FACTORS AFFECTING EARLY IDENTIFICATION OF SEPSIS AMONG INTENSIVE CARE UNIT NURSES AT MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM, TANZANIA

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By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Nursing (Critical Care and Trauma) at

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CERTIFICATION

The undersigned certifies that he/she has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **Factors affecting early identification of sepsis in nursing practice among intensive care nurses at Muhimbili National Hospital, Dar Es Salaam, Tanzania**, in partial fulfillment of the requirements for the degree of Master of Science in Nursing (Critical Care and Trauma) of the Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania.

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Prof. Edith Tarimo

Supervisor

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Date

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Hamza Lilenga

Co-Supervisor

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Date

DECLARATION AND COPYRIGHT

I, Asteria Julius, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature _____ Date _____

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Thank you, Almighty.

For always setting the stars in my favor,

Throughout my journey, my spouse has consistently provided me with unwavering support, belief, guidance, encouragement, love, and heartfelt prayers. He has also reminded me that I could succeed in your own unique ways and has always been there for me when I needed help or assistance, God bless you abundantly.

To my family especially the house help who always covers my responsibilities of caring for the children and housekeeping when I was busy with school;

To my parents who always believe I can do anything to accomplish my dreams

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.

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DEDICATION

To my Parents

Chief Julius Wizabulambu and Agnes Mahudi,

'For raising me to believe that anything is possible, sky is the limit'

To my Husband

Yahya,

'For making everything possible'

To my children

Gabriella, Samil & Salim, and Ghalib

For their understanding and tolerance

To nurses working in the ICUs

'For fighting sepsis regardless of the situations and difficulties'

To the critically ill patients in the ICUs,

"Because everyone is entitled to the highest caliber of medical care"

ABSTRACT

Background: Sepsis accounted for 19.7% of all deaths worldwide in 2017 with 11 million deaths and 48.9 million new cases. Sepsis rates are higher in low- and lower-middle-income nations. Critically sick patients may experience multiple organ dysfunction and even death if quick diagnosis and therapy are not initiated within an hour. ICU nurses can actively participate in the detection of sepsis by continuously monitoring patients and starting treatment in accordance with protocols. Every patient must be evaluated for sepsis at the beginning of every shift in order to maximize the likelihood of detecting those who are at risk.

Aim: To explore the factors affecting early identification of sepsis in nursing practice among Intensive Care Unit nurses working in adult ICUs at Muhimbili National Hospital, Dar es Salaam, Tanzania.

Material and methods: This was explorative descriptive qualitative study design. Purposive sampling was used to recruit study participants. In-depth interviews were conducted to 14 ICU nurses at Muhimbili National Hospital. The interviews were digitally recorded, transcribed verbatim and analyzed using thematic analysis to develop themes.

Results: Three main Themes emerged: individual factors, environmental factors and institutional factors affecting early identification of sepsis. The individualized experience and knowledge on sepsis identification, environmental factors being the nurse patient ratio and medical equipment for sepsis care, and in institutional factors being training on sepsis and availability of screening tools of sepsis to critically ill patients.

Conclusion: Early sepsis identification is affected by a combination of individual, environmental and institutional factors. The more the individual's knowledge and experienced are, with proper nurse patient ratio, with availability of screening tools and training the better they can recognize early signs of sepsis.

Recommendations: Regular workshops, simulation-based training sessions, and continuing education credits can significantly improve nurses' proficiency in sepsis identification.

Key words: Sepsis, Early identification**,** Intensive Care Unit, Intensive Care Unit Nurse

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LIST OF ABBREVIATIONS

CDC	Centre for Disease Control
GCS	Glasgow Coma Scale
ICU	Intensive Care Unit
IDIs	In-Depth Interviews
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
qSOFA	quick Sequential (Sepsis-Related) Organ Failure Assessment
SOFA	Sequential [Sepsis-related] Organ Failure Assessment
SSC	Surviving Sepsis Campaign

OPERATIONAL DEFINITIONS

Nursing Practice	A caring-based practice in which processes of diagnosis and treatment are applied to the human experience of health (American Nurses Association, 1994)
qSOFA	According to SSC the qSOFA score (also known as quick Sequential (Sepsis-Related) Organ Failure Assessment") is a bedside prompt that may identify patients with suspected infection at greater risk for a poor outcome. It uses three criteria, assigning one point for low blood pressure (Systolic Blood Pressure≤100 mmHg), high respiratory rate (≥22 breaths per minute), or altered mentation (GCS<15) (Singer *et al.* 2016)
Sepsis	Sepsis is defined as a life-threatening organ failure caused by the host's inappropriate response to infection (Singer *et al.* 2016)
Intensive care Unit Nurse	An intensive care unit nurse is the one who work in the ICU with additional skills in caring life threatening conditions (American Nurses Association, 2024)
Intensive Care Unit (ICU)	An Intensive Care Unit is a unit in a hospital that provides continuous monitoring and treatment using special medical facilities, equipment, and services for critically ill or injured patients (Marshall *et al*. 2017)
Early identification of sepsis	Is the clinical suspicions made when the early signs of sepsis arise, being alert for early signs of sepsis to determine whether the patient should be treated for sepsis (king et, al; 2023)

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Sepsis is an important cause of mortality and a global health issue. Critically sick people may experience organ failure and even death if sepsis is not detected and treated within an hour (1,2). A research from the Global Burden of Disease Study shows that there were 48.9 million incident cases of sepsis and 11 million sepsis-related deaths worldwide in 2017. They also pointed out that 19.7% of deaths globally throughout the observation period were caused by sepsis. Finally, the highest rate of sepsis was found in low- and lower-middle-income countries (LMICs), which include sub-Saharan Africa (3).

According to the Centers for Disease Control (CDC), there is an ongoing increase in the prevalence of sepsis. This increase is attributed to various factors, such as healthcare professionals' improved awareness of the illness and the subsequent detection of more cases (4). A potentially fatal medical emergency known as sepsis, or severe response to infection, occurs when an infection begins inside the body and triggers a cascade of events that spread throughout the body (5). Sepsis is now defined correctly as a dysregulated host response to infection that results in potentially deadly organ failure. Clinically operationalizing organ failure can be achieved by utilizing an increase of two points or more in the Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score, which is associated with an in-hospital death rate of more than 10% (6).

Several series of changes were made to the concept of sepsis in order to meet clinical needs. The global Surviving Sepsis campaign aims to raise awareness among medical professionals about the challenges associated with managing sepsis, the leading cause of admissions to Intensive Care Units and deaths from sepsis (7). The definition of sepsis was changed as a result of the sepsis-3 worldwide surviving sepsis campaign. According to a Chinese study, most patients who arrived at the Intensive Care Unit (ICU) had either septic shock or sepsis, and septic shock was associated with a higher ICU death rate of more than 30% (2).

ICU nurses who regularly monitor patients and report any changes can help actively detect sepsis. Every patient should get a sepsis assessment at the beginning of every shift to increase the likelihood of survival (9,10,11). According to Norwegian study, nurses' proactive involvement in quickly recognizing and appropriately treating bloodstream infection cases is critical to preventing sepsis, reducing complications, and ultimately saving lives. This proactive strategy not only results in shorter stays in the Intensive Care Unit and better patient outcomes, but it also lessens the need for intrusive therapies and intense care (9).

Selecting the appropriate instrument was contingent upon the particular conditions and the available resources. In order to utilize qSOFA, a patient must be vulnerable to organ malfunction since it can forecast the patient's risk of being admitted to the Intensive Care Unit (ICU) (6). With the help of this technology, prompt therapy can be started, improving the prognosis. To select the most suitable instrument for early sepsis diagnosis, Intensive Care Unit nurses must possess a comprehensive comprehension of pathophysiological alterations (11).

Severe sepsis is a leading cause of morbidity and mortality worldwide, particularly in sub-Saharan Africa with limited resources. According to research conducted in Malawi and Ethiopia, critically sick patients who are brought to the Intensive Care Unit (ICU) have a fatality rate that exceeds forty percent (12,13). Evidence-based guidelines underpin improvements in the acute therapy of sepsis and septic shock for these severely unwell patients with high fatality rates (14). For over 60% of the severely sick, community-acquired illnesses were the most frequent source of infection (12).

In Tanzania, almost 70% of all ICU deaths are attributable to sepsis and septic shock (15). Despite awareness of the guidelines for the management of sepsis, there is little evidence to support the ongoing rise in sepsis-related mortality. But in terms of managing the load, physicians have advanced. They now know the sepsis procedure better and are more inclined to follow it. Finding workable and economical strategies to lower the number of sepsis cases will be made easier by acknowledging the difficulties and scarce resources associated with managing sepsis-related mortality in low-resource environments (16). When sepsis symptoms

appear, the primary objective of ICU nurses is to locate the infection source as soon as possible. They need to periodically reevaluate the patient and precisely identify the source of the infection. Following that, nurses should begin a one-hour bundle of interventions very away. These actions include drawing blood for testing, assessing lactate levels, starting fluid resuscitation, and seeing a doctor about antibiotics (11). Since care must begin within an hour of sepsis detection, collaborative management is essential to the survival of sepsis (6). The survival rate can be raised with quick action and collaborative management, but healthcare teams' awareness of and decision on the selected tool will determine how to proceed with the debate.

1.2 Problem statement

The body's reaction to an infection can produce sepsis, a potentially fatal illness that can cause organ failure and finally pass away. In Tanzania, sepsis contributes to 79% and over 80% of ICU mortality and diagnosis respectively (17). A recent study conducted in Northern Tanzania found that more than 70% of ICU mortality was related to septic shock. Similarly, the most common reason for prolonged stays in the Intensive Care Unit (ICU) has been found to be sepsis (15). The increased mortality is due to pathogen diversity, therefore it is imperative for ICU nurses to identify the initial indications of sepsis. In ICU patients with sepsis can present with pyrexia, tachycardia, tachypnea, and cool skin. Other markers of sepsis that might mimic other conditions include altered level of consciousness, hypotension, oliguria, low platelet, low albumin, and elevated white blood cells.

To detect these early signs ICU nurses should continuously reassess the patient, identify these early markers, locate the specific source of infection, and act proactively while initiating the 1-hour bundle. The 1-hour bundle includes measuring lactate levels, obtaining blood for culture and sensitivity, and initiating fluid resuscitation while contacting a physician for a prescription of antibiotics. Unfortunately, in our current setting, the ICU nurses seldom use of validated tools such as qSOFA or National Early Warning Score (NEWS) to identify early signs of sepsis. Due to the strangeness of the tools in our setting, the ICU nurses rely highly on clinical

presentation, vital signs changes, and laboratory investigations to point out patients with sepsis which delays the identification of patients with sepsis resulting in poor outcomes (15).

The early identification of sepsis in our setting is inconsistent due to a lack of awareness of the disease itself, the congestion of patients, and the number of staff. Also, this inconsistency can be attributed to the failure to adhere to sepsis guidelines for the detection and management of sepsis (16). Organ failure could come from a worsening of the sepsis threshold caused by a lack of early recognition techniques. According to a study conducted in Northern Tanzania, more than 20% of patients hospitalized to the Intensive Care Unit had acute renal injury as a consequence of sepsis (18). Currently the ICU nurses uses the clinical presentations and laboratory results in identifying sepsis which sometimes delays the initiations of management.

Evidence suggests that the use of validated tools such as qSOFA and National Early Warning Score (NEWS) can lessen the time window for sepsis identification spot sepsis and predict in-hospital deaths (19). However, the adoption and integration of recommended tools such as qSOFA in early sepsis identification remain an unspoken challenge in our setting. Routine practices may help ICU nurses spot the early indicators of sepsis, avoiding the patient's condition from worsening, even though they have a significant role in diagnosing sepsis due to their regular encounters with patients. Once empowered through training, ICU nurses can identify early warning signs of sepsis that would prompt early sepsis identification and management to reduce mortality and other complications (16).

However, research on the factors influencing the prompt detection of sepsis in nursing practices is still scarce in our area. Thus, the purpose of this study is to investigate the multi-level factors that influence early identification of sepsis among ICU nurses at Muhimbili National Hospital in Dar es Salaam, Tanzania's early detection of sepsis.

1.3 Conceptual framework

In order to comprehend the elements affecting the early detection of sepsis in nursing practice, this framework adheres to the social-ecological model. The overlapping rings that show how elements at one level affect elements at another level are described by the model. People are influenced by their surrounds and environments; they do not exist in a vacuum. An individual's interactions with institutional and environmental elements reconstruct their habits and practices (20).

Nursing practice has demonstrated variation based on individual criteria, such as educational attainment. Only when they possess sufficient understanding of the biology of sepsis and its associated signs and symptoms, Intensive Care Unit nurses recognize the early indicators of sepsis in a critically ill patient. An additional individual component contributing to the delay in a disease's diagnosis is a lack of confidence and experience. A better prognosis for a patient with sepsis has been made possible in this nursing practice by the attitude and experience of the staff. Nurses who have not yet provided care for a septic patient have a very different experience than those who have (21–25).

The social-cultural elements of the environment were thought to influence seeking behavior. This can be applied to how nurses report and communicate a patient's health when turning in a shift or when a patient exhibits sepsis and needs to be communicated with the physician. The practice of diagnosing sepsis can also be impacted by clinical working environments, particularly in low-income nations (26).

The structural components of an institution include things like the availability of screening instruments, education about sepsis and its linked bundles, rules for working hours, and the collaborative spirit (21,23). The following is the modified conceptual framework to guide this study.

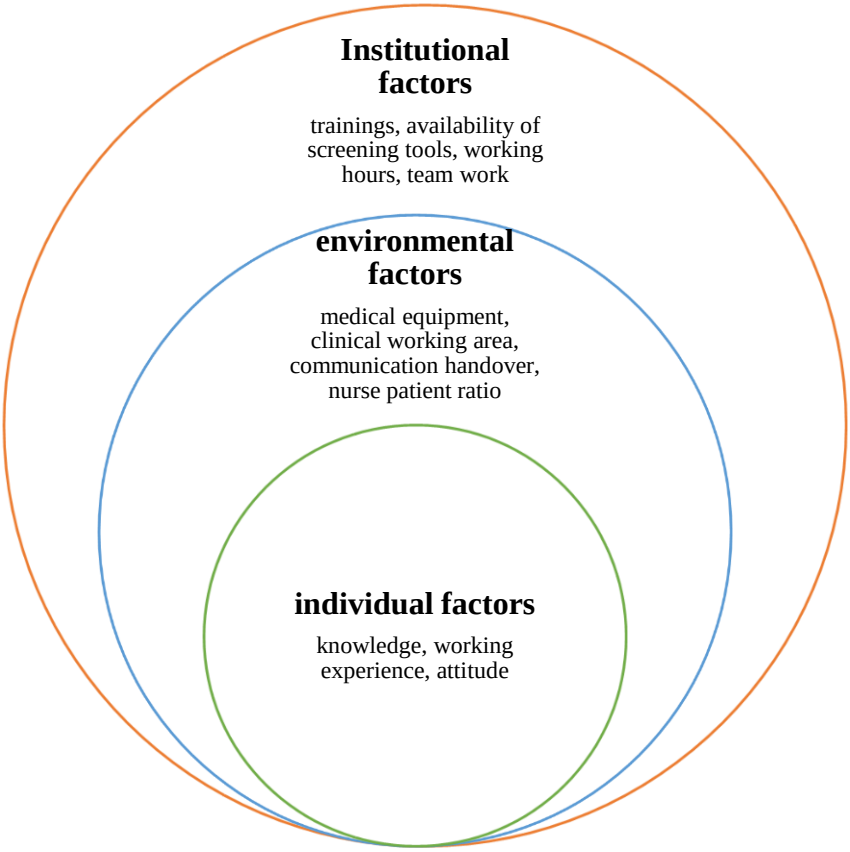


Figure 1: Modified Ecological model on factors affecting early identification of sepsis among Intensive Care Unit nurses

1.4 Rationale

Surprisingly little is known about the variables influencing the early detection of sepsis among Tanzanian adult Intensive Care Unit nurses. Understanding the institutional, environmental, and individual elements influencing nursing practice will be made possible by this study. The data from this study will help provide a baseline to which some of the causes contributing to the ongoing increase in sepsis complications may be assigned.

By detecting sepsis early, nurses who provide care for critically ill patients can alter the course of sepsis and lessen its effects. For critically ill patients to have better outcomes, institutions could take the appropriate action by investing on nurses. So, this study will also provide a framework for future research on the efficacy of using instruments and guidelines for sepsis screening and management in Intensive Care Units.

This will then assist institutional policymakers in implementing a proven strategy to enhance patient outcomes and lower sepsis consequences for critically ill patients who are at risk during routine ICU nursing practice. The results will also help guideline makers, training units, and local nursing practices understand the elements that lead to the daily increase in sepsis consequences. Additionally, the results of this study will benefit interventional or implementation researchers who are interested in closing the knowledge gap between knowledge and practice, particularly in limited resource areas.

1.5 Research question

What are the factors affecting early identification of sepsis in nursing practice among Intensive Care Unit nurses at Muhimbili National Hospital, Dar es Salaam, Tanzania?

1.5.1 Specific question

1. What are the individual factors affecting early identification of sepsis in nursing practice among nurses in adult Intensive Care Units at Muhimbili National Hospital, Dar es Salaam, Tanzania?
2. What are the environmental factors affecting early identification of sepsis in nursing practice among nurses in adult Intensive Care Units at Muhimbili National Hospital, Dar es Salaam, Tanzania?
3. What are the institutional factors affecting early identification of sepsis in nursing practice among nurses in adult Intensive Care Units at Muhimbili National Hospital, Dar es Salaam, Tanzania?

1.6.1 Objectives

1.6.1 Broad objectives

To explore the factors affecting early identification of sepsis in nursing practice among nurses in the adult Intensive Care Unit at Muhimbili National Hospital, Dar es Salaam, Tanzania

1.6.1 Specific objectives

1. To identify individual factors affecting early identification of sepsis in nursing practice among nurses in adult Intensive Care Units at Muhimbili National Hospital, Dar es Salaam, Tanzania.
2. To identify environmental factors affect early identification of sepsis in nursing practice among nurses in adult Intensive Care Units at Muhimbili National Hospital, Dar es Salaam, Tanzania.
3. To identify the institutional factors affecting early identification of sepsis in nursing practice among nurses in adult Intensive Care Units at Muhimbili National Hospital, Dar es Salaam, Tanzania.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Individual factors affecting nursing practice on early identification of sepsis to critically ill patients

Assessing and reassessing hemodynamics, volume status, and tissue perfusion is advised when caring for critically ill patients in order to improve outcomes for sepsis patients. This approach can be guided by factors such as educational attainment, attitude, and work experience (27). The Canadian study revealed that over 50% of nurses had low scores, indicating a very inadequate comprehension of sepsis characteristics and definitions, as well as general knowledge and treatment. This resulted from a lack of understanding of sepsis (28). However, they acknowledged their incomplete knowledge and expressed a strong desire for more research on sepsis. Skilled nurses have shown improved understanding of sepsis screening and care, as well as a positive attitude toward it. They also have more confidence in their ability to screen patients (22,29). The confidence in identifying the initial sepsis symptoms reduces the time to initiate the broad spectrum antibiotics before culture and sensitivity, which can prevent further complication as recommended by the SSC.

Because of their special ability to continuously assess patients and record changes as they occur, intensive care unit nurses have the potential to lower in-hospital mortality. Understanding the pathophysiology and physiological changes associated with sepsis enables nurses to recognize the clinical presentation of the condition, test patients using reliable instruments, and promptly communicate significant results to the treating physician (27).

Implementing a one-hour bundle strategy at an early stage is crucial for averting complications including septic shock and fatality (30). Knowing the instruments that are used to screen patients for sepsis allows for earlier identification and action based on the clinical presentation; the patient's prognosis may be predicted based on the tool's score (31).

Countless studies have consistently shown that nurses with master's degrees practice better than those with merely bachelor's degrees. Gaining another degree is essential for broadening one's horizons, developing optimistic outlooks, and improving practical abilities. Furthermore, during their schooling and clinical rotations, highly educated nurses have more possibilities to advance their knowledge and abilities. These results corroborate one another by demonstrating that more skilled nurses possess greater levels of expertise than less skilled nurses (22,29,32).

Experience has demonstrated that it helps identify sepsis. The Swedish study showed that assistance from guidelines or other healthcare experts, observations of disease progression, and previous experiences with sepsis patients all had an impact on the evaluation of individuals suspected of having sepsis. The more distinct the signs and symptoms are, the more accurate it will be to diagnose sepsis, but if they are unclear, confusion sets in, making treatment choices more difficult (33).

Sepsis can be accurately identified and managed when a number of factors are combined, including previous patient encounters, meticulous observations, adherence to guidelines, and collaborative support. Improved ability to make timely and well-informed treatment decisions is a result of healthcare professionals' experience and ongoing learning from one another, which eventually improves patient outcomes (34,35).

Moreover, tracking the course of the illness is essential. Healthcare professionals get better at identifying the early symptoms, even when they are mild or unusual, as they observe patients in varying stages of sepsis. This firsthand information is extremely helpful as it aids in differentiating sepsis from other illnesses that present similarly. The results of a study about sepsis and septic shock that was carried out in Gabon showed that many nurses lacked knowledge about sepsis and screening tools (qSOFA), which negatively impacted their practice (36). Providing critical care to critically sick patients requires routine patient screening and management based on the international standards for surviving sepsis campaigns. The ability to forecast mortality and the necessity of ICU admission has improved with the use of the qSOFA tool. Nurses who are unsure about the screening tool take longer to decide how to treat and discharge patients.

The qSOFA tool has significantly improved the ability to predict mortality and the necessity of Intensive Care Unit (ICU) admission. Research has shown that qSOFA is useful in identifying patients who are likely to have poor outcomes, which allows for more aggressive and early care (37). Nurses may postpone making decisions about patients' care and disposition when they lack knowledge about the screening instrument, which could have a negative impact on patient outcomes. Inadequate knowledge of sepsis screening instruments affects the standard of care given to patients overall and postpones important actions (38).

Through emphasis on these readily quantifiable parameters, the qSOFA test helps identify sepsis early on, which is essential for appropriate intervention. The timely implementation of sepsis care protocols, such as fluid resuscitation, antibiotic medication, and other supportive measures, is contingent upon early detection and is crucial in enhancing patient outcomes (6). Studies have shown that delays in recognizing and treating sepsis can significantly increase mortality rates, emphasizing the importance of tools like qSOFA in clinical practice (39). Furthermore, the qSOFA tool's simplicity and use make it very beneficial in a variety of healthcare settings, such as emergency rooms and settings with minimal resources. Due to its dependence on easily accessible clinical data, it can be used without the requirement for sophisticated equipment or a wide range of laboratory tests, making it possible to identify sepsis early even in environments with low resources (38).

With more people at risk of sepsis being diagnosed and treated quickly, there is a lower chance that the condition would advance to septic shock and organ failure. This broad applicability helps ensure that this happens. For example, when used in conjunction with lactate measurements and thorough clinical assessments, the qSOFA tool can help prioritize patients for more intensive monitoring and treatment (23). The qSOFA tool is a useful tool that enhances overall diagnostic accuracy when used in conjunction with other sepsis screening methods and can be integrated into broader sepsis protocols.

Nonetheless, the majority of Ugandan nurses are not familiar with the sepsis recommendations; only thirty percent of them have heard of them, let alone be able to recollect

the precise difficulties they raise (38). Every day, nurses assess their patients, but not all of them are confident enough to check for sepsis (25). Training can change the lack of confidence that most nurses have, even if they are the assessors. Appropriate training in sepsis and the use of qSOFA to identify patients at risk for sepsis are necessary for the capacity to employ proven methods in the screening of patients who will demonstrate deterioration of the vitals (6).

Prior to identifying the aberrant parameters, it is critical to understand the patient's baseline. Beginning with an evaluation of the patient's possible signs and symptoms, the nurse begins. Evidence-based guidelines for the treatment of sepsis and its subtype (septic shock) are provided by the Surviving Sepsis Campaign (SCC). When sepsis symptoms, such as fever and dyspnea, alter, a nurse should recognize them and respond appropriately, without delay. One method of managing developing sepsis is assessment and finding the source of infection; this should be done while evaluating the vital signs (11).

For these standards to be implemented effectively, all Intensive Care Unit nurses need to be completely aware of them and skilled in their conceptualization. It is essential to comprehend and follow these recommendations in order to guarantee reliable and superior patient treatment. A nurse's commitment to following established protocols can have a substantial impact on patient outcomes, making them an essential member of the healthcare team (22). Accepting accountability and realizing the enormous impact one has on the health and recovery of patients are the first steps toward embracing change in clinical practice. Nurses can effect positive change, raise overall treatment efficacy, increase patient safety, and improve overall health outcomes for patients receiving critical care by internalizing and putting these suggestions into practice

The infection site's source determines the symptoms and indicators. An individual's health evaluation is crucial since some circumstances can lead to sepsis, such as ongoing infections, weakened immune systems, or organ failure (33). The beginning one-hour bundle will be shortened since nurses' prior experience caring for patients with sepsis can facilitate and facilitate identification processes such collecting samples for blood tests, blood clotting, and

culture. A positive mindset at the outset of sepsis bundle treatment yields favorable results. The ability to follow sepsis rules with the necessary skills is the obstacle to achieving a positive result (22).

The SCC suggests that health care should have performance improvement initiatives. Interdisciplinary collaboration through education, frontline worker engagement, and improved workflow can lead to better care. The educational intervention increased the nurses' understanding of the guidelines for sepsis. When you evaluate a patient and discover that what you are evaluating is clear, it is a satisfying sensation. Frequent, ongoing professional nursing education on sepsis could enhance nurses' understanding of the condition and the standard of care they provide to sepsis patients (21,41).

The Tanzanian quality improvement project showed improved sepsis protocol adherence, notable clinical advancements in healthcare providers' practices, and increased clinician understanding and enthusiasm to follow the protocol (16). However, sepsis-related mortality has remained high since then. How nurses feel about the suggested instrument (qSOFA) at work is not well understood. When tending to patients in the intensive care unit, nurses should usually do the qSOFA test immediately (1).

2.2 Working Environment affecting nursing practice on early identification of sepsis to critically ill patients in ICU

The WHO's recommended healthcare worker population ratios are not met in a number of countries in Asia, Africa, and Latin America. Critically ill patients with sepsis or septic shock cannot be accommodated in intensive care units (ICUs) due to the chronic overcrowding in many of these countries. As a result, patients who require mechanical ventilation or vasopressors are treated outside of the ICU, where monitoring is either nonexistent or very inconsistent (26).

The inapplicability of conventional sepsis care procedures may be attributed to the variations un clinical conditions between low- and high-resource settings. Many environmental factors, such as the ratio of staff to beds, the availability of medical equipment, and the general

exchange of information among healthcare professionals, can impact nursing practice (23). For efficient care delivery, it is currently advised that ICU worker to patient ratios be one to one. Medical facilities frequently lack the staff needed to care for patients with sepsis (26,43).

Only the wealthy in certain nations have access to intensive care unit care. Even in situations when there are first-rate critical care facilities accessible, the distribution of scarce resources may not always adhere to a transparent, consistent, equitable, or accountable strategy. Sepsis patients may present challenges for diagnosis and treatment because medical institutions are understaffed and staff members lack sufficient understanding (5). The understaffed area makes the nurses to be overwhelmed with the responsibilities to care these patients hence giving substandard care.

Because of a lack of resources, many hospitals are unable to meet the current guidelines for managing sepsis. Intravenous fluids, extra oxygen, basic positive pressure airway devices, basic monitoring instruments like pulse-oximeters, and trained personnel to carry out the surgery are frequently lacking in low-resource situations. It can be challenging to sterilize and properly implant central venous catheters, particularly in patients who are very sick (43).

Although packaged care has been well examined and debated, there may be difficulties for medical practitioners if they are unable to offer every component of a bundle. It can be challenging to identify the most efficient and cost-effective strategies for lowering sepsis morbidity and death. When utilized among hospitalized individuals with suspected infection, the qSOFA score showed its capacity to detect infected patients at risk of mortality beyond the influence of baseline variables (39).

There is a severe lack of qualified nurses in Tanzania who can provide care for patients who are very sick. Competent and skilled nurses are scarce in many intensive care units (ICUs). The ICU nurses now employed there do not possess the necessary training to care for patients who are extremely sick (44). Notably, there is a pressing need for intensive care units to have additional critical care capacity that is equitable and accessible. In the Intensive Care Unit, developing critical care capabilities is essential.

This could be accomplished by offering ICU bundles, which train nurses and other healthcare professionals in the principles of intensive care, including frequent patient reevaluations at the bedside, meticulous infection control protocols, multidisciplinary daily rounds involving patients and their families, and vital sign monitoring and documentation (23,39). Fighting sepsis requires increasing the number of nurses in the intensive care unit in response to patient demand. Trainings that are daily and ongoing on vital sign monitoring, recording findings, and communicating effectively with fellows and doctors, among other healthcare professionals, boost confidence and enhance practice for better results (33).

2.3 Institutional factors affecting nursing practice on early identification of sepsis to Critically Ill Patients

All clinical staff members should be required to complete sepsis training since it enhances nurses' attitudes, knowledge, and confidence about sepsis screening and management and leads to adherence to evidence-based care (1). The rapid Sequential Organ Failure Assessment (qSOFA) is currently the accepted standard method for diagnosing clinical sepsis, according to the Sepsis Campaign. It's an advancement over the official evaluation instrument known as SOFA (Sequential Organ Failure evaluation), which was established in 2016 by the Third International Sepsis Consensus Task Force.

There are numerous components that go into calculating the SOFA score, and it requires equipment to monitor things like platelet count, bilirubin level, creatinine, and arterial partial pressure of oxygen. Using qSOFA made life easier because it assigns one point to each component, with a patient scoring two points or above indicating a positive diagnosis of sepsis. The instrument is linked to a 10% decrease in death (6). The use of sepsis and qSOFA screening for all patients per shift are recommended by international recommendations for the sepsis campaign. six hours and one bundle for the first sepsis management (31,45).

Less than 50% of health workers, including nurses and doctors, were aware of the criteria of the sepsis screening tool, according to a research done to evaluate how well they used it. One step toward correctly using a tool understands its parameters. The technique was advised to be

employed in different clinical characteristics and disease presentations because the qSOFA in-hospital patients had strong sensitivity (46).

According to research from the United Kingdom, sepsis screening should be integrated into routine patient care by healthcare workers, particularly ICU nurses, in order to improve outcomes. Evaluating symptoms and susceptibility to infection are two aspects of screening that are essential to its success. Using the qSOFA test, suspected sepsis patients must undergo a comprehensive examination and ongoing monitoring in order to ensure early detection, timely treatment, and positive results (47). The simplicity of this tool make it easiest tool to be used in other areas such ICU.

The qSOFA only comprises three criteria for the diagnosis of sepsis: abnormal mentation, systolic blood pressure of less than 100 mmHg, and respiration rate of 22 breaths per minute or more. This is because the SOFA had many requirements, whereas the qSOFA employed few criteria with rapid identification. Similar to other instruments, the qSOFA does not necessitate laboratory examinations and can be utilized repeatedly at the patient's bedside, yielding identical outcomes as the SOFA score (39).

According to a study conducted in Thailand, 45% of all admissions with the community-acquired infection malaria have a qSOFA of more than two points, meaning that the measure can be used to indicate the severity of the disease in adults with malarial sepsis (39,48). Depending on the user's comfort level and the resources available, intensive care unit nurses can examine patients for sepsis using a variety of techniques. The sensitivity and specificity of the tools vary as well; in a study comparing them all, the qSOFA was found to be the most preferred.

Intensive Care Unit (ICU) nurses who work well with the multidisciplinary team are aware of clinical guidelines and provide specialized care and monitoring for patients who are critically ill. They can help identify sepsis early and treat patients as advised in the first hour, as per the SSC (1). By establishing standard operating procedures for medical professionals and promoting awareness through training, institutions can raise the survival rate.

Care guidelines overseen by nurses can be put into practice to slow the disease's progression and improve patients' chances of life, with a minimum 30-day survival rate (49). A study on the content validation of a nursing care protocol in the Intensive Care Unit found that using protocols for specific needs, including the care of critically ill patients with sepsis, develops effective courses of action and procedures to optimize the work process (50). ICU nurses can assess patients for sepsis using a variety of instruments; the tools they choose will depend on the patient's comfort level, available resources, and institutional policies. The sensitivity and specificity of these instruments vary. The recently suggested qSOFA technique has low sensitivity and good specificity (46,51).

The assessment of the lactate level is a common inquiry across all screening techniques, setting it apart from qSOFA elements (47). This adds to the tool's ease of use and the Sepsis-3 survival campaign's support of it for screening of critically ill patients. The decision to utilize a screening tool is based on hospital and municipal policies, and the sensitivity of the instrument may change based on the patient's condition (6).

The Early Warning Scores (EWS) are a validated system that nurses in the United Kingdom have deployed to detect clinical deterioration and ensure patient safety through quick action (22). Recognizing red flag criteria, such as non-laboratory items and lactate level measurement, helps in the early detection of sepsis. Knowing these factors helps medical practitioner’s spot early indicators of sepsis. When early warning scores are fully completed, earlier treatment interventions are possible (51). The New Zealand study found that communication problems and clinical management delays caused a delay in the emergency triage system's ability to detect sepsis in patients (52).

In health systems with adequate funding, sepsis management depends on the amount of intensive care staffing, supervision, and institutional support. Critical care units (ICUs) are essential to most studies and guidelines for managing sepsis; nevertheless, the scarcity of ICUs presents a severe obstacle in most African settings (53). Even in well-equipped health systems, implementing the surviving sepsis guidelines can be difficult. This is particularly true in Africa, where there are more barriers to healthcare access, fewer resources, understaffing, and

a higher infection rate. Nonetheless, in low-resource settings, sepsis outcomes can be enhanced by efficient interventions such early detection, timely administration of antibiotics, oxygen, and fluids, and treatment monitoring. It might be frightening to change institutional procedures so that the correct patients receive the best care at the right time (54).

The study carried out in Uganda demonstrated that delays in the critical phases of sepsis screening can be attributed to a lack of clinical experience, an overwhelming workload, and insufficient staffing levels. Even while it can be helpful to teach nurses basic skills like venipuncture and test result interpretation, patients still have to wait for a doctor to write a prescription for the necessary drugs (55). There is a need for awareness training, particularly on the signs and symptoms of sepsis, as the majority of working professionals in the ICU in Gabon had never heard of the qSOFA instrument, according to a study conducted there (36).

Tanzania faces the same issues with ICU staffing, resources, and facilities as other sub-Saharan nations. The scarcity of resources in Tanzania's tertiary referral hospitals makes it difficult to give critically ill patients the best care possible and may be a factor in the country's startlingly high death rates (17). Further research is necessary to determine the reasons of this burden because the study conducted to describe Patten's ICU hospitalization in Northern Tanzania showed that the mortality rate was extremely high (15).

CHAPTER THREE

3.0 MATERIAL AND METHODS

3.1 Study design

An explorative-descriptive qualitative study design (56) was used to explore and describe factors affecting the early identification of sepsis among ICU nurses working in the adult ICU at Muhimbili National Hospital, Dar es Salaam, Tanzania.

3.2 Study setting

The study was conducted at Muhimbili National Hospital. Muhimbili National Hospital is a tertiary referral and teaching hospital located at United National Road Number 9, Charambe Street West Upanga, in Ilala Municipal Dar es Salaam, Tanzania. It receives patients from all over the country and neighboring countries. The hospital offers inpatient and outpatient services with a total bed capacity of 2000. At the time of study there were: 31 beds for adult ICUs (medical and surgical ICUs). Medical ICU has 13 beds while the surgical ICU has 18 beds. Both ICUs have an average of 520 admissions per year.

The Medical and surgical ICUs have 27 and 31 nurses respectively. Medical ICU has 3 critical care specialists, 8 nursing officers, and 16 assistant nursing officers while surgical ICU has 1 critical care specialist, 13 nursing officers, and 17 assistant nursing officers. The units have been selected based on their significance in providing ICU care services to critically ill patients around Tanzania. These ICUs are staffed by special trained nurses with diverse experience and education levels. The place is equipped with modern equipment and different guidelines that allow continuous monitoring and life support of critically ill patients.

3.3 Study participants

In this study, the participants were all nurses who were providing care to patients in the Intensive Care Unit from the two ICUs. Hospital administrators selected were the Nurse in-charges of the ICUs and were combined and treated the same as other participants since they worked in the ICU previously. Nurses were selected since they are the ones who stay with

critically ill patients twenty-four hours and are in place to detect and initiate protocols in the assessment and management of sepsis as early as possible. The hospital administrators were selected since they make and evaluate policies and supervise others in their practice(7).

The nurses working in the Intensive Care Unit were registered nurses as they have completed official nursing education leading to a Diploma, Bachelor's Degree, or Master's degree. Additionally, were tasked to provide care for severely ill patients who have been admitted to the Intensive Care Unit for more than 12 months. The hospital administrators were the nurse in-charge of the ICUs who also worked in these ICU previously. Therefore the participants for this study reached of 14 nurses working in the ICUs at MNH.

The principal researcher was a resident who was pursuing Master in Nursing critical care and trauma just spent one year residency in the both ICUs at MNH and was therefore known by most of the respondents. Working for weeks in the Intensive care units, she had an understanding of the general impression of the units. The investigator had gained some knowledge about practices in the ICUs from her residency and had some cultural understanding (57).

3.4 Sampling technique

Purposeful sampling was used to select ICU nurses and hospital administrators who met the criteria, rich in information and willing to participate in this study until saturation was reached (58). List of nurses (with the number of working experience, education level and designation title) in the ICUs were obtained with the help of the Nurse in-charges in Intensive Care Units at MNH. Then the principal investigator selected the nurses who meet the criteria for the study, made an initial contact with the selected ones. The principal investigator explained the objectives aim, benefits risks, and confidentiality and participants rights in this research. Participants who understood and willing to participate in the study gave verbal informed consent and appointment for the interview within March and April 2024 (59).

3.5 Inclusion criteria

- Registered Nurses who were working in the ICUs chosen for the study with working experience of at least 12 months. (This was to ensure that the nurses had some experience in caring for sepsis among critically ill patients and thus be able to give an informed insight into the research topic).
- Hospital nurse administrators who deals with the intensive care services

3.6 Exclusion criteria

- ICU Nurses and hospital administrators who were on leave/sick during the data collection period and thus unavailable.

3.7 Sample size

The sample size was 14 including both ICU nurses and hospital nurse administrators. This number was adjusted based on the principle of data saturation. The sample size was evaluated transparently and reached 14 participants, with an encircling assessment of data adequacy and saturation was reached as no more discoveries of novel concepts emerges. All these were reassessed concerning characteristics that are specifically relevant to this study (60).

3.8 Data collection

3.8.1 Data collection method

Semi-structured interviews were conducted to explore factors affecting early identification of sepsis among Intensive Care Unit nurses at MNH. In-depth interviews were conducted at MNH from March to April 2024. The interviews were directed and data were collected by the principal investigator who was a resident pursuing Master in nursing critical care. Participant signed the informed consent in the day of appointment for the interview. The interviews started with an open-ended question as follows “at first sight how do you recognize a patient with sepsis”. Additionally, probing questions followed for example, how do you assess a

patient with sepsis? Can you tell which tool do you use to assess a patient? When necessary, follow-up questions were also posed to promote increased understanding and richer descriptions. For example, do you know any international tool for assessing sepsis? How do you use it? The interview was conducted in Swahili language, audio recorded and later transcribed verbatim (61).

To enable the study to be successfully conducted given the interviewees' busy schedules, the researcher decided to let the potential participants choose where to be interviewed. Four interviews were conducted in the ICU conference room, two were done in the tea room, another two in the private room and the remaining three interviews were done at the nursing station, doctor's office and in-charge office. In all placed privacy and confidentiality were ensured. During the time of the interview the participants delegated the patients' care or their responsibilities to other nurses in the ward so as to ensure continuation of care.

During the process of data collection the principal investigator was writing down the issues that would influence data collection such self-experience in caring sepsis patients. Reviewing the bracketing notes helped to see the pattern of expecting negative ideas with the current practice and keeping to the neutrality during probing questions.

Interviews lasted between 7 to 25 minutes with an average of 16 minutes. All IDIs were conducted in Swahili. The whole interviews were audio recorded and vebartim transcription was done during the course of the interviews. The concept of data saturation was used to guide the number of IDIs to conduct (62). The transcripts were returned to the participants for comments if any and nothing were added afterward. Organization of the information before analysis was done to ensure quality information obtained (63). The audio records were stored under key and lock, and the transcribed data were stored on a password-protected computer.

3.8.2 Interview Guide

The interview guide (Appendix I) was structured by principal investigator after literature review reflecting factors that may affect nursing practise in early identification of sepsis. The semi-structured interview questions were formulated and taken to critical care specialists who are seniors in this field for verification of questions. There after the guide was pretested,

aiming to verify the effectiveness and appropriateness of the interview questions. The inputs provided by the specialists were then adjusted accordingly to align with the research objectives. So pre-tested in-depth interview guide was used to collect the information.

3.9 Trustworthiness

To guarantee that the results of content analysis in qualitative research are reliable, transportable, credible, and confirmable, trustworthiness must be established. This study uses a number of techniques to ensure credibility, in line with the standards set by Graneheim and Lundman, 2004 (64).

- Credibility

In order to perform the clinical duty and obtain a thorough understanding of the working environment, the researcher spent nearly ten months in the ICUs during a typical clinical rotation. Every participant was introduced to the same central query by the researcher. To make sure that the participants' experiences were fairly represented, preliminary findings were presented to them for approval and comments. To address new code themes and associated biases, a research partner and I had regular debriefing sessions, member checking was done together with the supervisors to verify and resonance of the interpretation all these improved the analysis (64). In the findings, quotes from the participants are presented, which enhance credibility by enabling the reader to follow how the narrations are expressed and whether the meanings drawn from the participants' information are reasonable and reliable.

- Dependability

The consistency of the results is related to the dependability requirement. Every step of the study process, including data collection techniques, coding choices, and analysis procedures, was recorded in a comprehensive audit trail. This trail makes it possible for others to examine and validate the study process. A subset of the data was recorded by an independent researcher, and the outcomes were compared with the original coding. The trustworthiness of the coding technique was validated by the high degree of agreement across coders. In order to record personal reflections and biases and how they might have affected the research, the

researcher kept a reflective journal (64). This constant introspection aided in preserving objectivity and openness.

- Confirmability

There was a clear trail of evidence supporting the conclusions thanks to the careful documentation of the raw data, coding schemes, and analytical choices. By documenting the researcher's thoughts and decision-making procedures, the reflexive journal further enhanced confirmability by verifying that the conclusions were based on the data rather than the researcher's personal prejudices (64). The results were verified by using multiple data sources and methods, which improved the findings' objectivity and dependability.

- Transferability

In-depth explanations of the ICU settings, participant backgrounds, and contextual elements were included to aid readers in comprehending the setting and determining whether the results might be applied in different circumstances (64). In order to ensure a thorough knowledge of the factors affecting the early detection of sepsis among Intensive Care Unit nurses at MNH, participants were purposefully recruited to comprise a broad group of nurses from both ICUs, with varying levels of experience, education, and administrative responsibilities (63).

The analysis was mainly performed by the principal investigator, and thereafter discussed and validated by supervisors on how meanings were understood and whether sub-themes and theme were related to the aim and original data.

3.10 Data Analysis

Thematic analysis was used to analysis the data to formulate themes and subthemes. The process were guided by the conceptual framework and followed the six steps as highlighted by Braun and Clarke (65). Deductive data analysis technique was used by using the conceptual frame work through the entire data corpus. The verbatim process of the audio-recorded data was done and then reread to get the meaning of words and ideas. The transcription process followed afterward, since the interview was done in Swahili; the transcripts were translated into the English language. The principal investigator repeatedly read all the transcripts with an

open mind to obtain a general impression and an overall understanding from each participant (57).

Since the principal investigator collected the data herself, prior thoughts and knowledge about the data was gained during data collection process. Repeated reading in an active way to search for pattern of the data was made to immerse in the data before the coding process began (57). Different colors were used to highlight the patterns in the text corresponding to the study objectives. To get a feel of the entirety of the data, the interviews were read aloud several times before beginning the process (64). The goal was to find the data's underlying significance, which was noted in the margin. Subjects that presented the research topic were colored-highlighted. Line-by-line coding was performed for each interview. The coding process was iterative and involved refining codes as more understanding was gained as shown in Table 1.

Table 1: Coding process

Data extract	Codes
A patient with sepsis may be anemic, difficulty in breathing; he may also be in septic shock have sepsis is like septic shock. He had septic shock. The patient will be sleepy. The pressure will be low also something else he may be dehydrated. In fact, I have never gone to school other than my regular school and I have never received any training in the rapid diagnosis Except for my regular school, I'm studying for a diploma, which gives me a little light as I explained before. I should just say that I am only looking at the symptoms, but until the tests show that other services to deal with sepsis should be taken. Or apart from that, it is to treat the symptoms that appear if the patient is dehydrated, you will give him fluid, if he is hypoxic, you will give him oxygen or put him on a ventilator A guide? I don't know if there is a sepsis treatment guideline for that first hour. What I do is treat the symptoms until they stop or subside while we wait for the lab results	• Septic patients may have anemia, difficulty breathing, septic shock, Sleepy, low BP, dehydrated • Not received formal training on sepsis • Little exposure on sepsis management • Limited Ability to identify sepsis symptoms • Not knowing the presence of sepsis treatment guideline

After generating codes, the patterns of codes with a similar meaning were grouped to generate sub-themes that aligned with the pre-determined themes (deductive reasoning). Patterns emerged from the arrangement of codes that were connected. Initial sub-themes were formed by grouping discovered codes sequentially. As the analysis went on, the sub-themes were re-examined, clarified, and given new names (64). Also were checked for, if it relates to code, data set and objectives.

After generating the sub-themes from the codes (Table 2), the sub-themes were continually reassessed and adjusted, and some of the sub-themes with similar content were merged as to form themes as shown in Table 3. The principal investigator reverted to the original interview notes in cases where a phrase was difficult to label, in order to reposition it in the context of the whole interview (64).

When challenges arose or the lead investigator's interpretation of the data was influenced by personal experience, she referred back to the bracketing notes throughout the analysis process. The investigator sustained reflexivity during the entire analysis process. The questioning of pre-understanding was carried out by highlighting and discussing my own view of assessing factors that may affect patients with suspected sepsis throughout the analysis process. Quotations from different participants were also presented in the results, which enhance the credibility by enabling the reader to decide whether interpretations are reasonable (64,66). The process of sorting themes and sub-themes was repeatedly done by the principal investigator and supervisors to ensure validity of the analysis. Finally the themes and sub-themes were then organized into a hierarchical structure.

Table 2: Process of forming sub-themes

Codes	Sub- themes
Septic patients may have anemia Septic patients may have difficulty breathing Septic patient may have septic shock Sleepy, low BP, dehydrated	• Having Knowledge to identify sepsis
Identifying sepsis without being trained Education and experience increased ability to identify sepsis Using experience in identifying sepsis	• Using work experience in the ICU to identify sepsis
Difficult to monitor many patient at once Loss focus when caring more than one patient Difficulties in caring more than one patient	• Unbalanced nurse patient ratio
Limited Ability to identify sepsis symptoms Confused to identify cardinal signs of sepsis on comorbid patients Diploma education lack clear knowledge on sepsis	• Lack of Knowledge to identify sepsis /symptoms
Not knowing the presence of sepsis treatment guideline Not aware of tools for identifying sepsis Nurses Not exposed to tool to identify sepsis qSOFA is a new word to the nurses	• Lack of awareness of using sepsis guidelines

Table 3: Themes and Sub-Themes from in-depth interviews with 14 ICU Nurses at MNH

Themes	**Individual factors affecting early identification of sepsis**		**Environmental factors affecting early identification of sepsis**		**Institutional factors affecting early identification of sepsis**	
Sub-themes	Knowledge on sepsis	Working Experience	Medical equipment,	Nurse patient ratio	Trainings	Tvailability of screening tools
Codes	Having Knowledge to identify sepsis Having Knowledge to diagnose sepsis Using work experience in the ICU to identify sepsis Having knowledge on qSOFA Monthly report on sepsis Lack knowledge to identify sepsis Lack awareness of using guidelines Lack knowledge on qSOFA	Identifying sepsis without being trained Education and experience increased ability to identify sepsis Using experience in identifying sepsis	Availability of patient charts for sepsis monitoring Availability of charts to document infection Having equipment for sample collection Lack equipment for temperature monitoring Lack bottles for sample collections	Unbalanced nurse patient ratio Difficulties to monitor more than one patient Understaffing Loss of focus when caring for more than one patient	Lack exposure on institutional initiatives Lack training on sepsis guidelines Having training on SOFA algorithm Having training on sepsis Having in-house trainings on sepsis	Lack tool for sepsis identification Presence of SOFA algorithm

3.11 Ethical consideration

Research approval was obtained from the Institutional Review Board (IRB) of Muhimbili University of Health and Allied Sciences (MUHAS) with Ref. No. DA.282/298/01.C/2043. The permission to conduct this study was obtained from MNH before the commencement of the process of data collection with Ref. No MNH/CRTCU/perm/2024/107. Before the interview begins, each participant was asked to provide written informed consent, after clear explanation of the study and its objectives, the risks, and benefits of participating in the study as well as the right to withdraw or participate in the study were given to each participant before consenting. So a written informed consent was provided and signed by all participants before the actual data collection procedure. Anonymity was ensured by using numbers (1-14) instead of names to enhance confidentiality as suggested by the Helsinki Declaration for studies involving human subjects. Also the information provided by the participants was not communicated to non-parties. To further maintain confidentiality the audio-recorded interview transcripts were kept in a safe place and will be destroyed later after the completion of the study.

CHAPTER FOUR

4.0 RESULTS

4.1 Characteristics of Study Participants

This study selected 14 participants. Half of the participants were female, and the majority was aged between 30 and 40 years. Seven participants had a diploma in nursing, followed by bachelor's degree holders, and one nurse had a master's degree in nursing. Thirteen participants had ICU working experience spanning more than three years. The summary of the social demographic descriptions of the study participants is shown in Table 4.

Table 4: Description of Social demographic characteristics of participants

Participant S/N	Sex	Age (years)	Level of education	years of experience in ICU (in years)	Medical ICU/ Surgical ICU
1	Female	38	Diploma	4	Medical ICU
2	Male	36	Advanced Diploma	10	Medical ICU
3	Female	25	Diploma	2	Medical ICU
4	Female	26	Diploma	3	Surgical ICU
5	Male	30	Diploma	5	Medical ICU
6	Male	33	Diploma	3	Medical ICU
7	Female	37	Bachelor degree	3	Surgical ICU
8	Male	28	Bachelor degree	5	Surgical ICU
9	Female	40	Bachelor degree	5	Surgical ICU
10	Male	27	Diploma	5	Surgical ICU
11	Male	29	Bachelor degree	3	Medical ICU
12	Male	40	Bachelor degree	10	Medical ICU
13	Female	46	Master's degree	15	Surgical ICU
14	Female	33	Bachelor degree	8	Surgical ICU

4.1 Theme and Sub-themes

The three main themes emerged from the analysis: individual factors, environmental factors and institutional factors. These themes were supported by six sub-themes, which are: Knowledge on sepsis, working experience, medical equipment, nurse patient ratio, sepsis training and availability of screening tools, as shown in Table 6.

Table 5: Themes and Sub-Themes

Themes	**Individual factors affecting early identification of sepsis**		**Environmental factors affecting early identification of sepsis**		**Institutional factors affecting early identification of sepsis**	
Sub-themes	Knowledge on sepsis	Working Experience	Medical equipment,	Nurse patient ratio	Training on sepsis	Availability of screening tools

Description of Themes and sub-Themes

4.2 Individual factors affecting early identification of sepsis

The theme encompasses the recognition chances that influenced or hindered the effectiveness and efficiency of sepsis identification. This theme also explains on intensive care unit nurses on knowledge about sepsis. The theme has two sub-themes which are knowledge on sepsis and working experiences.

Sub- Theme: knowledge on sepsis

Knowledge on sepsis was the first sub-theme emerged in the first theme. The sub-theme revealed participants understanding about sepsis terms of its cause and treatment. Many of participants reported having knowledge and understanding about early identification of sepsis through early signs. Participants were asked to describe the features of sepsis, many participants listed the key features of sepsis, including difficulty breathing, anemia, fever, and alteration of vital signs such as low blood pressure, which is evident in patients with septic shock. One participant said:

A patient with sepsis may be anemic or have difficulty breathing. (Participant1).

Another participant added:

Of course, a patient with sepsis will have changes in the vital signs, which is the biggest thing you can interpret. He may also have a fever; he may be in shock, that is, his blood pressure becomes very low; and he may have tachypnea. (participant 3).

Participants explained that having knowledge to identify sepsis is a critical factor in the early detection of sepsis among Intensive Care Unit nurses. It encompasses understanding the pathophysiology and symptoms of sepsis and being aware of patient-specific risk factors. As narrated below:

Education helps in knowing the initial symptoms or when I see a patient, and since they are things I work on every day and now I see it is something easy to identify patients with sepsis (Participant 2)

The participant added that enhancing this knowledge through ongoing education and practical training is essential for improving sepsis outcomes in the ICU. As narrated below:

Because of general knowledge, you know about sepsis, so it is easy to recognize it and know what is going on inside the patient's body, so that you can take care of him according to his needs. (Participant 5)

Participants further reported that when a patient is suspected with sepsis they initiate the process of taking blood samples as ordered as it was narrated by one of the participants that:

We take blood, get a sample, and send it to the laboratory whenever patient is suspected (Participant 1).

The participants explained how important the process was in identifying patients with sepsis quickly through laboratory tests, even if they did not show initial symptoms; it was intended as a screening campaign for every patient one of the participants said:

I don't know about the institution guidelines, but here in our ward, we have our own policy that every patient who arrives here, whether he has symptoms of sepsis or not, must be taken for a blood culture (Participant 6).

Sometimes the participants were in a dilemma about whether the symptoms were of sepsis or not. While some participants lack confidence during the process of identifying early signs and symptoms of sepsis since the symptoms are not very obvious,.

Of course it is confusing and can take a long time to be sure, that why we often wait for laboratory tests to find out. But using these initial symptoms is not clear (Participant 2).

But also, due to a lack of concentration in the shift, some participants described that they get difficulty identifying the initial symptoms due to the large number of patients to the nurse ratio.

Requirement because most of the time you find that a nurse has two to three patients. Now, monitoring the patient becomes difficult, you may miss the initial symptoms of sepsis because it often interacts with other diseases (Participant 9).

Participants reported that demands for patient care often left little room for personal study or pursuit of individual interests. This goes hand in hand with the delays in attending the symposiums regularly due to scheduling conflicts.

But due to having a lot of work, we don't go often," even If someone is interested, I don't really have that time (Participant 5)

While symposiums offered valuable opportunities for professional development and knowledge acquisition, the imperative to provide optimal patient care took precedence. Therefore, the decision not to attend such events may stem from a conscientious commitment to ensuring the immediate needs of patients are met within the demanding confines of the ICU environment. As it was narrated by one of the participants,

> *I have not seen or heard of specific training initiatives regarding sepsis. Unless there is a symposium, we are always told to go because it includes the whole department, but due to having a lot of work, we often don't get a chance to attend (participant 9)*

Another participant added that:

> *If you consider that I am busy with two patients, it is very difficult to find time to study or find new updates for something. Sometimes there are those symposiums for the whole department but there is no time to attend (participant 6)*

Participants knew that being aware of sepsis was important, so they tried to focus on knowing it well and looking for more information. Recognizing the significance of sepsis, they advocate for a proactive approach to understanding and gathering more knowledge about the condition, despite the fact the fact that the internet is not available in their environment.

> *Here, we don't have internet like WiFi, "Everyone who needs it is using their own Internet bundle to find information, and this is based on the interest of the person (Participant 8)*

The internet access was not for public use; hence, participants failed to access information and updates from the recommended sources. That was also due to a busy schedule, and the one who gets time has to use their own internet to search for information.

> *Here we don't have free WIFI, so everyone depends on themselves to get information or read more. But another challenge here is to find the time to study because most of the time we are busy with patients or if someone is interested (participant 7).*

Another participant added:

> *You cannot leave the patients when you go to read material about sepsis (Participant 6).*

Sub theme: Working experience

Participants explained that their practical experience and foundational education to navigate sepsis cases within their current work environment. They conveyed a sense of resilience and adaptability in facing the challenges of managing sepsis cases in the absence of formal instruction or guidance. It was narrated that:

> *The biggest thing is that if you combine my education and working for a long time in various ICUs, they have greatly increased my ability to identify patients with sepsis. Since they are things I work on every day, and now I see it is something easy to identify patients with sepsis (Participant 2)*

One participant went further and explained the practical experience and case-based learning as integral components, providing them with hands-on exposure to real-world scenarios and improving their ability to interpret clinical data effectively.

> *Currently, I have not received any training in the rapid diagnosis of sepsis. So far, I'm just relying on my ordinary education and experience working here in the ICU (Participant 1)*

Few participants reported the ability to use the recommended tool for sepsis identification (qSOFA). The participant also explained the familiarity and fasted tool for identifying sepsis, which were not recommended to be used in the setting. One participant said

> *So while qSOFA I know it exists but it is not used much in ICU (Participant 2*)

Participants described how obliged they were to adhere to the ward-based routine introduced by the institution for fighting sepsis. They even initiated a campaign aimed at performing cultures for every patient admitted to the ICU. This practice intended to promptly identify any infections and ensure appropriate treatment, preventing the spread of infections within the ward.

> *There was also a campaign to do culture for every patient who enters the ward, but these days I don't see it being emphasized, maybe because of financial constraints (Participant 4)*

The participant went further, explaining the lack of this service again, which brought the challenge of relying on initial symptoms. The participant practiced the initiative as a routine without considering if it was from the institutional guidelines, but it was mandatory to do so.

> *I don't know about the institution guideline, but here in our ward, we have our own policy that every patient who arrives here, whether he has symptoms of sepsis or not, must be taken for blood culture (Participant 6).*

Another participant cemented on that:

> *The collection of sample for every suspect is a mandatory in these wards (Participant 3)*

To add on that, participants narrated on the accessible monthly reports as a way of getting sepsis updated. The study has revealed that nurses get trends in sepsis through these reports, as one of the participants said:

> *We often get the information here through the monthly report, that is, a list of patients admitted or if they died or survived sepsis (Participant 9).*

As well another participant said:

> *Because the most cause of death here in the ICU is septic shock because even the monthly report tells us that (Participant 8)*

Other participants were confident when the laboratory results are out as it was narrated that:

> *We have a lot of delay until we know that this patient has sepsis, because we must take sample first (Participant1).*

Another participant added that:

> *We use vital signs along with those head to toe assessment data along with laboratory tests (participant 7)*

Many participants narrated the difficulties they experience in identifying the initial symptoms, especially when the patient has comorbid diseases, as stated below:

Initial symptoms are very confusing for me because these symptoms like high temperature or hypotension are present in many diseases (Participant 11)

Environmental factors affecting early identification of sepsis

Sub-Theme: Medical equipment for sepsis care

This sub-theme represents several internal and external conditions that exist in healthcare settings and have an impact on the prompt identification of sepsis, especially for Intensive Care Unit nurses. These variables include things like the easiest use and accessibility of charts to monitor patients, the availability of patient charts to document infection, and having equipment for sample collection. For example, having rapid access to diagnostic tools and laboratory testing can speed up the diagnosis process, allowing nurses to identify sepsis and start the right treatments.

Additionally participants described that accessibility and availability of patient medical charts in the Intensive Care Unit (ICU) were not problem. A patient's complete medical history, current diagnoses, treatment options, prescription regimens, test findings, and continuing clinical observations were all included in medical charts. One participant said:

But like these patient charts, we always fill them well and they have never been missing because it is mandatory for every ICU patient to have this chart on his desk (Participant 1)

Since patient charts were key instruments for recording clinical assessments and keeping track of patients' vital signs, participants reported identifying early indicators of worsening, such as those suggestive of sepsis, and took prompt action by regularly monitoring these vital signs, as one among the participant narrated that:

Our charts have a section to record and monitor the behavior of the patient when he is here in the ICU, for example there is a section where we record temperature pressure and if the patient has any invasive procedures (Participant 3)

It was reported that in the hectic environment in the ICUs, the busyness of numerous tasks often results in incomplete documentation. Since charts provide a room to document the source of infection, due to constant pressure and time constraints, accurate records were impossible to meet the needs. The participant added that sometimes, due to the busyness of many tasks, documentation in detail about sepsis is not possible, which impacts the clarity and accuracy of patient records, but at least it was possible to document any source of infection as stated below:.

> *There is no specific section for identifying sepsis after assessment. Instead, there is a section where you can note if the patient has a potential source of infection, such as a wound (Participant 1)*

The participant added that the action helped to ensure efficient monitoring and treatment by guaranteeing that all pertinent data regarding the patient's infection state is precisely and methodically recorded. Accurate documentation supports the healthcare team's communication, aids in identifying infection trends, and directs pertinent interventions.

They added that the presence of essential medical tools and resources within the work environment highlights the importance of having adequate supplies, such as sample collection bottles, one of the participants said:

> *The work environment makes it easier because it is very rare to run out of equipment like bottles for taking samples (Participant 5)*

The participants went further and explained that having enough equipment ensured the process was done in a timely manner and that taking the sample to the laboratory could be possible.

> *Sometimes bottles for full blood pictures tests are readily available compared to culture bottles (participant 13)*

In an ICU setting where timely and accurate identification of infections was critical, there were not enough culture bottles to impede the diagnostic process. The participant added that without these bottles, ICU nurses may face delays in collecting necessary samples, leading to postponements in diagnosing sepsis and initiating appropriate treatments. It was narrated that:

> *But the challenge we face is equipment to work on, especially bottles for culture of various specimens such as urine, sputum, even blood, sometimes it is a big challenge at the moment the replacement is difficult when your out of stock you can wait up to two months to restock this is due to financial issues (Participant 14)*

This shortage of bottles resulted in prolonged patient suffering increase the risk of complications, and may prolong the initiation of treatments. One participant said:

> *But sometimes you find that the blood culture bottles are not available, so you have to wait (Participant 6).*

Also, participants explained that these deficiencies hinder the ability to conduct comprehensive assessments, and when the equipment is unreliable, like thermometers for temperature assessments, it becomes a problem in the setting. One participant revealed that:

> *But there is also a shortage of thermometers, especially these digital ones, you find that they do not have batteries; it is very challenging (Participant 6).*

Without an adequate number of thermometers, the collection of temperature data became incomplete or inconsistent, leading to potential inaccuracies and compromised results.

Sub-Theme: Nurse patient ratio

Number of nurses per patient ratio was another sub-theme emerged during the analysis. Participants reported to care more than one patient due to little number of nurses per shift. The participant explained how they become distracted when tending to multiple patients concurrently, as one among the participant said:

> *Sometimes you have two or three patients, and it becomes very tight to monitor them closely. You get very tired* and added *I know how difficult the ICU environment is, but we are trying to deal with it (Participant 13).*

The participant agreed that the divided attention compromised the quality of care to patients. Receives as they struggle to prioritize tasks and manage their time effectively.. It was narrated that:

> *When there's one nurse for every two to three patients, the care becomes completely substandard (Participant 10)*

Participants understood the difficulties of the ICU environment, but they continued to do their best to manage these tough conditions. Almost all participants described that the number of nurses per patient ratio is a big challenge, leading to substandard care. The same experience was shared with one of the participants who work night shifts, who said that the situation gets worse.

> *And sometimes the staff is very challenging, especially at night (Participant 10).*

Participants explained the shortage of staff and busy working in the ICU as a big challenge, as they care for multiple patients at once. Despite the demanding environment, nurses strive to provide the best care possible. In an ICU setting, patients often require continuous and careful observation due to the severity and complexity of their conditions. The difficulty in monitoring numerous patients seems to be caused by various factors, including insufficient staffing levels, high patient acuity, and the demanding nature of critical care. It was narrated that:

> *Until there will be a shortage of staff then it will be a challenge, you will have one nurse attending to two or three patients, then monitoring becomes difficult regarding that patient"(Participant 5).*

The participant added that inefficiencies in the diagnostic workflow were another issue that delayed sepsis identification. Processing times can be slowed down by technical issues such as equipment constraints, as well as by heavy workloads that put healthcare or laboratory workers overworked. One of the participants said:

> *But even if you are in the required ratio of one nurse-one patient, there is still a shortage because you should wait for the laboratory's results because sometimes there is a queue at the laboratory even though the sample needs to be urgent (Participant 6).*

Institutional factors affecting early identification of sepsis

Sub-Theme: Training on sepsis

The sub-theme explains the role of training and its effect on the early identification of sepsis. Participants explained these opportunities, such as having sepsis training, the presence of the SOFA algorithm, having in-house training on sepsis, and having training on SOFA algorithm.

The participant explained different training they received. The training covered how to accurately calculate the SOFA score based on various clinical parameters, interpret the results, and make informed decisions about patient management. One of the participants said

> *For now there is this SOFA score that is being introduced and set for both of our ICUs. This is what we have to teach to all nurses and doctors (Participant 14)*

The participants explained that the SOFA score tool used to track a patient's status during their stay in the ICU by assessing the function of several vital organs. Also, it helped in identifying the extent of a patient's organ dysfunction and predicting their likelihood of survival.One participant said:

> *Regarding the tool that is here, it is posted, but it involves vital signs and laboratory tests and it starts to be used if the patient is in critical condition without any reason. It is called SOFA score (Participant 5).*

Some participants agreed been trained on the use of the SOFA score, such as identifying the early warning signs and symptoms of sepsis. One participant revealed that some nurses in the ICU received such training, but few were able to attend. One of the participants said,

> *Training was conducted here but not many people attended (Participant 5)*

The institution, through the in-charges of the ICU, has introduced in-house training, which is mandatory to be done on one of the days of the week. The participant explained that through the training provided, a slight understanding of the clinical signs and symptoms of sepsis is way better than nothing. One of the participants revealed that:

> S*epsis and the diagnosis of sepsis are a very small component in these in-house training, but they have helped me in caring for these patient (Participant 2).*

Participants reported gaining confidence through the weekly presentations on different issues related to sepsis. The willingness to learn was motivated by the proper timetable and on-hand practices during the sessions. Other participants who have knowledge or experiences on various issues were willing to share with other colleagues, as one of the participants said:

> *We also have weekly presentations on the various services that should be provided to the patient if he is here at ICU. The weekly presentations are not only about sepsis, but you can find someone to give you a little knowledge about sepsis (Participant 6)*

Participants explained the role of short courses as essential to sepsis identification in their daily practices, such as getting knowledge on sepsis etiology, clinical symptoms, diagnostic techniques, and therapeutic strategies. The goal of this program, as explained by one of the participants, is to give nurses the knowledge and abilities they need to identify, evaluate, and treat sepsis in patients who are severely ill. The critical care short course, which gave highlights on sepsis and sepsis bundles, helped in identifying sepsis and its management. One of the participants said:

Those are critical care courses and ICU bundles in those short courses, but they are not directly related to sepsis. Therefore, sepsis and the diagnosis of sepsis are a very small component in that training, but they have helped me in caring for these patients" (Participant 2).

Participants added that nurses who were enrolling in this brief course were provided with significant insights into the intricacies of managing sepsis, hence augmenting their capacity to provide optimal treatment and improve patient outcomes in critical care environments, despite the small number who were able to attend.

Those who attended have a different approach as they get insight from the training (Participant 4)

Participants explained the importance of training in updating their knowledge on sepsis. But unfortunately, the institution did not provide such training. As a result, they treat symptoms in a way that deviates from recommended recommendations, which results in inconsistent treatment techniques and differences in care practices. To standardize procedures and enhance patient outcomes, guidelines that include evidence-based practices were not provided to many participants. One of the participants said:

In fact, I have never attended any training sessions beyond my regular basic knowledge, and I have never received any training in the early identification of sepsis. Except for my regular schooling, I'm a diploma graduate; which provides me with limited insight (Participant 1)

Sub-Theme: availability of screening tool

Since sepsis symptoms can often be subtle and nonspecific, overlapping with other medical conditions, this complicates timely recognition. Participants explained how they struggle to distinguish these symptoms due to a lack of comprehensive training, insufficient clinical experience, or inadequate use of diagnostic tools such as the qSOFA score. One of the participants said:

> *The initial symptoms when the patient is in sepsis, are confusing to me and that's why when a patient comes, I focus more on obtaining a sample early so that I can get answers quickly (participant 13)*

Another participant added that:

> *But here for me I always wait for laboratory tests, that is blood tests and blood culture because these initial symptoms are very confusing for me (Participant 12)*

Other participants explained that this limitation is exacerbated in high-pressure ICU environments where workload and stress can impede careful observation and assessment. Consequently, delays in identifying sepsis symptoms can lead to delayed treatment, increasing the risk of severe complications and mortality.

Participants also explained that they experienced little knowledge on the specific issue, such as sepsis protocol, in caring for patients. They were unfamiliar with what to do at the first site with a patient with sepsis. They find themselves in a place to give service to a patient without knowing the guidelines. This was evident from one of the quotes from the participant:

> *This one hour bundle is not in ICU bundles so I don't really know if it is possible that I practice but I don't know if I implement that one hour bundle (Participant1*)

It was reported that participants always care for patients according to their needs and prioritize them. Other participants did not even know what they were doing or what was recommended by the guidelines.

> *In serving ICU patients with sepsis, we may be doing that one hour bundle, but now I don't understand if that is what we are practicing. But everything we do is due to the patient and that during that time, if he is dehydrated (Participant 7)*

While participants explained the use of clinical features as a first-line strategy in medical assessment rather than the recommended tools, this perspective underscores a practical

approach where healthcare providers prioritize identifying and documenting the observable signs and symptoms reported by the patient or evident during the physical examination using some assessment tools. One of the participants revealed that:

> *I don't know if in the ICU there are those tools to screen patients with sepsis. As far as I know, we use vital signs and blood tests like culture to confirm the presence of sepsis (participant 2)*

Another participant added:

> *There is none and I have never heard about those tools and I have never even used them, I should just say that I am only looking at the symptoms (Participant 1)*

Many participants reported concentrating exclusively on the symptoms; nurses may indicate conditions such as sepsis, which can allow preliminary diagnosis and immediate intervention.

Another participant said:

> *Often we only do assessment (head to toe assessment) but there is no specific tool (participant 6)*

It was explained that the lack of exposure to diagnostic tools for sepsis identification among Intensive Care Unit nurses significantly hampers their ability to recognize and manage sepsis effectively. Many participants admitted they were not exposed to these tools during their training or professional practice, making them solely reliant on clinical judgment as the participant revealed that:

> *No specific tool but we use vital signs for assessment what is done after knowing that this patient's vitals are low for example pressure we give him enough fluids (participant 3)*

Another participant added that:

I should just say that I am only looking at the symptoms (Participant1).

Many participants reported that the qSOFA tool was a new thing to them since they relied on the laboratory results. The tool commonly used to assess the early signs of sepsis has become unknown.

No is a new word for me (participant 1)

And another participant said:

No, I have never heard of these. And this is probably due to not being updated with information about this sepsis (Participant 8)

The fact that the tool is not known to almost all participants and some participants reported experiencing some emptiness in their daily practice. Since it was not emphasized in their daily clinical practice, the tool remained unknown to few. It was revealed that:

There is a screening tool called qSOFA that is recommended by the international sepsis campaign to be used. But here it is not used and it has not been emphasized that it should be used, leading to not having a specific screening tool for sepsis screening (Participant 10)

Participants explained that a lack of knowledge may make it more difficult to take advantage of all the resources at their disposal and to contribute successfully to programs that aim to improve sepsis outcomes. This goes hand in hand with the fact that the guidelines were there, but very few admitted to know how to integrate them into daily practice. But they do because it is the daily practice recommended by the ward in-charge. The participant said:

In serving ICU patients with sepsis, we may be doing that one hour bundle, but now I don't understand if that is what we are practicing. But everything we do is due to the patient and that during that time (Participant 3)

Participants were explained their unfamiliarity with the established guidelines and protocols specific to sepsis management within their organization. One of the participants said:

> *Even the institution does not emphasize about these patients with sepsis, maybe they should be treated differently, let them be under close supervision, there is none, even there is no training, so we are here we are (Participant 6)*

The participants reported, were not able to evaluate the degree of organ dysfunction in critically ill patients, especially those suffering from illnesses like sepsis, using the SOFA score. They explained the lack of the necessary SOFA score abilities, which could cause delays or mistakes in clinical decision-making. One of the participants said:

> *It is called the SOFA score, but I have never used it because I have not been instructed on how to use it (Participant 7)*

Many of the participants in this study revealed that the tool was introduced without any guide or instruction, so they failed to use it in their daily practice. One participant revealed that:

> *I really don't know if there are initiatives regarding specific training about sepsis, unless there is a symposium (Participant 3)*

Participants reported that the familiarity of certain protocols made the coordination clear and timely. Despite their critical role in patient care, the policy fails to explicitly acknowledge nurses' involvement in sepsis management, potentially leading to gaps in coordination and communication. One participant said:

> *The protocol is silent here because there is no training about sepsis, but we are being urged to do IPC at large maybe, we should say that (Participant 7)*

Since the local policy was noticed to be silent, even the trainings were not given on the basics of sepsis, so implementation was impossible. Participants observed that despite being curious about finding online information, getting the time to study became limited because most of the time they were busy with patients or attending to immediate needs.

Also, participants explained how the institution has initiated strategies for dealing with the early identification of sepsis. And to start with, they brought a poster showing the sepsis logarithm in each ICU (SOFA). But few participants were able to cooperate with the initiatives. Such that some did not even know the existence of the sepsis logarithm in their ICU,

> *And I haven't really explored into it*; *I've only seen the sepsis algorithm written*," *(Participant 12)*

The participant explained that their exposure to sepsis has been limited to encountering the algorithm without a comprehensive understanding of its application. Another participant said:

> *They brought a poster about sepsis and things to do when the patient is here in the ICU, this poster did not come with any training, so we still do not understand, we are waiting for them to come and explain to us how to use it (Participant 7).*

Despite these initiatives, the institution is familiar with these ICUs, but some participants were unfamiliar with such strategies. All in all, the entire participant cooperated with these initiatives and got to understand the use of the newly introduced screening tool for patients in the ICU. One participant narrated that:

> *I have not really seen, rather, there is a posture that was placed at the nursing station, but we were not given any information until now (participant 9)*

The study has revealed that participants were not very aware of or involved in the organization's sepsis management strategies. It was narrated as a lack of communication about the institution's initiatives that focused on treating sepsis or quality improvement initiatives, protocols and teaching programs. The participant said:

> *I don't know about the institution's guidelines, but here in our ward, we have our own policy every patient who arrives here, whether they have symptoms of sepsis or not, must be taken for a blood culture (Participant 13)*

Since there is no tool reported to be used as a standardized tool at the local level, ICU nurses find themselves in a situation where they can use the observable vital signs to guide their assessment. Furthermore, the international assessment tool is still new to them. Most of the participants said qSOFA is a new term for their daily practice.

> *No is a new word for me (Participant 1).*

Another participant added that:

> *I have never heard of those screening tools (participant 11)*

It seems that they never come across such a tool for use during sepsis identification. Since the ICU has no standardized tool to be used by all nurses, other participants reported being familiar with the qSOFA, but it was not emphasized that it should be used in their workplace. Making participants relay on other parameters, such as lab results, and sometimes dealing with the clinical features, which may be nonspecific to most patients. Most participants revealed that they may know the term, but in their practice, it is not emphasized.

> *The qSOFA screening tool, but here it is not used and it has not been emphasized that it should be used, leading to not having a specific screening tool for sepsis screening (Participant 10)*

CHAPTER FIVE

5.0 DISCUSSION

The aim of this study was to explore and describe the factors affecting early identification of sepsis in nursing practice among ICU nurses. The finding revealed that knowledge experience, training on sepsis and nurse patient ratio affect early identification of sepsis.

Individual factors affecting early identification of sepsis among ICU nurses in adult ICU

The study highlights that many participants have the fundamental understanding required to diagnose sepsis, allowing them to identify its key signs and symptoms. This implies that working experience and education level contribute to the understanding and practice of identifying sepsis in critically ill patients. According to the studies done in Uganda (40,67). Having fundamental information is essential for early detection and enables nurses to start interventions on time. Sustaining this knowledge and keeping nurses well-informed of the most recent advancements in sepsis management requires ongoing education and training. A solid baseline comprehension was demonstrated by the nurses' ability to identify symptoms such as hypotension and respiratory difficulties as indicators of sepsis. A similar study done in Uganda revealed that, when nurses have continued education, nurses are better able to advocate for patients and make educated judgments in the clinical setting (21).

This study has identified that nurses practice the procedure confidently and without hesitation. This implies that nurses know the sepsis guidelines and integrate them into their daily practice. Early sepsis diagnosis requires the fundamental information necessary to carry out diagnostic tests, such as drawing blood samples for culture prior to beginning antibiotics. Similar studies have identified the necessity of standard operating procedures in medical diagnostics, as demonstrated by the routine practice of drawing blood samples regardless of the existence of symptoms (39,68). When these procedures are carried out correctly, individuals who do not show symptoms at first can still benefit from early intervention because a prompt and precise diagnosis is guaranteed. This method emphasizes how vital laboratory testing is to the

diagnosis of sepsis and the formulation of treatment plans. The value of laboratory diagnostics in the treatment of sepsis is widely established throughout Africa (69).

The study has shown that nurses who have worked more than three years in the ICU have a good approach towards patients with issues relating to sepsis. This suggests that working in the ICU for quite a long time makes the nurses aware of some common conditions and their management. The experiences learned can be gained through observation, small teachings, major ward wounds, and discussion with other colleagues in the ward. The same results were obtained in the study done in Sweden (70). Which identified that the nurses' experience plays a part in identifying patients with sepsis by giving nurses confidence to pick the cardinal features without delays. The experiences of nurses can be incorporated through different trainings on caring for critical patients to gain an understanding of the clinical signs and symptoms of sepsis, as well as the diagnostic criteria (41,71).

The study has identified that nurses experience difficulties diagnosing sepsis since the symptoms can be vague and subtle, especially in the Intensive Care Unit (ICU) when pressure is high. This implies that nurses who lack clinical experience and training have difficulty differentiating between these symptoms. The problem is made worse by the underuse of diagnostic instruments like qSOFA. In such a situation, experience plays a great role in the identification of sepsis. The study was done in Sweden (70), found that nurses who saw the same symptoms as before were confident enough to intervene in sepsis. Experience working in the ICU for a long time may be a great weapon and can be cemented with training so as to gain confidence while caring for suspected patients in ICUs.

The study has identified that there is little use of evidence-based practice in caring for sepsis patients. Implies that nurses care for patients without considering the best practices with evidence. A study done in China and the United States of America emphasizes that strict adherence to sepsis protocols, including early assessment, timely administration of antibiotics, and fluid resuscitation, significantly reduces mortality rates. (1,2). Despite being introduced by the institutions, the nurses are still unaware of the SOFA score, which underscores the

importance of institutional initiatives to ensure all staff are informed and compliant with established protocols.

Improved communication channels to disseminate institutional guidelines and protocols are essential in dealing with sepsis identification. The study has identified that there is a loophole in communication in the workplace. But the current practice of getting the status was half way to a good practice. Having proper communications was mentioned to be an important aspect of the sepsis burden, which can help bridge the gap in knowledge and practice (32) . Regularly reviewing and updating sepsis management protocols is due to current evidence, feedback from frontline staff, and continuous quality improvement. All these efforts can optimize patient outcomes and safety, as suggested in the study done in the UK by Davis (72) .

Unfamiliarity with the SOFA score, qSOFA tools, and guidelines among most nurses working in the ICU delays the continuation of care for sepsis-suspecting patients. Despite the importance of guidelines in standardizing practices and ensuring quality care, it seems that these specific guidelines have not been made readily available or communicated to me and possibly other staff members. This lack of visibility could be due to various reasons, such as changes in protocols, limited dissemination of information, or oversight in training and communication processes. Similarly, the systematic review identified oversight training and a lack of communication on protocols (26). As a result, gaps were identified in the understanding of certain protocols or best practices outlined in sepsis guidelines. Other studies highlight the need for improved access to and awareness of such resources to enhance patient care and safety for better outcomes (54). The institution can join hands in programs aimed at training healthcare workers to recognize and manage sepsis to improve outcomes.

The study has also identified that the lack of confidence to identify the initial symptoms of sepsis delays the decision on suspected patients with sepsis. This implies that nurses can contribute to the delay in diagnosing sepsis and lead to complications. In this regard, a comprehensive assessment of critically ill patients, such as assessment by using validated tools such as qSOFA, getting blood samples for culture, and lactate assessment, is vital (14). Measuring lactate level is an essential component in the sepsis protocol, but such an element

was not one of the potential participants monitored in this study. Patients in the ICU need to monitor all of the elements in the sepsis protocol. One study showed that monitoring lactate levels has been associated with a reduction in the length of stay in the ICU (73).

This study found that the majority of the participants were not familiar with sepsis guidelines, especially the screening tool in their workplaces. This implies that nurses lack proper training on the current issues of sepsis, hence being unaware of the guidelines on sepsis. It was identified that the education sessions increased the nursing staff's overall confidence in the early identification of sepsis patients (74). Being unaware of the sepsis protocol makes the nurses lack confidence in the identification of key features of sepsis. The same result was obtained in the study done in Tanzania, which found that the barrier was a lack of knowledge and lack of self-motivation regarding the protocol. Education programs have shown improvement in compliance with the protocol (16)**.** This demonstrates the perceived value of education for health care providers in this area (25,73).

This study has identified that the majority of nurses are unaware of the sepsis one-bundle. Also, the nurses in this study are uncertain about the one-hour bundle, and it becomes a challenge to care for these patients while waiting for laboratory results. This signifies that most of the nurses fail to continue their care due to a lack of skills in managing sepsis. The assessment and management of sepsis heavily depend on laboratory results. Another study insists that when a patient presents with symptoms indicative of sepsis, healthcare providers initially stabilize the patient, often using the one-hour bundle approach with vital signs assessment to determine the fluid resuscitation needed (54). The SSC had revealed that fluid resuscitation in patient with suspected with sepsis should follow the SSC guideline (14).

The study has identified that insufficient knowledge and application of particular diagnostic instruments underscore the necessity of thorough instruction. Similar results were found in the studies done in Britain, North Carolina, and Uganda (22,27,74). Improving nurses' understanding of diagnostic techniques and resources can help identify and treat sepsis earlier, which will benefit patients (69). Due to a lack of access to sophisticated diagnostic

instruments, symptomatic assessment is frequently used in African healthcare settings. According to a Malawian study, medical professionals frequently rely on clinical indicators to diagnose sepsis, which can cause a delay in diagnosis and treatment (34). Similar results were found in this study which suggests improving sepsis care in patients. Institutions needs to expand access to diagnostic resources and providing instruction on their usage to all nurses working in the clinical area as it was suggested by (75).

Delays in diagnosis and treatment might result in a higher chance of complications and unfavorable outcomes for patients. In comparable with other healthcare systems in many African countries the same challenge is obvious (54). These issues can prevent nurses from receiving continuous education and adhering to established protocols. The WHO emphasizes the need for effective systems of care, including early recognition, resuscitation, and targeted antimicrobial therapy, which are often hindered by systemic inefficiencies (5).

This study has identified that there is restricted access to internet resources which impair research, learning, and general advancement in a number of sectors. Restricted internet connection reduces the availability of up-to-date knowledge, educational materials, and crucial information on current practices and developments for individuals and organizations, particularly those in distant or under-resourced places. Most nurses in this study are limited with free internet access which limits their access to knowledgeable information. Other studies suggests nurses can acquiring sepsis competencies through simulation based (71) and more importantly and easily through online learning (72).

This study has revealed knowledge on sepsis can be gained through different ways such online training, so the limited access hinders knowledge to most nurse. The study done in Gabon revealed that health personnel in have significant gaps in their knowledge regarding sepsis, which could hinder the timely identification and treatment of sepsis. It is necessary to set up regular updated knowledge through online trainings (36). An obstacle that has evolved is the limited availability of instructional resources, which forces nurses to rely on personal internet access for knowledge. This suggests that accessible educational resources and chances for

professional growth require institutional support. Nurses who receive ongoing education through seminars, conferences, and online tools are better equipped to manage difficult illnesses like sepsis. Enabling healthcare personnel to access educational resources should be a top priority for institutions in order to enable them to give the best possible treatment as it was suggested in SSC (14).

This digital divide has the potential to widen the gap between those who have knowledge and those who don't have. Improving the internet access and universal internet access are all necessary to address this problem and make sure that everyone can take use of the wealth of knowledge that is available online. The institutional support is crucial for access to educational materials and online resources. This can give access to devoted library or online platform for healthcare professionals can facilitate continuous learning and knowledge acquisition.

Environmental factors affecting early identification of sepsis among ICU nurses in adult ICU

According to the study, there are no issues with patient medical charts' accessibility or availability in the Intensive Care Unit. This finding is consistent with the urgent requirement for complete and current patient records. This means that effective patient management requires medical charts that contain a patient's whole medical history, current diagnosis, prescribed medications, and continuing clinical observations. One of the participants emphasized the need for these records for each and every ICU patient, pointing out their dependability. This accessibility enables the multidisciplinary team to provide integrated care, make educated decisions, and assess patients quickly and accurately (9). Standardized patient charts have been demonstrated to enhance clinical outcomes by enabling speedy evaluations and the early identification of problems (52).

For the early detection of sepsis, sample collection tools like blood culture vials must be readily available. Some participants in the study observed that such equipment is rarely lacking in the workplace, guaranteeing prompt sample collection and diagnosis. A participant brought up the convenience of carrying out the required procedures because sample collection

bottles are readily available. Contrary to what was done in Ethiopia, the shortage of equipment was obvious and caused delays in vital therapies, underscoring the significance of having sufficient resources for prompt sepsis identification (12). The early identification is greatly affected by the availability of basic medical supplies in Sub-Saharan Africa.

Even though patient charts are readily available, the study finds that the hectic nature of intensive care units (ICUs) makes it difficult to accurately document infections. Although the charts have sections for noting potential infection sources, there is no specific section for identifying sepsis post-assessment. This can result in incomplete documentation, which negatively impacts the clarity and accuracy of patient records. One participant brought up the pressure to document infections during head-to-toe assessments, which is crucial for early sepsis identification and intervention. Similar challenges have been noted in Ugandan healthcare settings where the nurses relied on the informal way of documenting infections on patient charts (21).

Having a small number of nurses per shift in relation to the number of patients was a common challenge, as narrated by many participants. The study has also revealed systemic challenges, such as inadequate staffing, high patient-to-nurse ratios, and overburdened moments in their practice. The implication of this is that high patient-to-nurse ratios and insufficient staffing can make it more difficult for nurses to properly monitor patients and spot early sepsis symptoms. The study has identified that the workload and unbalanced nurse-patient ratio contribute to dividing attention and resources between multiple patients.

This can strain the ability of medical professionals to provide focused and comprehensive care to each individual, impacting overall patient outcomes. In the hectic environment of healthcare, the busyness of numerous tasks often results in incomplete documentation. The constant pressure and time constraints faced by medical professionals can lead to lapses in writing detailed and accurate records, which are essential for patient care continuity. Similar results were obtained in the study done in the UK and limited resource countries where there were no proper assessments of the patient and incomplete documentation (23,76)

The study has shown that effective patient monitoring is severely hampered by the hard ICU environment and uneven nurse-patient ratios. Also, the challenge of handling several patients at once was mentioned by the many participants. This can cause delays in identifying important changes, such as early sepsis indications. Similarly, inadequate nurse-patient ratios in intensive care units (ICUs) in limited resource areas have been associated with delays in the diagnosis and treatment of sepsis, hence impairing the quality of patient care (76). These issues can be resolved with the use of supported technologies and increased workforce numbers, guaranteeing prompt interventions and improved patient outcomes.

As result, nurses use the symptomatology approach to assess for suspected sepsis in their ICU. The use of the specified tool for sepsis screening was affected by the lack and ignorance of the international tool for sepsis screening and the sepsis guidelines and protocol. This was similar to the study done in Jordan and Singapore (25,32). To improve nurses' understanding and self-assurance in identifying and treating patients with sepsis, more robust sepsis education and training initiatives are required, along with the application of sepsis screening instruments and care bundles (28,32,77,78).

In order to improve patient survival rates, a Ugandan study highlighted the significance of prompt blood cultures and other laboratory testing in the diagnosis of sepsis (79). Contrary to the study, the initiatives are hampered by inadequate laboratory equipment and resources, which emphasizes the need for better diagnostic facilities and training. This implies that the process of identifying sepsis is delayed due to a lack of essential equipment, such as bottles for sample drawing. However, given the wide variations in technological, material, and human resources both within and between these contexts in limited resource areas, each institution must assess if putting these ideas into practice would be beneficial given its unique set of circumstances (76).

The study has exposed the Lack of basic supplies, including thermometers, makes it difficult to perform thorough temperature readings that are necessary for diagnosing sepsis. Participants brought out problems with digital thermometers, like low battery levels, which

result in uneven temperature readings. The assessment and management of sepsis heavily depend on laboratory results (79). When a patient presents with symptoms indicative of sepsis, healthcare providers initially stabilize the patient, often starting with a vital signs assessment and fluid resuscitation if needed. However, a definitive diagnosis and an appropriate treatment plan rely on laboratory findings. In this study, it was found that, despite laboratory results being an important part of the management of sepsis, equipment such as bottles for culture was found to be a challenge, which caused a delay in the proper management of the patients with sepsis. A study done in limited resource areas suggests the use of available equipment in dealing with such problems (75,76).

The study draws attention to sporadic shortages of culture bottles, which are essential for sepsis diagnosis. Few participants mentioned that because of budgetary limitations, stock restocking could take up to two months, which would cause serious delays in sample collection and diagnosis. This means that nurses are stuck in the process of managing sepsis due to a lack of equipment. Similar problems with equipment shortages are common in countries with limited resources. For instance, a study discovered that a lack of culture bottles hampered the prompt diagnosis and treatment of sepsis (26). Better supply chain management and resource allocation are necessary to address these shortages, which will enhance patient outcomes and diagnostic capabilities.

Institutional factors affecting early identification of sepsis among ICU nurses in adult ICU

This study has identified that many nurses lack training on sepsis and the few who have training are not willing to use their knowledge properly. This implies a deficit in the continuation of care and management of sepsis. Consequently, many ICU nurses in Tanzania and other African countries do not receive comprehensive training on sepsis management protocols. According to a study published in the "African Journal of Emergency Medicine," there is a significant gap in the knowledge and practice of sepsis management among healthcare providers due to insufficient training programs and educational resources (54). The gap has been revealed in this study which leads to a lack of awareness about the latest

protocols and best practices in sepsis care. For the early assessment of sepsis, nurses frequently depend on visible signs and symptoms. Although useful, this method has limitations and needs additional diagnostic testing to prove sepsis.

The study has identified that some nurses have training in sepsis. This infers from their practice that sepsis education and training programs are essential to addressing this problem. The study done in Tanzania identified that timely and efficient interventions can be achieved by providing nurses with thorough knowledge and practical skills to identify and respond to early indicators of sepsis (16). Timely diagnosis is made more difficult by the complexity of sepsis symptoms and the heavy workload in intensive care units. According to a study done in Malawi (81). Poor training seriously obstructs the early detection of sepsis, delaying treatment and raising fatality rates. Improving training initiatives and lessening the burden of work are crucial measures to enhance sepsis detection and treatment in these kinds of environments.

Many participants mentioned that the in-house session on different ICU bundles provides a small component of the overall knowledge and skills on sepsis assessment. But the focus on sepsis and its diagnosis has significantly improved nurses 'ability to care for patients with this condition. This indicates that nurses battle to stay up-to-date on sepsis and combat it by using the ICU bundles that are accessible. And so it is about prevention rather than cure. Similarly, the study was done in different areas, such as Uganda, Canada, and China (27,28,77,78) showed that knowledge plays a greater role in nurses' ability to recognize sepsis early, initiate timely interventions, and collaborate effectively with other healthcare teams to provide comprehensive care. Additionally, understanding the pathophysiology and management strategies for sepsis has empowered us to deliver evidence-based care and optimize patient outcomes in this critical condition (9,23,30).

The study has identified that the Sequential Organ Failure Assessment (SOFA) score was being introduced and implemented in both of our ICUs. The SOFA score is still a valuable tool used to track a patient's status during their stay in the ICU by assessing the function of several vital organs. It helps in identifying the extent of a patient's organ dysfunction and predicting

their likelihood of survival. To ensure the effective use of this scoring system, it is crucial that all nurses and doctors receive thorough training (48). Contrary results were found in this study, where the coverage of the training was inadequate. The training always covers how to accurately calculate the SOFA score based on various clinical parameters, interpret the results, and make informed decisions about patient management. By standardizing the use of the SOFA score across these ICUs, we can improve patient outcomes through better monitoring and timely interventions, as suggested in the study done in Uganda (27).

This study has identified that there were underutilization of sepsis assessment tools. Also, the study has shown that nurses' knowledge of the qSOFA tool is limited, hence ineffective in rapidly recognizing sepsis with it. This indicates a potential training and knowledge gap on available tools and other recommended tools for sepsis screening that impede prompt sepsis detection. The SSC insists that having a thorough understanding of and ability to use qSOFA can help with early diagnosis and timely intervention, which can greatly improve patient outcomes (42). Thus, to improve sepsis management in the ICU, regular educational programs must include training on qSOFA and SOFA score as the diagnostic tools in the setting. Studies conducted in African environments attest to the value of diagnostic instruments such as qSOFA in enhancing sepsis outcomes. Training nurses to use qSOFA greatly increased their capacity to recognize sepsis early, resulting in quicker interventions and better patient outcomes, according to a study conducted in Malawi (82).

This study has identified that many nurses are not aware of the screening tool and the general guidelines for sepsis. This led to a delay in the proper assessment and management of sepsis. Notable shortcomings have been identified in the training of healthcare professionals in Tanzania concerning the assessment and management of sepsis. A considerable number of ICU nurses lack sufficient education on the most recent sepsis protocols, leading to challenges in effectively identifying and treating the condition (16). In an environment with limited resources such Tanzania, the qSOFA score would be a straightforward tool that can help with risk stratification by predicting mortality (82).

Nurses also were largely unfamiliar with the qSOFA instrument and frequently rely instead on clinical judgment and test results. This lack of accessibility to crucial diagnostic resources can exacerbate patient outcomes by delaying the diagnosis and treatment of sepsis. Improving training programs to stress the use of diagnostic techniques like qSOFA is necessary to address this problem. The same results were obtained in Gabon, which identified that more than half of the health care workers did not hear of qSOFA (36), hence unable to utilize it. Ensuring that nurses possess these instruments and are adept at utilizing them is essential for managing sepsis effectively. In African healthcare, qSOFA and other diagnostic technologies are not well known (54).

The introduction of tools such as the SOFA score and qSOFA for sepsis assessment was mentioned in the data. While some nurses received training on these tools, others lacked sufficient guidance and felt unprepared to utilize them effectively. This highlights a critical training gap that could impact early recognition and intervention in septic patients. The literature supports the role of structured training in improving sepsis management. A systematic review by Rhodes (2017) concludes that training healthcare providers on sepsis recognition and management leads to earlier diagnosis and improved patient outcomes. Effective training should include not only theoretical knowledge but also practical application of tools like the SOFA score in clinical settings (14,35,71). Implementing structured training programs that cover sepsis management protocols, the use of assessment tools like SOFA and qSOFA, and updates on clinical guidelines is essential in nursing practice. This ensures all staff are equipped to provide consistent and effective care.

Sepsis detection and treatment are greatly improved by the Sequential Organ Failure Assessment (SOFA) score. One of the main signs of sepsis is growing organ dysfunction, which is shown by a rising SOFA score. With the use of this technology, medical professionals can detect organ failure symptoms early on in sepsis cases, when they may not be as obvious as traditional clinical markers (42,48,76). In contrast, in this study, nurses were unskilled in the use of the SOFA score. Also, there was little application and less emphasis on the SOFA score in sepsis screening. The little application of such a tool was due to insufficient

skills by the ICU. Although the study done in Thailand exposed that the SOFA score was precise in detecting sepsis, which allows for timely and effective therapeutic measures that can lower the morbidity and mortality associated, especially with malaria sepsis (48).

Lack of training on available sepsis screening tools was one of the key issues identified in this study, which significantly hindered the early detection and management of this life-threatening condition. Other studies suggest that effective use of tools such as the Sequential Organ Failure Assessment (SOFA) score, Quick SOFA (qSOFA), and Early Warning Scores (EWS) were crucial for timely diagnosis and treatment (46). And without proper training, healthcare providers may miss early signs of sepsis, apply these tools inconsistently, or respond inappropriately, leading to delayed treatment and increased patient morbidity and mortality (22,67).

This study has identified that many nurses had no training on the SOFA score, regardless of whether it was the recommended tool to be used in the setting. Notwithstanding being given the orientation on the tool, most nurses did not attend the sessions; hence the continuation of care becomes a nightmare. This implies the continuation of care being missed since other nurses are unaware of the sepsis identification. The same results were identified in the study done in Gabon, where there was a significant knowledge gap in the sepsis tools (36). Addressing this training gap through continuous comprehensive education programs, standardized protocols, regular monitoring, and interdisciplinary collaboration is essential to improve sepsis outcomes and save lives as it was insisted in the study which identifies the barriers in implementing sepsis protocol (72,78).

Because initial symptoms can be ambiguous and test results might cause delays in initial care, ICU nurses frequently encounter difficulties when diagnosing sepsis. In particular, when patients have coexisting illnesses, participants showed a lack of trust in their ability to recognize early indicators of sepsis without test proof. Similar difficulties are seen in low-resource countries, where the non-specific nature of sepsis symptoms often forces nurses to

rely on test data (26). According to a study conducted to assess the challenges in sepsis identification, nurses frequently wait for confirmatory testing before starting treatment for sepsis, which results in delays in the diagnosis of the illness (21). To reduce these delays, it is crucial to improve training on early sepsis recognition and speed up diagnostic turnaround times.

The study has identified that ICU nurses get very little chance to attend for training; sometimes this gives a less updated knowledge on the updated issues. Also, the busy schedules and demanding environment in the ICUs make the nurses feel overwhelmed and fail to attend the symposium. The early identification of sepsis mainly depends on the knowledge of the individual, whether received through training or self-learning. This is contrary to the SSC, which recommends training to give health professionals awareness of sepsis (14).The knowledge of sepsis can be obtained also through symposiums and house trainings when discussing different cases (78).

This study revealed that the majority of ICU nurses were not trained in early identification and also had limited knowledge of the early symptoms of sepsis. Some of the participants use their outdated knowledge to manage these patients. This means that nurses are unaware of the sepsis updates since they lack training. The finding is supported by the review of literature, which identified that more than half of the nurses were unaware of the early symptoms of sepsis (27). Unawareness of the early symptoms of sepsis among nurses resulted into lack training hence delay detection and recognizing sepsis (25). So being aware with sepsis protocol and guidelines can increase the ability and reduce time to initiate the management of sepsis (27,36,81,83). The trainings can be from weekly in-house training or external training. Then nurses' professionals should have the adequate knowledge to enhance the capacity for identifying sepsis as early as possible.

The study has identified that the intense demands of the ICU workload often lead to a perceived neglect of patient care, overshadowing considerations such as symposium attendance. The relentless nature of critical care environments means that healthcare professionals are frequently overwhelmed, prioritizing immediate patient needs over

educational opportunities. Similar results were obtained in the study done Italy, Uganda and Norway (31,38,84). This prioritization, while necessary, can limit the chances for medical staff to engage in continuing education and professional development, ultimately impacting the quality of care they provide (3).

Some of the participants additionally commented that the provided SOFA logarithm which the institution is currently insisting to be used should be communicated to all ICU nurses so as they can include it the documentation chart to make it easier to use and follow. Other studies has pointed out that access to updated clinical guidelines and protocols can be challenging in resource-limited settings (54). Many healthcare facilities in Africa may not have the infrastructure to regularly update and disseminate new guidelines to their staff. The WHO highlights that effective sepsis management requires integrated clinical care with timely updates and training, which are often lacking in low- and middle-income countries. Health care professionals actors were identified as critical for improving the delivery of recommended sepsis practices by knowing what to do and why and this can be achieved through effective training on sepsis(85).

Sepsis assessment primarily involves observing and identifying symptoms suggestive of sepsis, it's important to understand that waiting for test results before initiating treatment may delay critical interventions. Nurses in this study relay on the laboratory test results since they lack skills to use the sepsis screening tool. Sepsis is a time-sensitive condition where early recognition and management significantly impact patient outcomes. Therefore, even in the absence of definitive diagnostic tests confirming sepsis, it's essential to promptly initiate interventions based on clinical suspicion (32).

The study has identified that there is no tool used for assessing sepsis so they use laboratory results to detect sepsis. Other studies suggests to have collaborations to facilitate timely administration of appropriate antibiotics and fluid resuscitation, which are cornerstone treatments for sepsis (30). By initiating these interventions promptly, we can mitigate the progression of sepsis, reduce the risk of complications, and improve patient survival rates.

5.1 Implication to practice

The results of this study directly affect nursing practice and the early identification of sepsis in critically ill ICU patients. As has been mentioned, sepsis is a leading cause of death and morbidity in patients in critical condition. If sepsis is not properly identified and treated, it can lead to complications, many of which result in death, high treatment costs, and a load on the nation's hospitals and healthcare system. Thus, it is imperative to state that sepsis needs to be identified early on in order to be treated effectively. In order to do this, nurses who are tending to critically ill patients need to conduct the necessary assessments. Appropriate early management is impossible without adequate early assessment.

Furthermore, nurses must be familiar with and competent in using the sepsis guidelines since the assessment of sepsis has been reduced to the use of dependable, user-friendly tools. The qSOFA tool is the most widely advised among the others, and it is also the simplest and most predictive of this study. Through this study, it was determined that nurses employed by Muhimbili National Hospital in the ICUs are unaware of and do not use the qSOFA. Even though SOFA score is the tool that is suggested in this institution, there is still a lack of information and expertise regarding its application. Instead, nurses depend on laboratory testing, the use of techniques for assessing vital signs, and other readings of physiological parameters, which may cause a delay in the diagnosis of sepsis. When the tool is used correctly, sepsis in critically sick patients can be accurately assessed, providing nurses with guidance on how to effectively manage the patient's sepsis and averting problems from poorly managed sepsis.

5.2 Study limitation

- Being an explorative descriptive qualitative study it was time-consuming on data collection since the data collection were done in the ICU premises which sometimes the respondents had to attend other emergency issues or responsibilities.
- Interpretation might be limited by personal experience and knowledge which influence observations and conclusions.

5.3 Study mitigation

- All participants were well informed on the significance of the study and were asked to give their rich information without interactions. Also all participants were asked to delegate their responsibilities to other Nurses on the day of appointment and during the interview
- The principal investigator and the other research assistant were in open mind state and use of bracketing during data collection and analysis to get uninterrupted codes, meanings and themes.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Variety of individual, environmental, and institutional factors influences the early detection of sepsis. Individual factors include the knowledge and experience of healthcare professionals in recognizing sepsis; environmental factors include the nurse-patient ratio and the availability of medical equipment for sepsis care; and institutional factors include the availability of screening tools for critically ill patients and the provision of training on sepsis. Taken together, these elements suggest that a comprehensive approach is necessary to improve sepsis identification, addressing personal expertise, resource availability, and institutional support.

6.2 Recommendation

Enhancing ICU nurses' ability to identify early signs of sepsis requires a multifaceted approach.

Recommendation in nursing education

Training (By Nurses and Nurse Managers at the Hospitals and Universities):

- To conduct continuous professional education training programs on sepsis assessment for critically ill patients to all the nurses who care for such patients.
- To incorporate sepsis assessment training specifically for critically ill patients into the nursing curriculums at school/university level across all cadres – Diploma, Degree and Masters Level.

Recommendation in Clinical Practice

- Adopting a culture of continuous learning: Implementing peer review systems, promoting interdisciplinary collaboration, and establishing learning communities will help nurses improve their sepsis management practices.
- An implementation plan should follow a phased approach, starting with a needs assessment and detailed planning, followed by the development of training programs and protocols, resource allocation, and systematic implementation. Continuous monitoring, evaluation, and refinement of these measures based on feedback and emerging best practices will ultimately enhance the early identification and management of sepsis, leading to better patient outcomes and reduced mortality rates
- Regular workshops, simulation-based training sessions, and continuing education credits can significantly improve nurses' proficiency in sepsis management.
- Standardizing and enforcing sepsis protocols across the institution, supported by regular audits and strong leadership emphasis, will ensure consistency in sepsis care.
- Additionally, equipping ICUs with advanced diagnostic tools and integrating sepsis alert systems into electronic health records can aid in early detection.
- Ensuring adequate resource allocation, including optimal nurse-to-patient ratios and flexible scheduling, will support nurses in providing focused and effective sepsis care

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APPENDICES

Appendix I: Guided Questions for the Interview (English version)

1. Participant particulars
    a) Participant serial number
    b) Age
    c) Sex
    d) Education level
    e) Years of experience in ICU
2. Open-ended questions concerning individual factors affecting early identification of sepsis in nursing practice
    a) How do you identify the patient has sepsis?
    b) How knowledgeable are you to detect early signs of sepsis when caring for patients?
    c) How familiar are you with the use of tools such as qSOFA in screening for sepsis in the ICU?
    d) Most patients in ICU suffer from sepsis and most of them are older adults. On your own experience, how do different conditions of the patient affect your practice
    e) What is your action when a patient has sepsis? Within one hour, post one hour
    f) How do you see the process of identification and managing sepsis in critically ill patients?
3. Open-ended questions concerning environmental factors affecting early identification of sepsis in nursing practice
    a) How does the working environment affect early identification of sepsis in your practice
        - How easy are you able to access up-to-date information about sepsis
    b) One of the best practices in sepsis control is identifying of the source of infection. How easily do the patients' surroundings allow you to control infection?
    c) The patients' charts are an important tool in the ICU, how does it allow you to document the findings concerning changes including the source of infection?

4. Open-ended questions concerning institutional factors affecting early identification of sepsis nursing practice.

a) How does your institution support the Global surviving sepsis campaign?
   - How often do you get training concerning sepsis

b) How does the institutional policy advocate nurses' part in the early identification of sepsis

c) Does the institution have guidelines on how to communicate?

d) What is your perception of the different screening tools available in your institution

e) How do the institution's demands affect your practice in the early detection of sepsis?

Closure: is there anything you want to clarify or correct? If no then, then thank you for your participation

Appendix II: Informed consent form (English version)

INFORMED CONSENT FORM

Greetings,

My name is Asteria Julius, a postgraduate student in Critical Care and Trauma Nursing, conducting a study on factors affecting early identification of sepsis in nursing practice among ICU nurses who are working in adult ICU of the Muhimbili National Hospital, Dar es Salaam, Tanzania.

You are eligible to take part in this research project because you have been taking care critically ill patients in adult ICUs. This form gives you important information about the study. It describes the purpose of the study, and the risks and possible benefits of participating in the study. Please take time to review this information carefully. If you have any queries, do not hesitate to consult me (principal investigator).

Study Title: Factors affecting early identification of sepsis in among Intensive Care Unit nurses in National Referral Hospital-Tanzania

Researcher: *Ms. Asteria Julius*, RN, School of Nursing, Muhimbili University of Health and Allied Sciences

Purpose of this study: The purpose of this study is to assess the factors affecting early identification of sepsis in nursing practice among nurses in adult Intensive Care Unit nurses at Muhimbili National Hospital, Dar es Salaam, Tanzania. Also, this study aims to assess the individual, environmental and institutional factors that can affect early identification of sepsis in the Tanzanian setting.

Who can take part in this study? This study is for all nurses working at the ICU. Participation in this study is entirely voluntary. You may leave this study at any time without any harm on you. You will neither lose any benefits, nor will it affect your work at the ICU if you decide not to take part in this study.

What will happen in this study? There will be in depth interview which will be conducted in the hospital premises. If you consent, you will be enrolled for 40 minutes for in-depth interview. You will be informed of the time, date and venue of the interview. On the day of the

interview, you will be asked open ended question, you will be required to give details to the best of your knowledge and the researcher will be voice recording your details.

Are there any risks of taking part in this study? There are no risks for you for participating in this study. There may be some inconvenience for your time dedicated for attending the interview only.

Are there any benefits of taking part in this study? You will not receive any personal benefits from being in this study. However, any new information that will be learned in this study will be used to improve efficiency of nursing care and improve overall outcome of patients in your care.

Is there confidentiality in this research project? The individual information obtained from this study will not be shared. The results will not be directed to any individual, rather as general outcomes. The results of this study could be published in an article for other researchers to read but would not include any information that would let others know who you are.

Your signature below means you have read the above information, understood it well and are voluntarily ready to participate in this study.

Signature of Participant _____

Date _____

Thank you for agreeing to participate in the study. Please do not hesitate to contact me or any of the contact persons below for clarification about your participation.

Contact Information:

Ms Asteria Julius,

Principal Investigator.

School of Nursing, MUHAS

Mobile No: +255 755 963 769

Email: asteriamahudi@gmail.com

Director of Research and Publication,

PO Box 65001 – MUHAS

Tel No: +255 -022-2152489

Email: drp@muhas.ac.tz

Prof. Edith Tarimo

Study Supervisor,

School of Nursing, MUHAS.

Tel No: +255 784 917;

Email: etarimo54@yahoo.com

Appendix III: Informed consent form (Swahili version)

FOMU YA RIDHAA KUSHIRIKI KWENYE UTAFITI

Salamu.

Jina langu ni Asteria Julius, mwanafunzi wa shahada ya uzamili katika *Critical Care* na *Trauma Nursing*, nikifanya utafiti juu ya kuchunguza mambo yanayoathiri utambuzi wa mapema wa *sepsis* katika *nursing practice* kati ya wauguzi wa ICU ambao wanafanya kazi katika ICU ya watu wazima ya Hospitali ya Taifa Muhimbili, Dar es Salaam, Tanzania.

Unastahiki kushiriki katika mradi huu wa utafiti kwa sababu umekuwa ukiwahudumia wagonjwa mahututi katika vyumba vya wagonjwa mahututi vya ICU. Fomu hii inakupa taarifa muhimu kuhusu utafiti. Inaelezea madhumuni ya utafiti, na hatari na faida zinazowezekana za kushiriki katika utafiti. Tafadhali chukua muda kukagua habari hii kwa makini. Ikiwa una maswali yoyote, usisite kuwasiliana nami (mtafiti mkuu).

Kichwa cha Utafiti: Kuchunguza mambo yanayoathiri utambuzi wa mapema wa *sepsis* katika *nursing practice* kati ya wauguzi wa wagonjwa mahututi katika Hospitali Taifa Muhimbili, Dar es Salaam, Tanzania.

Mtafiti: Bi. Asteria Julius, RN, Shule ya Uuguzi, Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili.

Madhumuni ya utafiti huu: Madhumuni ya utafiti huu ni kutathmini mambo yanayoathiri utambuzi wa mapema wa *sepsis* katika *nursing practice* kati ya wauguzi wa kitengo cha wagonjwa mahututi. Pia, utafiti huu unalenga kutathmini mambo binafsi, mazingira na kitaasisi yanayoweza kuathiri utambuzi wa mapema wa *sepsis* katika mazingira ya Tanzania.

Nani anaweza kushiriki katika utafiti huu? Utafiti huu ni wa wauguzi wote wanaofanya kazi katika ICU. Kushiriki katika utafiti huu ni kwa hiari kabisa. Unaweza kuacha utafiti huu wakati wowote bila madhara yoyote kwako. Hutapoteza manufaa yoyote, wala haitaathiri kazi yako katika ICU ikiwa utaamua kutoshiriki katika utafiti huu.

Nini kitatokea katika utafiti huu? Kutakuwa na mahojiano ya kina ambayo yatafanyika katika eneo la hospitali. Ukikubali, utaandikishwa kwa dakika 40 kwa mahojiano ya kina. Utajulishwa kuhusu saa, tarehe na mahali pa usaili. Siku ya mahojiano, utaulizwa swali la

wazi, utahitajika kutoa maelezo kadri ya ufahamu wako na mtafiti atakuwa akirekodi maelezo yako kwa sauti.

Je, kuna hatari zozote za kushiriki katika utafiti huu? Hakuna hatari kwako kwa kushiriki katika utafiti huu. Kunaweza kuwa na usumbufu kwa muda wako uliowekwa kwa ajili ya kuhudhuria mahojiano pekee.

Je, kuna manufaa yoyote ya kushiriki katika utafiti huu? Hutapokea manufaa yoyote ya kibinafsi kutokana na kuwa katika utafiti huu. Hata hivyo, taarifa yoyote mpya ambayo itajifunza katika utafiti huu itatumika kuboresha ufanisi wa huduma ya uuguzi na kuboresha matokeo ya jumla ya wagonjwa katika huduma yako.

Je, kuna usiri katika mradi huu wa utafiti? Taarifa za kibinafsi zilizopatikana kutoka kwa utafiti huu hazitashirikiwa. Matokeo hayataelekezwa kwa mtu yeyote, badala yake kama matokeo ya jumla. Matokeo ya utafiti huu yanaweza kuchapishwa katika makala ili watafiti wengine wasome lakini hayatajumuisha taarifa yoyote ambayo ingewafahamisha wengine wewe ni nani.

Sahihi yako hapa chini inamaanisha kuwa umesoma maelezo hapo juu, umeelewa vyema na uko tayari kwa hiari kushiriki katika utafiti huu.

Sahihi ya Mshiriki _____

Tarehe _____

Asante kwa kukubali kushiriki katika utafiti. Tafadhali usisite kuwasiliana nami au mtu yeyote wa mawasiliano hapa chini kwa ufafanuzi kuhusu ushiriki wako.

Maelezo ya Mawasiliano:

Bi Asteria Julius,

Mtafiti Mkuu.
Shule ya Uuguzi, MUHAS
Nambari ya Simu: +255 755 963 769
Barua pepe: asterimahudi@gmail.com

Prof. Edith Tarimo

Msimamizi wa utafiti,

Shule ya Uuguzi, MUHAS.

Nambari ya Simu: +255 784 917;

Barua pepe: etarimo54@yahoo.com

Mkurugenzi wa Utafiti na Uchapishaji,

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Nambari ya simu: +255 -022-2152489

Barua pepe: drp@muhas.ac.tz

Appendix IV: Ethical clearance (MUHAS)

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/2043 Date: 14/02/2024

MUHAS-REC-02-2024-2043
ASTERIA JULIUS
SHOOL OF NURSING
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: FACTORS AFFECTING EARLY IDENTIFICATION OF SEPSIS IN NURSING PRACTICE AMONG INTENSIVE CARE NURSES AT MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM, TANZANIA

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 14/02/2024
EXPIRATION DATE OF APPROVAL: 14/02/2025

STUDY DESCRIPTION:
Purpose:

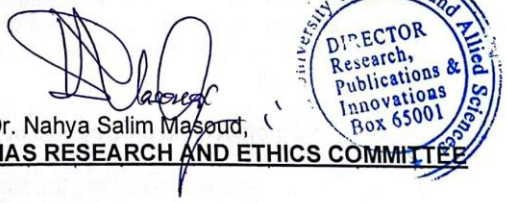
The purpose of this explorative qualitative study is to explore the factors affecting early identification of sepsis in nursing practice among intensive care unit nurses working in adult ICUs at Muhimbili National Hospital, Dar es Salaam, Tanzania.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014554.pdf and in the MUHAS archives.

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The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.



Dr. Nahya Salim Masoud,
CHAIRPERSON, MUHAS RESEARCH AND ETHICS COMMITTEE

Appendix V: Permission letter from Muhimbili National Hospital

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH

MUHIMBILI NATIONAL HOSPITAL

In reply please quote:

Ref. No.: MNH/CRTCU/Perm/2024/107 Date: 28th February, 2024

Block Manager,
Mwaisela
Muhimbili National Hospital

RE: PERMISSION TO COLLECT DATA AT MNH

Name of Student	**Asteria Julius**
Title	**"Factors Affecting Early Identification of Sepsis in Nursing Practice Among Intensive Care at MNH"**
Institution	Muhimbili University of Health and Allied Sciences
Supervisor	Dr. Edith Tarimo (MUHAS)
Co – supervisor	Dr. Dinna Issa Ruhwanya (MNH)
Period	28th February, 2024 to 30th May, 2024

Approval has been granted to the above principal investigators to collect data at MNH. Dissemination of study findings at MNH shall be overseen by **Dr.** Dinna Issa Ruhwanya (MNH) supervisor.

Kindly ensure the named principal investigator abide to the ethical principles and other conditions of the research approval.

Sincerely,

Dallangyo

Dr. Charles K. Dallangyo
For: Head of Clinical Research, Training and Consultancy Unit

M.N.H. TEACHING, RESEARCH & CONSULTANCY UNIT
P.O. Box 65000
DAR-ES-SALAAM
MUHIMBILI NATIONAL HOSPITAL

c.c DMS
c.c Dr. Dinna Issa Ruhwanya
c.c **Asteria Julius**

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Appendix VI: Digital Receipt

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Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	ASTERIA JULIUS
Assignment title:	Plagiarism check
Submission title:	Factors Affecting Early Identification Of Sepsis Among Inten...
File name:	SERTATION_ASTERIA_JULIUS_1__FINAL_VERSION_JULY_FIRST_...
File size:	5.59M
Page count:	105
Word count:	27,451
Character count:	154,822
Submission date:	17-Jul-2024 12:14PM (UTC+0300)
Submission ID:	2417101862



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