment is clean and within reach			
IMPLEMENTATION				
	Assist the patient to change into examination gown			
	Position Patient appropriately			
	Wash and dry hands and put on clean gloves			
	Expose only the chest of the patient			
Inspection				
	Inspect thoracic cage noting shape and configuration e.g barrel and pigeon chest.			
	Inspect movement of posterior and anterior chest; symmetry and deformities.			
	Inspect skin colour and condition			
	Assess use of accessory muscle			
Palpation				
	Perform light and deep palpation of the anterior, lateral and posterior chest noting nodules, tenderness and swelling			
	Perform tactile fremitus.			

Percussion				
	Percuss anterior and posterior chest wall noting sounds such as resonance, hyperesonance and dullness.			
Auscultation				
	Instruct patient to breathe through the mouth and take deep breaths.			
	Auscultate lung fields over the anterior chest from the apices in the supraclavicular down to the 6th rib noting presence of adventitious sounds such as crackles, wheeze and rhonchii.			
	Proceeding down from side to side as shown in the diagram, listening to one full respiration in location			
	Listening to lung fields over posterior chest from apices along the 7th cervical bone down to the 6th rib noticing crackles, wheeze and rhonchi.			

Appendix IV: Originality Report

Vera Akinyi

EVALUATING EFFECTIVENESS OF SIMULATION IN LEARNING RESPIRATORY ASSESSMENT AMONG NURSING STUDENTS O...

Thesis 2024 December Graduation

Documents 2024

Mount Kenya University

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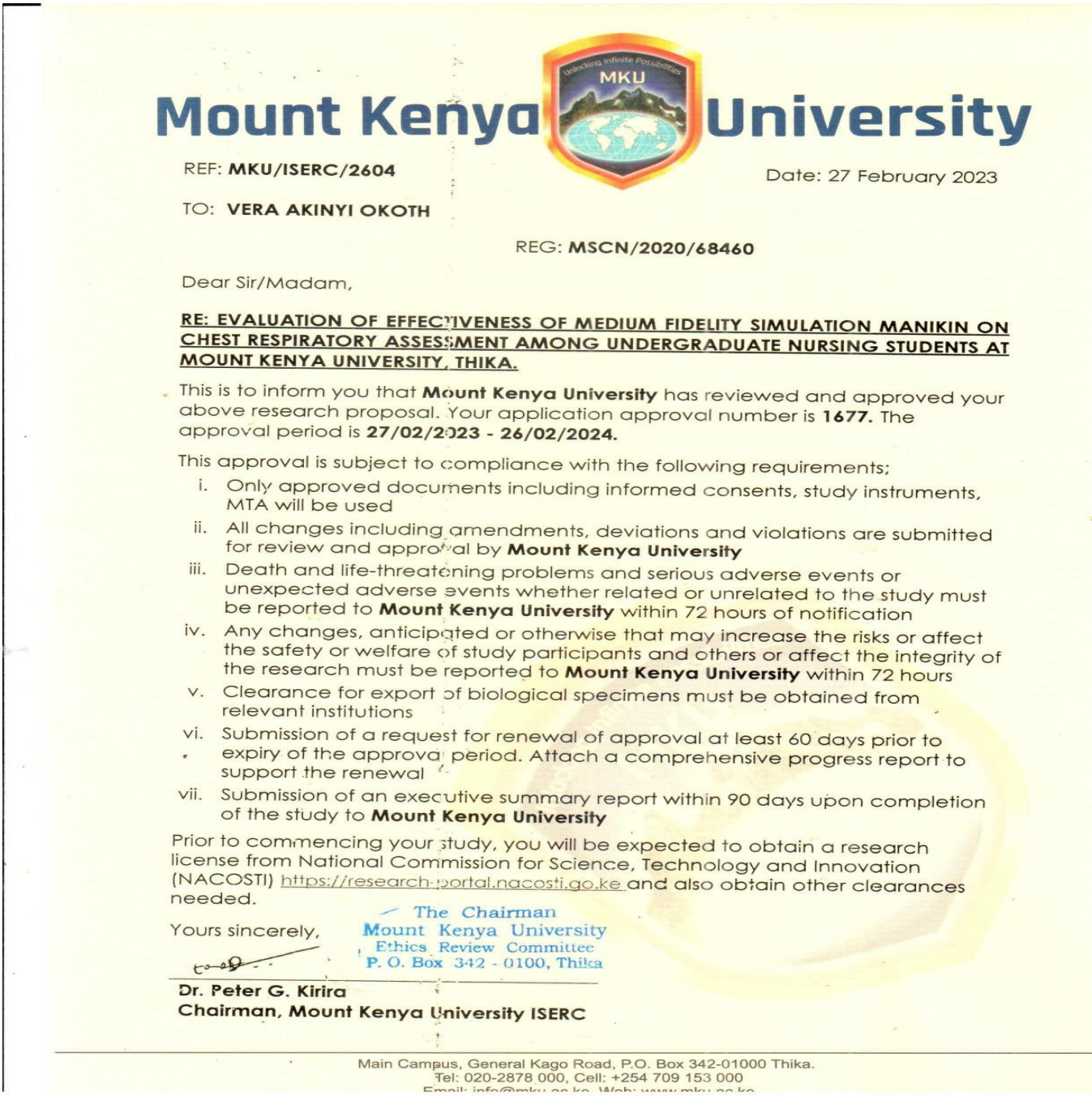
Appendix IV: Ethical Clearance Certificates



Mount Kenya University

REF: **MKU/ISERC/2604**

Date: 27 February 2023

TO: **VERA AKINYI OKOTH**

REG: **MSCN/2020/68460**

Dear Sir/Madam,

RE: EVALUATION OF EFFECTIVENESS OF MEDIUM FIDELITY SIMULATION MANIKIN ON CHEST RESPIRATORY ASSESSMENT AMONG UNDERGRADUATE NURSING STUDENTS AT MOUNT KENYA UNIVERSITY, THIKA.

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **1677.** The approval period is **27/02/2023 - 26/02/2024.**

This approval is subject to compliance with the following requirements;

i. Only approved documents including informed consents, study instruments, MTA will be used
ii. All changes including amendments, deviations and violations are submitted for review and approval by **Mount Kenya University**
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **Mount Kenya University** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal
vii. Submission of an executive summary report within 90 days upon completion of the study to **Mount Kenya University**

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

Dr. Peter G. Kirira
Chairman, Mount Kenya University ISERC

Main Campus, General Kago Road, P.O. Box 342-01000 Thika.
Tel: 020-2878 000, Cell: +254 709 153 000

Mount Kenya University

DIRECTORATE OF GRADUATE STUDIES

MSCN/2020/68460

28th February, 2023

National Commission for Science Technology & Innovation (NACOSTI)
Off Waiyaki Way, Upper Kabete,
P.O Box 30623- 00100
NAIROBI, KENYA

Dear Sir/Madam,

RE: VERA AKINYI OKOTH - REGISTRATION NO. MSCN/2020/68460

The purpose of this letter is to introduce the above named student who is pursuing **Master of Science in Nursing** in the department of **Nursing Education Leadership Management and Research** in the **School of Nursing.**

The title of the research is **"Evaluation of Effectiveness of Medium Fidelity Simulation Manikin on Chest Respiratory Assessment Among Undergraduate Nursing Students at Mount Kenya University, Thika."**

It has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data between **March, 2023 and May, 2023.**

Any assistance accorded to the student will be highly appreciated.

Thank you.

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Dr. Samuel M. Kareriga, Ph.D
Director, Graduate Studies
Enc.

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATIO

Ref No: **132223**

Date of Issue: **04/April/**

RESEARCH LICENSE

This is to Certify that Ms.. Vera Akinyi Okoth of Mount Kenya University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu on the topic: EVALUATION OF EFFECTIVENESS OF MEDIUM FIDELITY SIMULATION MANIKIN ON CHEST RESPIRATORY ASSESSMENT AMO UNDERGRADUATE NURSING STUDENTS AT MOUNT KENYA UNIVERSITY, THIKA. for the period ending : 04/April/2024.

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The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under th Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be t regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Ke is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
    i. Endanger national security
    ii. Adversely affect the lives of Kenyans
    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
    vi. Adversely affect the rights of communities
    vii. Endanger public safety and national cohesion
    viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance wit the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a rep of its findings to the Commission for necessary action.

National Commission for Science, Technology and Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
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COUNTY GOVERNMENT OF KIAMBU
DEPARTMENT OF HEALTH SERVICES

All correspondence should be addressed to HEAD
HRDU – HEALTH DEPARTMENT
Email address: mndiritu@gmail.com
mkwasa@live.com
Tel. Nos: 0721641516
0721974633

HEALTH RESEARCH AND DE
UNIT
P. O. BOX 2344 – 00900
KIAMBU

Ref. No.: KIAMBU/HRDU/23/04/18/RA_OKOTH Date: 18th April 2023

TO WHOM IT MAY CONCERN

RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY

Kindly note that we have received a request by Ms. Vera Akinyi Okoth of Mount Kenya University to carry out a study in Kiambu County, the research title being **"Evaluation Of Effectiveness Of Medium Fidelity Simulation Manikin On Chest Respiratory Assessment Among Undergraduate Nursing Students At Mount Kenya University, Thika"**.

We have duly inspected her documents and found that she has been cleared by NACOSTI to carry out the research for a period ending **4th April 2024**. She thus doe not need any further clearance with another regulatory body in order to conduct research within the county of Kiambu.

However, it is incumbent upon the institution where she is carrying out research to ensure that she receives adequate supervision during the process of conducting the research. This note also accords her the duty to provide a feedback on her research the county at the conclusion of her research.

DR. MWANCHA KWASA
COUNTY CLINICAL RESEARCH OFFICER
KIAMBU COUNTY

COUNTY GOVERNMENT OF KIAMBU

DEPARTMENT OF HEALTH SERVICES

Telephone: +254722106797
Email address: **thikal5hospital@gmail.com**

When replying please quote:

THE MEDI
SUPERINTEN
P. O. BOX 227 -
THIKA

Ref: CGK/TL5H/07/16/2023

Date: 21st July, 2023

APPROVAL TO CARRY OUT RESEARCH

PRINCIPAL INVESTIGATOR: VERA AKINYI OKOTH

RE: A STUDY ON EVALUATION OF EFFECTIVENESS OF MEDIUM FIDELITY SIMULATION MANIKIN ON CHEST RESPIRATORY ASSESSMENT AMONG UNDERGRADUATE NURSING STUDENTS AT THIKA LEVEL 5 HOSPITAL.

Following deliberations by Thika Level 5 Hospital's Training, Research and Ethics Committee (TR and subject to provision of all the necessary licenses and ethical approvals, your proposal to carry o above referenced research, at this facility, has been approved.

This approval is subject to the following mandatory conditions:

1. You shall submit a copy of the abstract of the final report, through the above contact details.
2. Where called upon, you shall be expected to make a feedback presentation to the hospital's Tr Research and Ethics Committee.
3. You shall maintain ethical consideration and the research subjects' confidentiality as outl your proposal.
4. Any patient confidential information that you may access during your research should not without consent.
5. You shall make payments of applicable research fees to the hospital before commencing r activities.

This letter is valid up to 20th September, 2023. For any queries feel free to contact the committe through the Medical Superintendent's office or Training, Research and Ethics Committee Office.

Thank you and all the best.

SUSAN GATEI
FOR: CHAIRPERSON, TRAINING RESEARCH & ETHICS COMMITTEE,
THIKA LEVEL 5 HOSPITAL

Appendix V: Map of the study area