# NURSES' PREPAREDNESS IN MANAGEMENT OF PHYSIOLOGICALLY UNSTABLE PATIENTS WITH SEVERE COVID-19 DISEASE AT THE ACCIDENT AND EMERGENCY DEPARTMENT, KENYATTA NATIONAL HOSPITAL, NAIROBI

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**DECLARATION**

I hereby certify that this is my original work. All resources and materials used or quoted have been indicated and acknowledged by means of reference. This work has not been presented for an award of a degree in any other institution.

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## DEDICATION

This work is dedicated to my entire family for their continuous encouragement and support throughout the program. Special dedication to my parents Mr. Francis Ndungu Muneri and Mrs. Mary Mumbi Ndungu. May God bless you all.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| **A & E** | Accident and Emergency |
| **AKI** | Acute Kidney Injury |
| **COVID-19** | Coronavirus disease 2019 |
| **GCS** | Glasgow Coma Scale |
| **HCW** | Health-Care Workers |
| **HDU** | High Dependency Unit |
| **HIV** | Human Immunodeficiency Virus |
| **ICU** | Intensive Care Unit |
| **IDU** | Infectious Disease Unit |
| **IPC** | Infection prevention and control |
| **KNH** | Kenyatta National Hospital |
| **MERS-CoV** | Middle East respiratory syndrome coronavirus |
| **MOH** | Ministry of Health |
| **PPE** | Personal Protective Equipment |
| **SARS-CoV-2** | Severe acute respiratory syndrome coronavirus 2 |
| **WHO** | World Health Organization |

## OPERATIONAL DEFINITION OF TERMS

**Management** – in this context, it refers to providing nursing care by a skilled nurse and administering prescribed treatment for the illness (severe COVID-19). It also refers to any other nursing intervention provided by the nurse to the patients and their relatives, such as reassurance, encouragement, health education and advocacy, meeting psychological and social needs.

**Nurses** – According to this study, nurses refer to all with formal training to be nurses, employed by KNH to work at the Accident and Emergency department and who use their knowledge and skills to provide nursing care to physiologically unstable patients with severe COVID-19.

**Physiologically unstable patients** – This refers to patients who are very sick and rapidly deteriorating. They include those with poor perfusion, hemodynamic instability, and declining mental status. They usually require oxygen therapy, intensive care and close monitoring.

**Preparedness** refers to the nurse's readiness to provide nursing care to patients with severe COVID-19. It entails professional preparedness, which can be obtained by adequate knowledge and experience, psychological preparedness, meaning being mentally ready and preparedness in terms of availability of the necessary resources.

**Severe COVID-19 disease** refers to a respiratory system disease that causes dyspnea and hypoxia to the infected person. The patients with severe COVID-19 disease saturate below 94% on room air, have a respiratory rate of more than 30 breaths per minute, requiring oxygen therapy to prevent or reverse hypoxemia.

## ABSTRACT

**Background:** COVID-19 pandemic has disrupted global systems through exponential infections, severe disease, deaths, and profound negative economic impact. The health systems have been affected to the point of being overrun and overwhelmed. Most countries, including those with advanced healthcare systems, have been shaken because of the enormous numbers of critically ill patients and inadequate resources. Nurses have been at the forefront in responding to the pandemic in numbers. Due to the enormous number of patients, mobilization from other departments has been carried with questions about preparedness. Nurses are the primary caregivers in the accident and emergency department for acutely ill patients with COVID-19 disease, while their preparedness has not been ascertained.

**Objective**: The objective of this research was to assess nurses' preparedness in the management of physiologically unstable patients with severe COVID-19 disease at the Accident and Emergency department, Kenyatta National Hospital.

**Methodology:** A cross-sectional descriptive study design was used, and respondents were selected by convenient sampling method from a population of nurses working at the KNH Accident and Emergency department. The study involved 62 respondents. Data was collected by the use of a questionnaire. The data was analysed using R version 4.0.2 and presented using descriptive statistics in tables, graphs, or pie charts. Inferential statistics were also applied. The fisher's exact test at a 95% confidence level was utilized to analyse the association between level of training, specialization, COVID-19 training, and level of experience with nurses´ preparedness at A & E, KNH to manage physiologically unstable patients. Ethical principles of information confidentiality, anonymity in data reporting, voluntary participation and appropriate ethical approvals were observed.

**Results:** 77% of the respondents had managed physiologically unstable COVID-19 patients. 52% were somewhat prepared, and 47% were confidently prepared to manage these patients. The majority were knowledgeable on proper triage of patients: 92% knew comorbidities causing poor outcomes and 72.6% on emergency signs. 82.3% knew of the PPE required to protect themselves. More than half had received training on triage and isolation procedures of COVID-19 patients, but only 38.7% were trained to manage these patients. The main challenge reported was lack of adequate PPE, fear of contracting the virus and fatigue (90.3%). The level of education was found to be associated with COVID-19 management preparedness with a p-value of 0.019. In contrast, experience (p-value 0.154), specialization (p-value 0.764) and training on COVID-19 (p-value 0.509) were not associated with nurses' preparedness to manage COVID-19 patients.

**Conclusion**: This study established that most of the nurses in the A & E department at KNH were prepared to manage physiologically unstable COVID-19 patients. Some levels of education were found to be significant in preparing nurses to manage COVID-19 patients. Contrary to most beliefs, essential variables such as the level (years) of experience and specialization that had been thought to be influential in nurses' preparedness to manage COVID-19 patients were found not to be as significant as we thought.

# CHAPTER 1: INTRODUCTION

## 1.1 Background

Coronavirus disease, discovered in 2019 (COVID-19), is a viral disease of global pandemic status that has caused significant morbidity and mortality in the world (Elhadi et al., 2020). The pandemic continues to cause devastation through infections, complications and deaths associated with the disease. As of 23rd August 2021, there were 212,852,352 infections globally and 4,448,702 deaths in the world (2021). In Kenya, the infections stood at 229,009, while deaths were at 4,497 (2021).

The rapid spread of COVID-19 worldwide requires preparedness of healthcare systems and response operations - a critical line of defence (Hou et al., 2020). According to the United Nations International Strategy for Disaster Reduction, preparedness is defined as "the knowledge and capacities developed by governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent or current hazard events or conditions."(Hou et al., 2020).

COVID-19 is highly transmissible and remains a threat to global public health (Lv et al., 2020). One year after the virus was first discovered in Wuhan, China, it spread rapidly worldwide. No medication has been approved for the treatment of COVID-19 as none has been proven to be effective against the virus (Güner et al., 2020). In addition, there has been the emergence of variants of concern in several parts of the world. Some of these mutant variants have a higher binding affinity for cellular receptors, enhanced resistance to neutralising antibodies and increased virulence than the parental coronavirus (Gómez et al., 2021). The emergence of variants undermines the hope of eradicating the pandemic through vaccination

(Gómez et al., 2021). However, safe and effective vaccines have been proven to be the most effective measure for protecting and controlling the pandemic. The vaccines have been shown to prevent the infection from transiting to severe disease, prevent spread, and therefore it is an economical way to help go to near normal status (Lipsitch and Dean, 2020).

Despite the availability of vaccines in most countries worldwide, new cases are still on the rise. Breakthrough infections, especially with the new variants, have been reported in many countries, with hospitalisation and mortalities documented. Transmission has been on unprecedented levels in the United States despite the availability of highly effective vaccines (Birhane et al., 2021). The increase in positive cases may be due to vaccine hesitancy among the populations resulting in less vaccine uptake. A study conducted in Saudi Arabia showed that more than half the population was unwilling to get the vaccine (Alfageeh et al., 2021). Sadly, despite some uptake of vaccines in developed countries, in lower-income countries like Kenya, the vaccination levels are extremely low due to a lack of coherent vaccination approaches, inadequate numbers of vaccines and vaccine hesitancy. These challenges make the dream of achieving herd immunity a mirage, and therefore fully opening of economic activities is highly curtailed.

Consequently, vaccination initiatives have to be combined with other mitigating factors to substantially reduce morbidities and mortalities caused by COVID-19 disease (Moghadas et al., 2021). The main ways that have been shown to prevent the spread of the virus include proper hand hygiene, social distance and early screening, diagnosis and isolation or quarantine of the confirmed positive cases (Güner et al., 2020). Additionally, governments have implemented a lockdown to slow down the spread of the virus to places without or to prevent the virus or

mutations from getting into their countries (Guzzetta et al., 2020). Another practical approach has been the use of face masks by people in public places. The masks work by protecting healthy people from getting ill and preventing the spread of the virus from the sick people into the atmosphere. N95 masks or other high filter masks, gowns and goggles should be used in the hospitals by staff in direct contact with infected patients (World Health Organization, 2020a). Proper public education with accurate scientific information is also paramount as it reduces anxiety and panic resulting from misinformation. It translates to people better following the regulations put in place (Xiao and Torok, 2020).

Despite the COVID-19 mitigation measures, the elderly and those with comorbidities are at the greatest risk of contracting the severe disease (Lipsitch and Dean, 2020). Such comorbidities include diabetes, respiratory conditions such as Chronic Obstructive Pulmonary Disease (COPD) and hypertension. Diabetic patients have compromised innate immunity and may have exaggerated pro-inflammatory cytokine expression, further contributing to the cytokine storm that causes the severity of COVID-19. Patients with COPD are hypoxic at baseline and thus already have compromised lung function. (Gold et al., 2020). These patients have been prioritised for vaccination because of their high risk of developing severe disease. However, early detection through screening is done, and intensive care is instituted when they contract the disease. After leaving the accident and emergency department, the patients are cared for in highly specialised units such as the critical care unit and high dependency unit with highly specialised nurses and resources.

Nurses triage patients at the emergency department, screen them for COVID-19, conduct a quick health assessment to determine the severity of illness, stabilise

those physiologically unstable, and isolate them to facilitate their continued care without further exposure to others. Symptom-based screening methods are used in emergency departments. General appearance and vital signs are both used during triage (Deitrick et al., 2020). COVID-19 disease mainly presents as an acute respiratory infection with symptoms of fever, dry cough, fatigue, sudden onset difficulty in breathing, shortness of breath, chest pain, nasal congestion, rhinorrhea, sore throat, anosmia (Hornuss et al., 2020), ageusia, nausea, vomiting and diarrhoea (N. Chen et al., 2020). Patients with mild disease are usually discharged to self-isolate at home, more so if they are asymptomatic or do not require respiratory support. They are advised to adequately hydrate orally and quarantine at home (Deitrick et al., 2020).

Patients with severe COVID-19 infection are usually physiologically unstable, and their management requires hospital admission. Physiologic instability may manifest as acute respiratory distress syndrome, with the patients being hypoxic and dyspneic. This results in metabolic acidosis that is difficult to reverse (N. Chen et al., 2020). Some patients that appear stable have at times been found to have saturations as low as 40-60%; a terminology referred to as happy hypoxia or silent hypoxemia. These are also severely ill patients and should be treated as such (Deitrick et al., 2020). In addition, inflammatory reactions usually occur, resulting in the cytokine storm, further contributing to severe disease (Perrella *et al.*, 2020). Coagulopathies are also a common occurrence in severe disease, and the patients eventually develop multi-organ failure. These patients are at a high risk of death (Hou et al., 2020).

Patients with severe COVID-19 disease are usually very sick and require close monitoring, which the nurses do. Patients that develop hypoxic respiratory failure

are managed by oxygen therapy via nasal cannula, simple oxygen masks or non-rebreather masks. These patients are put on continuous monitoring, including pulse oximetry (Deitrick et al., 2020). Patients may also be managed via non-invasive continuous positive airway pressure. Early rapid sequence intubation may be initiated, and prolonged mechanical ventilation indicated. Proning is another therapy used to increase the survival chances of patients with severe COVID-19 disease (Wiggermann et al., 2020). Severe COVID-19 patients tend to develop cardiomyopathy and cardiogenic shock and thus should be monitored and treated for the same. Poor prognosis has been observed in patients with advanced age and comorbidities such as diabetes, obesity, cardiovascular disease, including hypertension and chronic lung diseases (Jamil et al., 2020).

COVID-19 transmission ability poses a higher risk for physicians and nurses in critical care, emergency medicine, infectious diseases, and pulmonary medicine departments (Elhadi et al., 2020). However, there has been increased patient exposure by the nurses compared to other healthcare workers since the COVID-19 outbreak, as nurses have had to perform tasks previously undertaken by others (Schroeder et al., 2020). Nurses are at the frontline of response to COVID-19, as they are the first contact with patients upon arrival to the hospital. They are at a higher risk of acquiring the disease and, subsequently, exposing patients, their relatives and colleagues (Gómez-Ochoa et al., 2021). Their role is vital in mitigating the effects of health crises (Chua et al., 2021).

Highly prepared nurses have been shown to treat patients more effectively during the COVID-19 pandemic (Chua et al., 2021). However, previous studies on the awareness of COVID-19 among healthcare workers worldwide showed that a significant proportion had poor knowledge about the virus. Lack of adequate

knowledge of a disease and its presentation can lead to delayed treatment, resulting in the rapid spread of infections (Bhagavathula et al., 2020). This indicates the need to train the nurses as COVID-19 is a new disease adequately, and it can be overwhelming working from the point of less knowledge.

Nursing care also includes ensuring infection prevention and control (IPC), preventing the spread of the disease to other patients, hospital staff, and the community in general (Deitrick et al., 2020). Studies have shown that healthcare workers and systems well prepared in knowledge, personal protective equipment, and adequate staffing have fewer healthcare-associated infections to their staff and patients. Having IPC programs in place, including availing adequate and appropriate PPE at the facility and national levels, is essential to preparedness for outbreak response (Assadi et al., 2020).

For severely sick patients who develop multi-organ failure, the prognosis is usually poor. Part of nursing care includes involving the patient and family with the management options available, including end of life care (Deitrick et al., 2020).

### 1.2 Problem statement

The COVID-19 pandemic has been devastating with resultant strain on the health system due to many patients, the severity of disease with the patients requiring ventilation support, specialised care, and resources including a large medical workforce. Indeed, there are incidences where ICU services have been overstretched with patients to the level they cannot admit further, necessitating very critically ill patients to be managed at the A & E as they await an ICU bed (Carter et al., 2020). COVID-19 has had severe impacts on healthcare workers,

including nurses, such as severe fatigue and burnout, as they are forced to serve more patients without additional staffing (Ramaci et al., 2020).

In addition, COVID-19 is a new disease which means that little information on its management exists. This calls for a need for continuous training among the nurses managing the COVID-19 patients. Most of the institutions may not have implemented training for their staff on COVID-19 management because of the pandemic and shortage, leaving staff with no option but to learn on the job. This study assessed whether training was conducted among the nurses at A & E and its impact on their preparedness to manage patients with severe COVID-19. For example, the constraints on resources and PPE shortages have also been challenging for most nurses globally working with COVID-19 patients. Shortages of other resources needed for patient management, such as ventilators, have also been encountered. This has been implicated in the challenge of providing quality competent care associated with fear of infection among nurses.

At the peaks of COVID-19 infections, about 30 patients with severe COVID-19 were attended to at the A & E department of KNH each day. Those needing intubation made up about 10%, and they were transferred to IDU for mechanical ventilation. The rest were transferred to the isolation unit located at Mbagathi Hospital for continued management. This is a huge number for the small department that received other non-COVID medical emergencies and trauma cases. This caused a strain on the few resources available such as oxygen ports and cylinders. The staffing has also not been increased with the increasing number of patients, stretching the nurses who now have to manage more patients. The study determined the availability of PPE and other resources.

As indicated by (Hou et al., 2020), understanding the individual perspectives of nurses in the emergency department and their experiences in managing physiologically unstable patients with severe COVID-19 can provide valuable information on various aspects of preparedness, including challenges that they have faced or overcome. So far, no studies have attempted to understand the preparedness of nurses to manage patients with severe COVID-19 in Kenya. This study will attempt to identify gaps and find solutions that will empower the nurses to be adequately prepared to manage patients with severe COVID-19 who are physiologically unstable. The study also hopes to identify the challenges nurses faced and how they affected their level of preparedness in managing the COVID-19 cases.

**1.3 Research Questions**

i. Are nurses at A & E in KNH knowledgeable in assessing and managing physiologically unstable COVID-19 patients?
ii. What resources has the institution put in place to assist the nurses in managing physiologically unstable COVID-19 patients at A & E, KNH?
iii. What challenges do nurses face in managing physiologically unstable COVID-19 patients at A & E, KNH?
iv. What is the association between level of training, specialisation, training on COVID-19 and level of experience of nurses and their preparedness managing physiologically unstable COVID-19 patients?

## 1.4 Objectives

### 1.4.1 Broad Objective

To assess nurses' preparedness to manage physiologically unstable patients with severe COVID-19 disease at Accident and Emergency department, Kenyatta National Hospital.

### 1.4.2 Specific Objectives

i. To assess the knowledge on assessment and management of physiologically unstable COVID-19 patients by nurses at A & E, KNH.
ii. To identify the resources availed by the institution that facilitate the management of physiologically unstable COVID-19 patients at A & E, KNH by nurses.
iii. To identify the challenges encountered in managing physiologically unstable COVID-19 patients at A & E, KNH by nurses.
iv. To establish an association between level of training, specialisation, COVID-19 training, and level of experience with the preparedness of nurses at A & E, KNH to manage physiologically unstable patients

## 1.5 Study hypothesis

H0: Nurses at the Accident and Emergency department of Kenyatta National Hospital are not adequately prepared to manage physiologically unstable patients with severe COVID-19 disease.

## 1.6 Study justification

Many studies have been done to assess preparedness for the care of COVID-19 patients among nurses in emergency departments in other countries. However, to the best of my knowledge, none of these studies has been conducted in Kenya. Kenyatta National Hospital (KNH) is the biggest referral hospital in Kenya which

also serves a large portion of critical walk-in patients from the County of Nairobi, which has been the most affected region in Kenya by the COVID-19 pandemic with approximately 42% of the cumulative cases in the country as of 10th August 2021. Therefore, the study findings will be generalisable to other facilities in Kenya managing COVID-19 cases.

Establishing the level of preparedness of the nurses in the accident and emergency department to manage physiologically unstable COVID-19 patients will inform practice change and policy formulation towards improving patients care. Policies such as capacity building and regularly training A & E nurses can be suggested. This study will also identify gaps and offer recommendations on how to mitigate them. Patients with COVID-19 will be the greatest beneficiaries of this study because when nurses are better prepared, they will be more efficient in managing these patients.

## 1.7 Conceptual framework

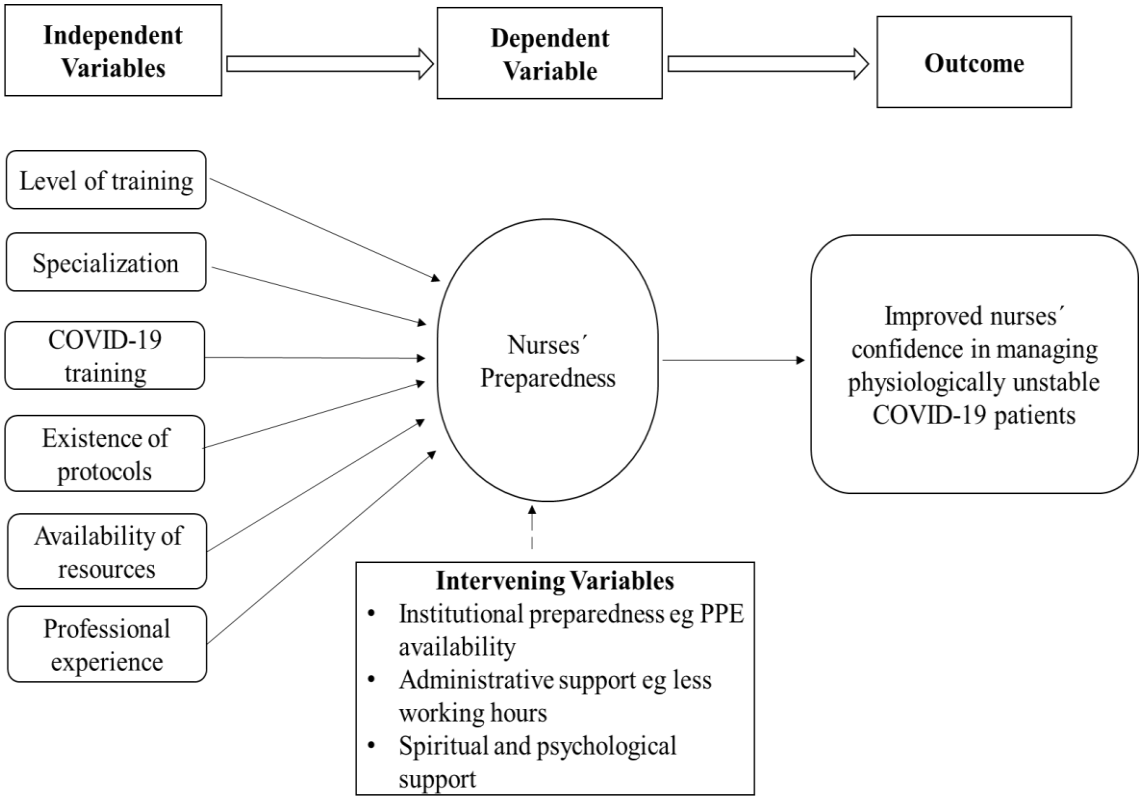


**Figure 1. 1: Conceptual framework**

# CHAPTER 2: LITERATURE REVIEW

This chapter begins with introducing the management required for the physiologically unstable patients with severe COVID-19 disease at the accident and emergency department, including their initial assessment upon arrival at the hospital. It then discusses the various aspects on which nurses should be prepared to manage these patients. It includes a discussion on the knowledge needs for the nurses managing physiologically unstable patients and the gaps noted on the same from previous studies.

Because COVID-19 is a new disease, the researcher also discusses the need for continuous on-job training to bridge the identified gaps. Another aspect covered is the institutional readiness and the support accorded to the nurses to include availing PPE and other resources needed to manage these patients, such as oxygen and ventilators. Finally, the researcher discusses some of the challenges nurses have experienced while managing these patients in the accident and emergency department.

## 2.1 Introduction

The rapid spread of COVID-19 worldwide required preparedness of healthcare systems, including adequately preparing the healthcare workers such as nurses to ensure better management and outcomes for the patients (Hou et al., 2020). Public health emergency preparedness is defined as the capacity of public health and healthcare systems, communities, and individuals to prevent, protect against, quickly respond to, and recover from health emergencies, especially those whose scale, timing or unpredictability threatened to overwhelm routine capabilities (Nelson et al., 2007). Emergency preparedness was seen as an essential aspect of responding to any health crisis. It was described as the knowledge and capacity to

effectively anticipate, respond to, and recover from the impacts of a likely or ongoing crisis (de Rooij et al., 2020).

Lessons learned from past and present pandemic response efforts that have been successful can be used by the global healthcare workforce in preparation for the handling of outbreaks of emerging infectious diseases such as COVID-19 (Guilamo-Ramos et al., 2021). Over the last century, numerous outbreaks of various diseases occurred, including the plague, cholera, H1NI Swine Flu, Middle Eastern Respiratory Syndrome Coronavirus Disease (MERS-CoV), Spanish Flu, Human Immunodeficiency Virus (HIV), Severe Acute Respiratory Syndrome (SARS), among others. Some measures were taken to prevent the spread and manage those outbreaks were effective in COVID-19 management. Proper handwashing in cholera, physical distancing measures in Spanish flu and surveillance and quarantine of infected patients to stop the spread of the SARS virus were among measures that controlled previous pandemics. They were also seen to be effective in reducing COVID-19 spread ("COVID-19 vs. previous pandemics," 2020).

COVID-19 disease posed a higher risk for healthcare workers in critical care, emergency medicine, infectious diseases, and pulmonary medicine departments. Use of personal protective equipment (PPE), proper handwashing, and hand hygiene was critical in breaking the transmission chain and lowering the risk of transmission of COVID-19 in hospital set-ups. Adequate training, knowledge and resources were also deemed necessary to prevent staff and patients from acquiring or transmitting COVID-19 in hospital settings (Elhadi et al., 2020).

In developing countries, infection of HCW with COVID-19 undermined a fragile healthcare system by overstretching an already thin workforce. In addition to

equipment availability, the preparedness of frontline healthcare workers, including nurses at the emergency departments, to withstand the impact of an outbreak ensures the system functions correctly and efficiently (Suleiman et al., 2020).

Another study by Hou evaluated the preparedness of an emergency department in Shanxi Provincial People's Hospital, China, highlighting the relationship between organisational, individual, and patient and family preparedness. The results indicated that the positive preparation of the organisation provided emergency department staff with guaranteed personal preparedness during the COVID-19 outbreak. In addition, the positive preparation of patients and their families was a motivator for emergency nurses to be prepared when responding to the COVID-19 outbreak. It made the nurses feel respected and recognised, which improved their morale by giving them a positive feeling. This shows that the work environment contributed to the output of the staff working in a department and underscored the importance of institutional preparedness as a contributor to personal preparedness (Hou et al., 2020).

Patients with severe COVID-19 tended to rapidly deteriorate unless managed promptly, hence the need for proper assessment during the initial stages of arriving at the hospital. Patients with severe COVID-19 were also seen to develop systemic complications such as sepsis, septic shock, acute kidney injury (AKI) and multisystem organ failure, which could be identified during their assessment (World Health Organization, 2020b). Nurses at emergency departments were the first contact of patients visiting health facilities. The nurses needed to know how to assess and manage physiologically unstable COVID-19 patients in order to reduce complications and mortalities of the patients. The skills of the nurse and

available equipment determined the detail and accuracy of the patient's examination. Assessment usually followed the ABCDE, namely, Airway, Breathing, Circulation, Disability and Exposure (Carter et al., 2020).

Proper history taking was also crucial because it enabled the nurse to identify comorbidities such as diabetes and cardiovascular diseases that predisposed the patient to severe COVID-19. Older people were also more prone to severe disease and mortality (World Health Organization, 2020b). Others at higher risk included obese people, men more than women and blacks and Hispanics more than Caucasians and Asians (Berlin et al., 2020).

The altered respiratory rate, rhythm and depth, signs of peripheral and central cyanosis, use of accessory muscles, and audible respiratory sounds such as wheeze and stridor (indicating compromised airway by secretions) were noted in patients with severe disease (Carter et al., 2020). Another indicator for the severe disease at A & E department was oxygen saturation levels. Patients with higher respiratory rates above 30 breaths per minute and lower oxygen saturation levels below 94% on room air were physiologically unstable (Berlin et al., 2020). In prior studies, many patients without apparent signs of respiratory distress were hypoxic; a concept referred to as happy hypoxia or silent hypoxemia (Allado et al., 2021). This further emphasised the need to combine clinical manifestations with an objective assessment of vital signs (Heldt et al., 2021). Patients who required oxygen therapy were considered to have severe COVID-19 disease. There was a need for intensive care, including mechanical ventilation, for these patients (World Health Organization, 2020b).

Blood pressure, pulse rate, capillary refill time, skin colour, temperature and oedema were also assessed. The circulatory indicators of severe COVID-19 were

similar to those of shock. They included tachycardia, hypotension, and reduced urine output. Acute Kidney Injury (AKI) had been observed in critically ill severe COVID-19 patients. Fever was also a common but non-specific presentation. Neurological assessment was done by calculating the Glasgow Coma Scale (GCS) and assessing pupillary reaction to identify any disability. A random blood sugar test was also done under disability assessment. Finally, the patient was exposed to visualise any skin ulcers or abnormalities (Carter et al., 2020).

Management entailed frequent monitoring of both the vital signs and the clinical condition of the patient. This was advocated for to detect changes in the patient's status early enough for appropriate intervention. The respiratory compromise was managed mainly by oxygen therapy to prevent or correct hypoxia which was common in severe COVID-19. Maintenance of a clear airway obstructed by secretions was done by suctioning. Nursing patients in the prone position delayed the need for invasive oxygenation by intubation. Another intervention was maintaining adequate blood volume and blood pressure by administering fluids to prevent AKI (Carter et al., 2020). For patients not in shock, conservative fluid management was done. Symptomatic management such as administration of antipyretics in fever and treatment of coinfections and sepsis was initiated. Comorbidities were also managed appropriately (World Health Organization, 2020b).

## 2.2 Aspects of preparedness

### 2.2.1 Knowledge of the disease

Individual preparedness of nurses involves adequate knowledge about the disease, appropriate skills to assess and manage patients, knowledge of proper use of PPE and mental preparedness (Hou et al., 2020). Previous studies on the awareness of

COVID-19 in healthcare workers worldwide showed that a significant proportion had poor knowledge about the virus and the management of COVID-19 disease (Bhagavathula et al., 2020). In addition, nurses and other medical professionals were reassigned to unfamiliar clinical areas, including pandemic Intensive Care Units with insufficient skills and training (Mehta et al., 2021). Inadequate knowledge was one of the risk factors for disease transmission. It was shown to lead to low levels of care offered to the patients (Elhadi et al., 2020). As the global threat of COVID-19 continued to emerge, it was critical to improve nurses' knowledge and perceptions through educational interventions.

Nurses were at the frontline in battling the pandemic, and they had been instrumental in various aspects. Despite some gaps in knowledge in the management of patients with severe COVID-19, they were found to be knowledgeable on the signs and symptoms of COVID-19 infection and the necessary infection prevention measures required to prevent or minimise transmission, such as proper use of PPE. This made them instrumental in screening for COVID-19 at the triage stations in the emergency departments and in prompt isolation of suspected and confirmed cases. Nurses also provided health education to the patients and public on measures to prevent the spread of the virus or avoid infection and on the early signs and symptoms of infection (S.-C. Chen et al., 2020).

Nurses were also responsible for the assessment and management of acute and critical patients with severe COVID-19 disease. This included assessing the respiratory system by checking patency of the airway and effectiveness of breathing by use of respiratory rate, rhythm, oxygen saturation levels and other signs of dyspnea such as leaning forward and use of accessory muscles for

respiration. Assessing the circulatory system entailed measuring the blood pressure, pulse rate and rhythm, and capillary refill to determine the adequacy of perfusion. The patient was then assessed for neurological status, blood sugar levels and exposed to identify any deformities or other visible issues of concern. Proper assessment and management of patients with severe COVID-19 reduced complications and mortalities (Carter et al., 2020).

Nurses with specialised training, such as critical care nurses, were better prepared to manage physiologically unstable patients with severe COVID-19 than those with basic nursing training (Lauck et al., 2021). The specialised training prepared them to manage critically ill patients with ARDS and multi-organ system failure, which were some of the features of patients with severe COVID-19 (World Health Organization, 2020b). These patients required close monitoring of their clinical status, vital signs, and other investigations such as arterial blood gases, which informed further management requirements such as intubation based on their progress. However, the high numbers of patients with severe COVID-19 needing ICU admission had overwhelmed many facilities necessitating their management at the emergency departments and other wards as they awaited a bed in ICU. This meant that nurses without primary specialisation or experience managing physiologically unstable patients were managing patients with severe COVID-19 (Carter et al., 2020).

Hospitals stepped in to bridge the knowledge gaps among their nurses without specialised training by providing institution-based in-service programs (Rathnayake et al., 2021). Another recommendation to bridge this gap was adapting the buddy system, where nurses trained in critical care were paired to work with those without critical care training to guide them in managing

physiologically unstable patients (Marks et al., 2021). Some hospitals employed the self-directed learning approach in addition to the training. They did this by providing learning resources that the nurses could access to guide their management of physiologically unstable patients (Lauck et al., 2021).

### 2.2.2 Institutional resources needed for managing physiologically unstable COVID-19 patients

In addition to taking up unprecedented roles, nurses had to go through frequently changing information and guidelines on the presentation, transmission, and management of patients with COVID-19 and what PPE they were required to use and how to use them. Therefore, they struggled to distinguish between accurate information and misinformation (Mehta et al., 2021).

Organisational preparedness contributed to the overall preparedness of the nurses. It included the generation of policies and protocols that guided staff on preventive measures and management of COVID-19 patients. Participants highly valued the availability of care guidelines and protocols (Rathnayake et al., 2021). Such protocols ensured adequate staffing, good infrastructure, availability of adequate supplies needed by the patients and the nurses. Proper institutional preparedness translated positively to nurses' preparedness (Hou et al., 2020). On the other hand, inadequate organisational preparedness of public health systems led to a lower willingness to work among the nurses and an increased loss of lives during an epidemic (Li et al., 2008).

Healthcare systems responding to COVID-19 required additional Healthcare workers globally, regular and intensive care beds, ventilators, and general medical supplies (Godderis et al., 2020). The COVID-19 pandemic had challenged and, in many cases, exceeded the capacity of hospitals and intensive care units (ICUs)

worldwide (Mehta et al., 2021). The burden of COVID-19 on health systems and healthcare workers was substantial in low-income and middle-income countries (LMICs), where difficult daily triage decisions had to be made in the context of grave shortages of essential equipment and consumables (Cohen and Rodgers, 2020). Institutions were expected to ensure the availability of appropriate and adequate PPE for their frontline workers and to find ways of improving their capacities to accommodate the more significant numbers of patients requiring management for COVID-19.

### 2.2.3 Challenges experienced by nurses

Inadequate knowledge and training on the management of COVID-19 patients were some of the significant challenges nurses face worldwide. The rapid spread of the disease necessitated nurses and doctors to be deployed to manage and care for the patients with COVID-19 disease despite their minimal knowledge on the same (Mehta et al., 2021). Nurses without specialised training or prior experience managing severely ill patients had to manage critically ill patients with severe COVID-19 at the emergency departments because the ICUs were full (Carter et al., 2020). This, combined with the fact that COVID-19 was a new disease with very little information available on its proper management, was overwhelming to nurses at the emergency department.

Before the COVID-19 pandemic, there was a shortage of healthcare service providers in low-income countries (Alhalaseh et al., 2021). Low- and middle-income countries experienced further internal drain on human resources as healthcare workers were transferred to specialised COVID-19 units or moved from clinical practice and emergency departments to join COVID-19 committees and task forces (Mehta et al., 2021). A study conducted in India supported a

diversion of health care staff, especially doctors and nurses, for COVID-19 related duties (Garg et al., 2020). There was an increase in workload following large numbers of COVID-19 patients going to the hospitals at any given time without matching the increase in the available nurses. The nurses available kept reducing when some of them got infected and thus had to be away on quarantine to recuperate or sadly died from the disease. This resulted in burnout among HCW, including nurses (Ramaci et al., 2020).

Global shortages of PPE followed as the countries producing them decided to freeze exports to try and satisfy their demand (McMahon et al., 2020). Many countries were insufficiently prepared to protect healthcare workers from infection, with hospitals reporting personal protection equipment (PPE) (Godderis et al., 2020). Access to adequate PPE and having sufficient staff to manage the patient surge was critical to an effective response to the pandemic (Friese et al., 2020). As a result of these shortages and shortcomings of existing structures and systems, COVID-19 was spreading quickly in healthcare settings (Ye et al., 2020). A study conducted in a tertiary hospital in Taiyuan, China, identified a lack of multidisciplinary collaboration as another significant barrier to preparedness for and treating patients with COVID-19 disease (Hou et al., 2020). An institution needs to have adequate plans and arrangements to rapidly diagnose and treat patients with fever in critical conditions. Poor collaboration hindered this from happening. Consequently, the more time patients with acute respiratory symptoms and fever spent without a diagnosis in an emergency department that received other general trauma and medical patients, the higher the risk of cross-infection (Lin et al., 2020).

Despite the selflessness and dedication shown by nurses during the pandemic, they faced discrimination and stigmatisation within the communities they serve. They were viewed as infectious and therefore shunned. This was especially so for those who contracted the virus and then recovered. This added to the intrinsic fear they already had of spreading the disease to their loved ones (Ramaci et al., 2020). The frustration by nurses working with COVID-19 patients was enhanced as they were also discriminated against by co-workers, peers, and their family members and society. For some, the discrimination was extended to their families, who were rejected by neighbours, shops and taxi drivers (Rathnayake et al., 2021).

Working with a potentially fatal and highly infectious disease can be paralysing to the best of us. Many nurses had a constant fear of contracting the virus and being potential carriers of the same to their families (Rathnayake et al., 2021). As a result, psychological consequences were witnessed among nurses. They presented as emotional strain, burn out which had cognitive, behavioural, emotional and physical manifestations such as anxiety, irritability, detachment, fatigue, insomnia, reduced concentration, poor decision making, hesitancy to work and decline in performance (Ramaci et al., 2020). Burnout among healthcare providers led to a lack of motivation, absenteeism, and low morale. It also caused deterioration of the quality of care provided by the staff resulting in poor patient outcomes (Jalili et al., 2021).

### 2.2.4 Establishing an association between the subject variables and preparedness

A study done in Saudi Arabia used descriptive statistics such as frequency and percentage distribution to measure the various variables determining nurses' preparedness and response to COVID-19 (Al Baalharith and Pappiya, 2021).

However, to establish an association between such variables, various statistical analysis tools are employed. The tool that was used to analyse this association was the proportional ordinal logistic regression. One of the objectives of this study was to establish an association between the level of training, specialisation, and training received on COVID-19 and the level of experience the nurses had with their preparedness to manage physiologically unstable COVID-19 patients at A & E, KNH.

Studies found that nurses with specialised training, such as critical care nurses, were better prepared to manage physiologically unstable patients with severe COVID-19 than those with basic nursing training (Lauck et al., 2021). Regarding training on COVID-19, nurses stated that receiving timely information on COVID-19 enabled them to get new knowledge and provide safe care to the patients (Rathnayake et al., 2021).

Research also showed that the experience of nurses facilitated their decision-making while caring for deteriorating patients. The more experienced nurses understand disease processes and a broad, holistic understanding of acute patient care situations. They utilise a combination of intuition and critical thinking to assess patients and provide them with safe, quality care rapidly and confidently (Anton et al., 2021). Another study found that HCW who had experience providing clinical care to patients with Ebola, cholera and SARS were less worried about the COVID-19 crisis than those without that experience (Deressa et al., 2021). Some studies, however, indicated no relationship between nurses' years of experience and their preparedness to care for COVID-19 patients as it was a new experience entirely (Elhadi et al., 2020).

The data collected from this study attempting to identify whether an association exists between the various variables discussed above and the level of nurses' preparedness to manage patients with severe COVID-19 was analysed using inferential statistics. When the outcome variable is measured in categories and exceeds two categories, a multinomial regression model is used when these categories are not ordered. If the categories are ordered, ordinal logistic regression is used (Liang et al., 2020). When ordinal regression is used, the interpretability of the results increases and reduces variability in the outcome variable.

Rahman and Das in 2011 applied ordinal logistic regression to determine the risk factors for child malnutrition in Bangladesh. The outcome variable of interest was malnutrition. It was divided into three categories: undernourished, moderately undernourished, and nourished. It is clear from this example that the outcome variable was ordered, hence necessitating ordinal logistic regression (Das and Rahman, 2011). The independent variables considered in this case included the child's age, mothers' education, child's feeding status, economic status, post-natal care, birth interval and incidence of diarrhoea (Das and Rahman, 2011). The general equation for studying the association of the risk factors for malnutrition and the outcome was:

$$\ln(malnutrition) = \beta_0 + \beta_1 mother'seducation + \beta_2 feeding\ status + \beta_3 economic\ status + \beta_4 post\ natal\ care + \beta_5 incidence\ of\ diarrhea + \beta_6 birth\ interval$$

$\beta_0$ is the intercept of the equation. This is considered the value of the outcome in the absence of covariates (independent variables)

$\beta_1 to\ \beta_6$ represents the impact of each covariate respectively on the outcome variable

The results from this model were interpreted in terms of odds ratios, confidence intervals for the odds ratios and p-values. When using confidence intervals for odds ratios, an interval that contains one is non-significant. P-values are interpreted at 0.05, where significant covariates must have p-values less than 0.05.

## CHAPTER 3: METHODOLOGY

This chapter outlines the methodology and procedures that were used to obtain the research data. It includes research design, population, sampling methods, data collection instrument and procedures used for data collection, data management and ethical considerations.

### 3.1 Study design

The study was a cross-sectional descriptive study aimed at assessing nurses' preparedness to manage physiologically unstable patients with severe COVID-19 disease at the Accident and Emergency department, Kenyatta National Hospital. This study design was the most suitable in that I studied the variables without manipulating or controlling them. The data was also collected over a short duration (five days), thus cross-sectional.

A descriptive research design studies the distribution of one or more variables without regard for causal or other hypotheses. There is no manipulation or control of variables. Cross-sectional study designs are a type of descriptive study that involves collecting information on the presence of one or more variables of interest as they exist in a defined population at one particular point in time (Aggarwal and Ranganathan, 2019).

### 3.2 Study area

The study was carried out at Kenyatta National Hospital, Accident and Emergency department. KNH is located in Upperhill, approximately four kilometres from Nairobi city centre. It was established in 1901, and it is the largest teaching and referral hospital in the country, with an in-patient bed capacity of 1800. It receives patients from other health facilities from all over the country and from outside the

country for specialised health care. It provides facilities for medical education and research for the University of Nairobi and many other medical schools.

The A & E department comprises of a receiving and triage area, three medical consultation rooms, one surgical consultation room, a gynaecology and obstetrics emergency consultation room, a trauma ward with a capacity of 5 beds, an isolation room with two beds (with negative pressure), a minor theatre, a trauma theatre and two critical care rooms with a total bed capacity of 10 beds. It also has a health information and records desk, a social worker office, a laboratory, a pharmacy, and counselling rooms. It is close to the radiology department. The department has approximately 70 nurses.

The A & E departments receive approximately 200 to 250 patients daily, translating to over 90,000 patients annually (2021). On average, 30 patients with suspected COVID-19 disease were managed per day during the peaks, with 10% physiologically unstable.

At the triage area, the patients' general condition and vital signs were assessed. The vital parameters used to determine the severity of the disease included oxygen saturation levels, respiratory rate, other physical signs of respiratory distress and hypoxia such as leaning forward and breathlessness while speaking, confusion and restlessness. History of comorbidities was taken. Random blood sugar was also taken as studies show that COVID-19 is associated with hyperglycemia. All suspected COVID-19 patients were isolated. Patients found to be physiologically unstable were put on oxygen therapy, which included invasive endotracheal intubation and mechanical ventilation. Samples were taken for COVID-19 PCR testing at the laboratory. The test results and condition of the patient would determine where they were taken from A & E for further management.

### 3.3 Study population

The study population included nurses working in the A & E department, KNH. According to records in the department, approximately 70 nurses were working at the department during the study. The nurses at the department would work at all stations on a rotational basis, and thus all had a chance of managing the physiologically unstable COVID-19 patients.

### 3.4 Inclusion and exclusion criteria

#### 3.4.1 Inclusion criteria

Registered nurses with a license to practice

Registered nurses that had been working within A & E department for the last six months

Registered nurses who had interacted with and managed physiologically unstable COVID-19 patients

Those willing to consent

#### 3.4.2 Exclusion criteria

Registered nurses not working within A & E department

Registered nurses away from the department (those on sick-off, annual, maternity, paternity, or study leave)

Those who did not consent to participate

### 3.5 Sample size determination

**Sample size calculation for one sample, binary outcome (Sullivan, L., 2003)**

$$n = p(1-p)\left(\frac{Z}{E}\right)^2$$

Whereby

…

**n** = the desired sample size

**p** = the assumed population proportion (0.5) in the absence of findings of past studies.

**Z =** level of significance for 95% confidence level, 1.96

**E** = desired margin of error, 0.05

$$n = 0.5(1 - 0.5)\left(\frac{1.96}{0.05}\right)^2$$

$$n = 384.16$$

**Sample size adjustment**

$$\boldsymbol{n} = \frac{\boldsymbol{n} * \boldsymbol{N}}{\boldsymbol{n} + \boldsymbol{N}}$$

N = the total population under study which is 70 nurses

$$n = (384.16 * 70)/(384.16 + 70)$$

$$n = 60$$

### 3.6 Sampling method

A convenience sampling method was used. In this method, nurses working at A & E were requested to participate in the study as they become available on duty until the required number of 60 was reached.

### 3.7 Data collection instrument

A semi-structured questionnaire was used as the tool for data collection. It was issued to the participants with the help of qualified research assistants who were trained. It was divided into four sections. Section A gathered data on social demographic characteristics of the nurses; Section B assessed nurses' knowledge, Section C assessed availability of institutional resources in the unit, and Section D assessed the challenges nurses faced. The consent form was provided to every voluntary participant to read and sign before they could fill the questionnaire to show approval for their participation.

### 3.8 Validity and reliability of the instrument

This was done by pre-testing the data collection tool. The instrument was pre-tested at KNH ward 3C, which manages confirmed COVID-19 paediatric cases. This ensured that the questionnaire included all the relevant information to the study. The number of nurses used for pre-testing was 6 to represent 10% of the study sample. COVID-19 preventive measures were observed during the pre-test. The principal investigator, research assistants and participating nurses were all required to wear a face mask, sanitise their hands before filling the consent form and questionnaire and maintain a physical distance of at least one meter between them during the exercise. Necessary adjustments were made according to the outcome of the pre-test.

### 3.9 Data collection procedure

Nurses working at A & E were selected to participate in the study using the convenience sampling method. They were selected as they became available at work during the various shifts. There are three shifts at KNH: morning, afternoon, and night shift. Data was collected during the morning and afternoon shifts, and six nurses were selected to participate from each of these shifts, totalling twelve participants per day. The sample size of 60 nurses was achieved over five days. The principal investigator and research assistants would identify when the nurses were not too busy and explain the study to them. Those who met the inclusion criteria and consented to participate were enrolled in the study. They signed the consent form, after which the questionnaire was administered for them to fill. All the COVID-19 preventive measures discussed below were observed. After filling the questionnaire, it was checked for completeness by the principal investigator or research assistants before being put away in an envelope until time for analysis

### 3.10 COVID-19 preventive measures

COVID-19 is a highly infective disease, and the study entailed physical data collection in a hospital. It was, therefore, paramount to have preventive measures put in place and have them observed during the pre-testing of the study tool and data collection. The principal investigator and research assistants wore a surgical face mask throughout the pre-testing and data collection. The questionnaire was placed on a clipboard to prevent it from being placed directly onto potentially contaminated surfaces. Those collecting data sanitised their hands and decontaminated the clipboards using alcohol wipes between participants. A physical distance of at least one meter between the principal investigator or research assistants and the participants was maintained throughout their interaction. All participating nurses were required to be in a face mask throughout the data collection. Those without were provided with one. A hand sanitiser was provided, and the participating nurses would sanitise their hands before signing the consent form and filling the questionnaire. The filled questionnaires were then put away in an envelope immediately after the principal investigator, or research assistants confirmed completeness to further reduce contamination until time for analysis.

### 3.11 Data management and analysis

After the questionnaires had been collected, they were re-checked for completeness and the incomplete ones discarded (by shredding) to avoid distortion of the results. The remaining questionnaires were locked in a safe cupboard awaiting data entry and analysis. The questionnaires were coded, and the data were entered into the computer in a Microsoft Excel spreadsheet. After data entry, the coded data were exported to R version 4.0.2 for analysis. The

available data in soft copy was stored in a password protected laptop only accessed by the principal investigator and study statistician. The consent forms and questionnaires were safely stored in a locked cupboard, where they will remain for five years, after which they will be destroyed.

The categorical outcomes for objectives one to three, that is, knowledge on assessment and management of COVID-19, resources provided by the hospital for COVID-19 and challenges experienced by nurses when taking care of COVID-19 patients, were summarised in terms of frequencies and proportions and presented in tables, pie charts and bar graphs.

The ordinal outcome in objective number four was analysed through proportional ordinal logistic regression to find out how specialised training, refresher courses on COVID-19 disease and a nurse's level of experience affected his or her preparedness to manage physiologically unstable COVID-19 patients. Ordinal logistic regression was used because the outcome variable was measured in more than two ordered categories. Using ordinal regression increased the interpretability of the results and also reduced variability in the outcome variable.

### 3.12 Selection and training of research assistants

Two research assistants were recruited and trained to explain the purpose and objectives of the research to the participants. Once the participants understood this, the research assistants issued them the consent form for signing. After this, the participants were issued the questionnaire on which they answered the questions. The research assistants were also trained on checking the tool for completeness upon collection from the participants.

### 3.13 Study assumptions

The following are some of the study assumptions:

1. The responses provided by respondents were true
2. The participants had been working at A & E KNH for the last six months

### 3.14 Ethical consideration

Approval to conduct the study was sort from the Kenyatta National Hospital and University of Nairobi Research and Ethics Committee (KNH-UON ERC). After ethical clearance, administrative clearance to collect data at the Accident and Emergency department of KNH was sought and obtained from the hospital's Medical Research department. The purpose of the study was explained to each prospective respondent in simple language, and they were given the right to ask questions and seek clarification where necessary. Informed written consent was sought from the respondents before they could participate in the study. Participation was voluntarily, and study participants were free to withdraw from the study at any point during the study period without victimisation. Participants' confidentiality was maintained throughout the study. No names of respondents appeared anywhere on the questionnaire. Given that the study took place during the COVID-19 pandemic in a hospital and that data collection was conducted physically, all the preventive measures discussed above were observed during the pre-testing of the study tool and actual data collection to protect the participants, research assistants and principal investigator.

### 3.15 Quality assurance

A standardised questionnaire was used for all respondents to improve the consistency of the collected data and thus enhance its reliability. The research assistants and principal investigator explained the purpose of the study to the

nurses prior to their participation. Participation in the study by the nurses was voluntary. No monetary benefit was offered to participate. Data were collected during the day shifts when most staff were expected to be on duty.

### 3.16 Study results dissemination plan

Study results will be made available to the administration of KNH and the Accident and Emergency department, KNH. The results will also be made available in the University of Nairobi Library and repository for easy access to other researchers and scholars. The study findings will also be published in academic journals.

# CHAPTER 4: RESULTS

## 4.1 Introduction

This chapter reports the study findings based on the data obtained from the nurses who work at the Accident and Emergency department at Kenyatta National Hospital. The study sought to establish the level of education, area of specialisation, nurses' experience, and the association between these characteristics with the nurses' preparedness to manage physiologically unstable patients with severe COVID-19 disease. It also wanted to identify institutional preparedness to manage the severe COVID-19 patients and the challenges nurses faced while managing these patients.

This study had 62 participants, and all of them responded hence a response rate of 100%. The findings are presented and interpreted based on the demographic characteristics of the participants and study objectives.

## 4.2 Demographic characteristics

Regarding gender, majority were female at 54.8% (n = 34) and the males were 45.2% (n = 28). Regarding the level of education, most participants were diploma holders at 37.1% (n = 23), while postgraduate holders were the least at 3.2% (n = 2). Bachelor's degree holders were 32.3% (n=20), and those with a higher diploma were 27.4% (n=17). As for the area of specialisation, almost half had basic nursing training without any additional specialised training at 46.8% (n = 29). They were followed by those with specialised training in Accident and Emergency at 40.3% (n=25). Those who specialised in critical care were 11.3% (n=7), and the least had other specialities (oncology nursing) at 1.6% (n=1). As for the experience, nearly half of the participants had between 1 to 5 years of experience in nursing practice,

43.5% (n=27), while only 8.1% (n = 5) had worked for less than one year. The results are illustrated in table 4.1.

**Table 4. 1: Demographic characteristics of the study population**

| | **Frequency (N)** | **Proportion (%)** |
|---|---|---|
| **Gender** | | |
| Male | 28 | 45.2 |
| Female | 34 | 54.8 |
| **Level of education** | | |
| Diploma | 23 | 37.1 |
| Higher diploma | 17 | 27.4 |
| Bachelors' | 20 | 32.3 |
| Postgraduate | 2 | 3.2 |
| **Type of Specialisation** | | |
| A & E | 25 | 40.3 |
| Critical care | 7 | 11.3 |
| Oncology | 1 | 1.6 |
| None | 29 | 46.8 |
| **Years of experience** | | |
| <1 year | 5 | 8.1 |
| 1-5 years | 27 | 43.5 |
| 6-10 years | 11 | 17.7 |
| 11-15 years | 9 | 14.5 |
| >15 years | 10 | 16.1 |

### 4.3 Nurses' knowledge on assessment and management of physiologically unstable COVID-19 patients by nurses at A & E, KNH

The study inquired how many participants had managed physiologically unstable COVID-19 patients at the A & E department. The majority of the respondents, 77% (n=48), had managed these patients. In terms of experience, 32.0% (n=20) of the nurses had worked for 1-5 years, while only 5.0% (n=3) had less than one

year of experience. The rest, which comprised more than half, had a high-level experience of more than six years. Regarding education level, 26% (n=16) were diploma holders, followed closely by those with a higher diploma at 24% (n=15). Of all the postgraduates who participated, 3% (n=2) had managed unstable COVID-19 patients. As for the gender distribution of those who had managed physiologically unstable COVID-19 patients, 40.0% (n=25) were female, while 37.0% (n=23) were male. The participants who had specialised training in Accident and Emergency Nursing and the nurses with only basic nursing training and no specialisation tied at 32.0% (n=20) in having managed severe COVID-19 patients.

### 4.3.1 Nurses who have managed physiologically unstable patients

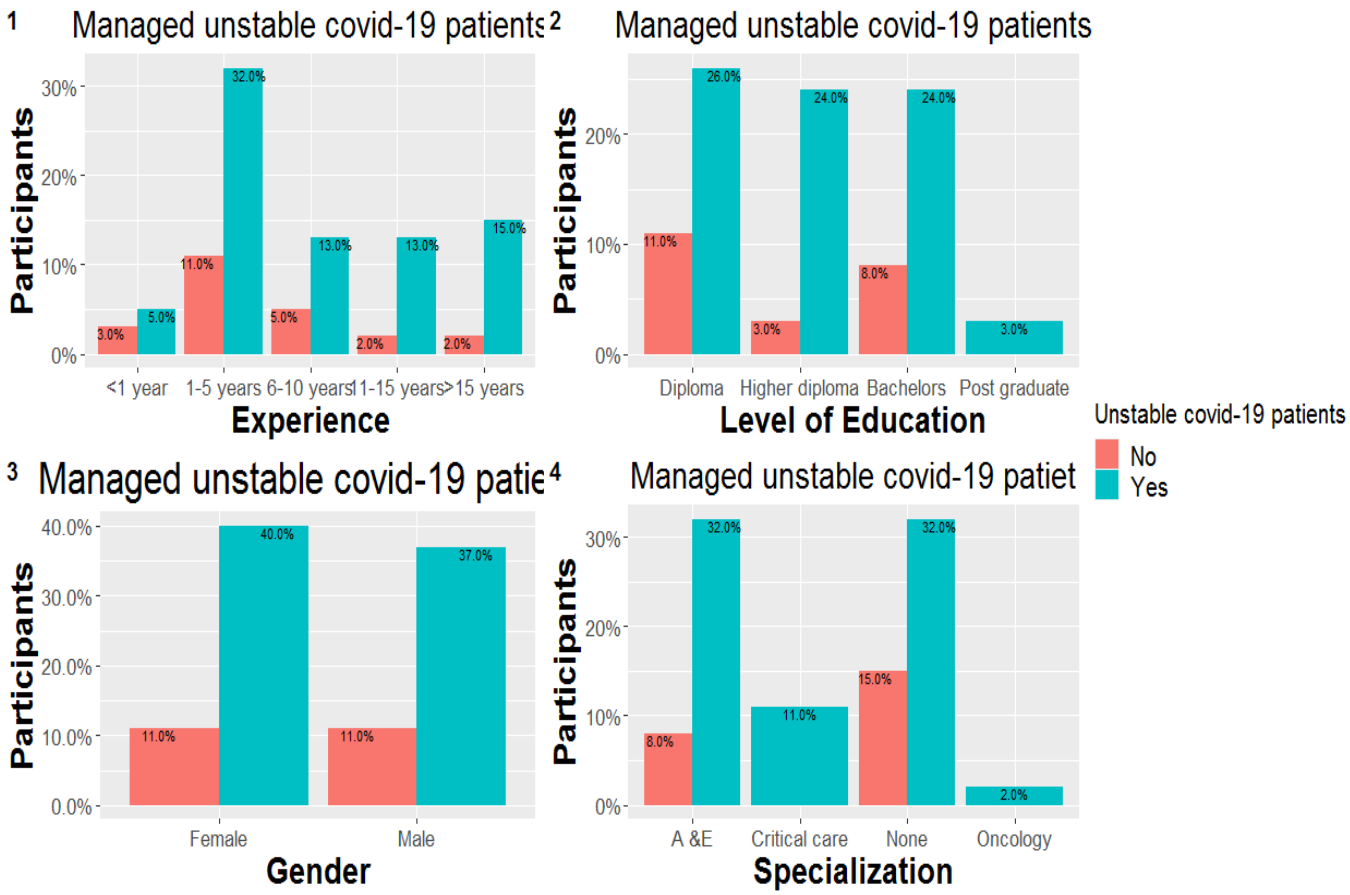


**Figure 4. 1: Nurses who have managed physiologically unstable patients**

### 4.3.2 Nurses' knowledge of COVID-19 signs and symptoms

The respondents were supposed to identify COVID-19 signs and symptoms from a list of options provided in the questionnaire. Under this theme, respondents were given a set of signs and symptoms and asked which clients they would suspect to have COVID-19 disease. This question was to assess the respondents' ability to identify COVID-19 patients at the triage area. The signs and symptoms were lumped together according to how the participants responded, as shown in table 4.2.

The most significant number of participants, 48.4% (n=30), identified all the signs and symptoms as probable for someone suffering from COVID-19 disease, which was the correct choice. The other respondents would miss some signs, but none of them failed to choose at least one sign or symptom. The least 9.7% (n=6) of the respondents identified dry cough and fever as the only signs and symptoms of COVID-19 disease. The rest of the responses are as shown in table 4.2.

**Table 4. 2: Knowledge on signs and symptoms**

| **Signs and symptoms** | **Frequency (N)** | **Proportion (%)** |
|---|---|---|
| Dry cough and fever | 6 | 9.7 |
| Chest pain and difficulty in breathing | 12 | 19.4 |
| Patients with headache and loss of taste or smell | 14 | 22.6 |
| All of the above | 30 | 48.4 |
| None of the above | 0 | 0.0 |

### 4.3.3 Nurses' knowledge on signs of hypoxia

Still, under knowledge on assessment, respondents were asked whether they could identify signs of hypoxia among patients. This was assessed by having the respondents identify signs of hypoxia as described in literature from a list of

options provided and pick the one option that was not a sign of hypoxia. The options provided by the investigator were: shortness of breath, confusion, fever, chest pain and cyanosis. The respondents were supposed to choose the option that was not associated with hypoxia.

The most significant number of the respondents, 48.4% (n = 30), chose fever which was the correct reply, while the least chosen was chest pain at 3.2% (n = 2). Confusion was chosen by 29.0% (n = 18) of the respondents despite not being the correct response. The results for this question are indicated in table 4.3.

**Table 4. 3: Knowledge on signs of hypoxia**

| **Signs of hypoxia** | **Frequency (N)** | **Proportion (%)** |
|---|---|---|
| Shortness of breath | 3 | 4.8 |
| Confusion | 18 | 29.0 |
| Fever | 30 | 48.4 |
| Chest pain | 2 | 3.2 |
| Cyanosis | 5 | 5.2 |

### 4.3.4 Nurses' knowledge of comorbidities and COVID-19

From the literature, patients with some chronic conditions who develop COVID-19 disease tend to have a poor prognosis. On this basis, respondents were given four conditions: epilepsy, diabetes, peptic ulcer disease and depression, and they were to select one that had been documented to result in worse outcomes if the patient with the said condition contracted COVID-19. From this list, only diabetes had been attributed to poor outcomes in the literature. The bar graph in figure 4.2 shows the responses in terms of specialisation. From the bar graph, it is clear that the majority of the respondents, 92% (n = 57), chose diabetes as the comorbidity that is likely to cause poor prognosis among COVID-19 patients, while depression was chosen by the least number of participants 4% (n = 3). Among those who

chose diabetes, 35% (n = 22) were specialized in accident and emergency, 10% (n = 6) were critical care nurses, 2% (n = 1) had other specializations (oncology) and the majority, 45% (n = 28) had basic nursing training with no specialization. Of all the four likely comorbidities, none of the participants chose peptic ulcer disease.

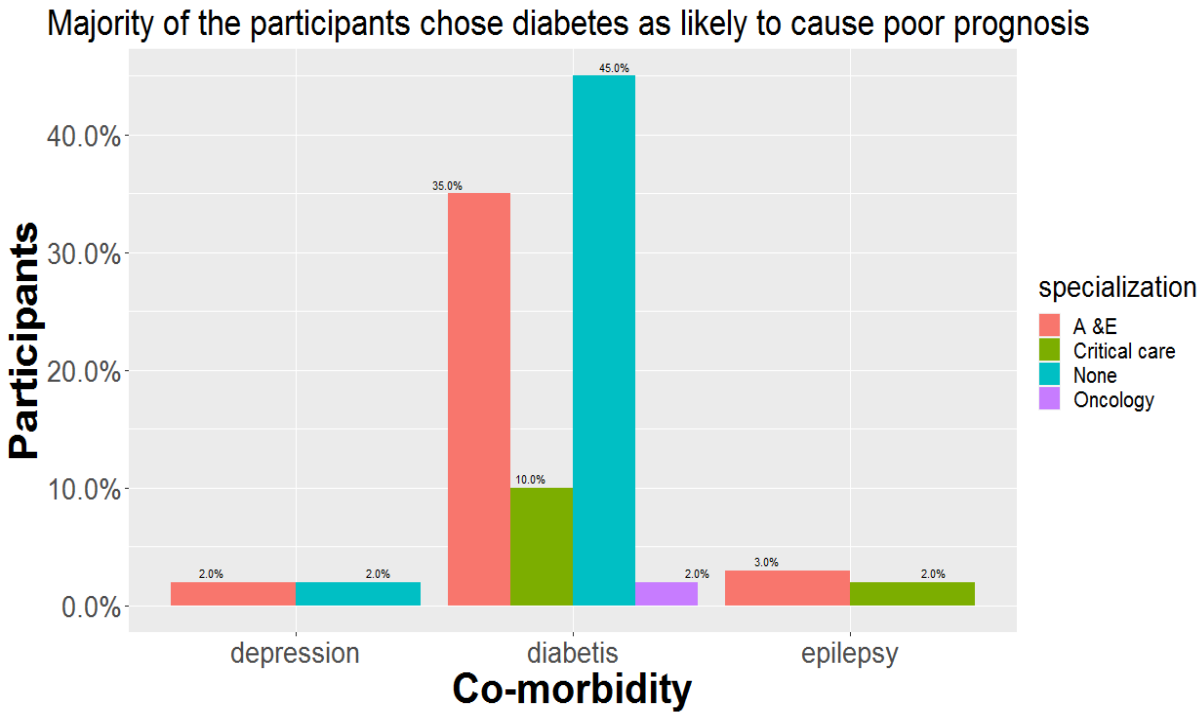


**Figure 4.2: Comparison between knowledge on comorbidities affecting COVID-19 prognosis and nurses' specialisation**

### 4.3.5 Nurses' knowledge on presentation of COVID-19 patients at A & E

The nurses were supposed to identify priority signs of COVID-19 patients presenting at the triage desk. A set of hypothetical patient histories were provided, and respondents were asked which of the patients was likely to prioritise emergency care. The responses were compared in terms of the level of education, as shown in table 4.4. Shortness of breath with SPO2 of 80% was the correct answer. Majority of the respondents 72.6% (n = 45) chose the correct response

while the least chosen option was headache and fatigue at 1.6% (n = 1). Of the respondents, most of those who chose the correct response were diploma holders at 25.8% (n = 16), followed by those with bachelor's degrees at 24.2% (n = 15).

**Table 4. 4: Comparison between triage of priority patients and level of education**

| **Patient history** | **Nurses' level of education** | | | | |
|---|---|---|---|---|---|
| | **Diploma (n/%)** | **Higher diploma (n/%)** | **Bachelors' (n/%)** | **Post graduate (n/%)** | **Total (n/%)** |
| Loss of taste and smell | 0 (0) | 3 (4.8) | 1(1.6) | 0 (0) | 4 (6.5) |
| Shortness of breath with SPO2 of 80% | 16 (25.8) | 14 (22.6) | 15 (24.2) | 0 (0) | 45 (72.6) |
| History of cough with respiratory rate of 14 breaths per minute | 2 (3.2) | 0 (0) | 6 (9.8) | 1 (1.6) | 9 (14.5) |
| Headache and fatigue | 1 (1.6) | 0 (0) | 0 (0) | 0 (0) | 1 (1.6) |

### 4.3.6 Nurses' knowledge on the management of physiologically unstable patients

Nurses' knowledge on how to manage a physiologically unstable patient was assessed by presenting the respondents with a hypothetical adult patient with features of difficulty in breathing, unable to complete sentences, respiratory rate of 28 breaths per minute and saturating at 65% on room air. The respondents were then asked what the appropriate management of such a patient would be.

As table 4.5 illustrates, 46.8% (n = 29) of those who responded said they would use a non-rebreather mask at 15 litres per minute for oxygen administration, which was the correct answer, followed by intubation at 32.35% (n = 20). The least

number of participants, 8.2% (n = 5), chose oxygen administration via nasal prongs at 2 litres per minute.

**Table 4. 5: Management of physiologically unstable patients**

| **Management** | **Frequency (N)** | **Proportion (%)** |
|---|---|---|
| Oxygen via nasal prongs at two l/min | 5 | 8.2 |
| Oxygen via face mask at six l/min | 7 | 11.3 |
| Oxygen via non-rebreather mask at 15 l/min | 29 | 46.8 |
| Endotracheal intubation with FIO2 of 100% | 20 | 32.3 |

In addition to the above question, respondents were provided with another question, and they were to identify what the inappropriate management would be. The patient in this question had difficulty in breathing, fever, and unrecordable blood pressure. The correct option that indicated inappropriate management was discharging the patient. The responses are presented in terms of specialisation, as shown in table 4.6.

Overall, the correct answer which was discharging the patient was chosen by majority 64.5% (n = 40) with many of the respondents 45.0% (n = 18) being those with no specialization followed by A & E nurses at 35.0% (n = 14). Reducing patient clothing was not chosen by any of the respondents.

**Table 4. 6: Comparison between knowledge on appropriate management of COVID-19 and specialisation**

| **Management** | **Specialisation** | | | | |
|---|---|---|---|---|---|
| | **A & E (n/%)** | **Critical care (n/%)** | **No specialization (n/%)** | **Others (n/%)** | **Total (n/%)** |
| Propping up the patient´s head of bed to 30 degrees | 2 (20.0) | 5 (50.0) | 3 (30.0) | 0 (0.0) | 10 (19.4) |
| Fluid administration | 5 (62.5) | 0 (0.0) | 3 (37.5) | 0 (0.0) | 8 (12.9) |
| Discharge of the patient | 14 (35.0) | 7 (17.5) | 18 (45.0) | 1 (2.5) | 40 (64.5) |
| Reducing patient clothing | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |

### 4.3.7 Nurses' knowledge on appropriate PPE required

The respondents were supposed to select the appropriate PPE required to protect themselves against COVID-19 while carrying out aerosol-generating procedures, which put them at a higher risk of getting infected. Four choices were provided, and respondents were asked to select all required during intubation of a COVID-19 patient. The choices were: N95 mask, face shield, gloves, and coverall. The responses were as shown in table 4.7.

The majority of the respondents, 82.3% (n = 51), said all the PPE listed were required during intubation which was the correct answer. The other respondents are illustrated in table 4.7.

**Table 4. 7: Knowledge on appropriate PPE**

| Type of PPE | Frequency (N) | Proportion (%) |
|---|---|---|
| N95 mask | 3 | 4.8 |
| Face shield | 2 | 3.2 |
| Gloves | 3 | 4.8 |
| Coverall | 0 | 0.0 |
| All of the above | 51 | 82.3 |

### 4.3.8 Nurses' knowledge on the method used to test for COVID-19 disease

The investigator also wanted to know whether the participants knew the primary mode of testing for COVID-19 disease in the A & E department. The choices were whether the diagnosis was made symptomatically by use of PCR or rapid antibody test. The correct response was the use of signs and symptoms to isolate patients. PCR testing was mainly done in the other departments of the hospital and only occasionally used in A & E department.

Despite the question asking for one response, some participants selected all methods used at the department. The bar graph in figure 4.3 shows that majority of the respondents chose PCR testing at 62.9% (n = 39), followed closely by those who chose symptomatic testing at 61.3% (n = 38). Majority of the diploma holders chose PCR testing 18.0% (n = 11) and symptomatic testing was the second option at 16% (n = 10). Holders of bachelors' degrees gave multiple responses. Most chose a combination of symptomatic and rapid test 15% (n = 9) and 2% (n = 1) chose a combination of PCR and rapid test. Only 6% (n = 4) selected symptomatic presentation only. The majority of the higher diploma holders, 13% (n = 8), chose symptomatic diagnosis as the common method of COVID-19 diagnosis in the A & E department. All postgraduate holders chose symptomatic presentation as the only mode of diagnosis.

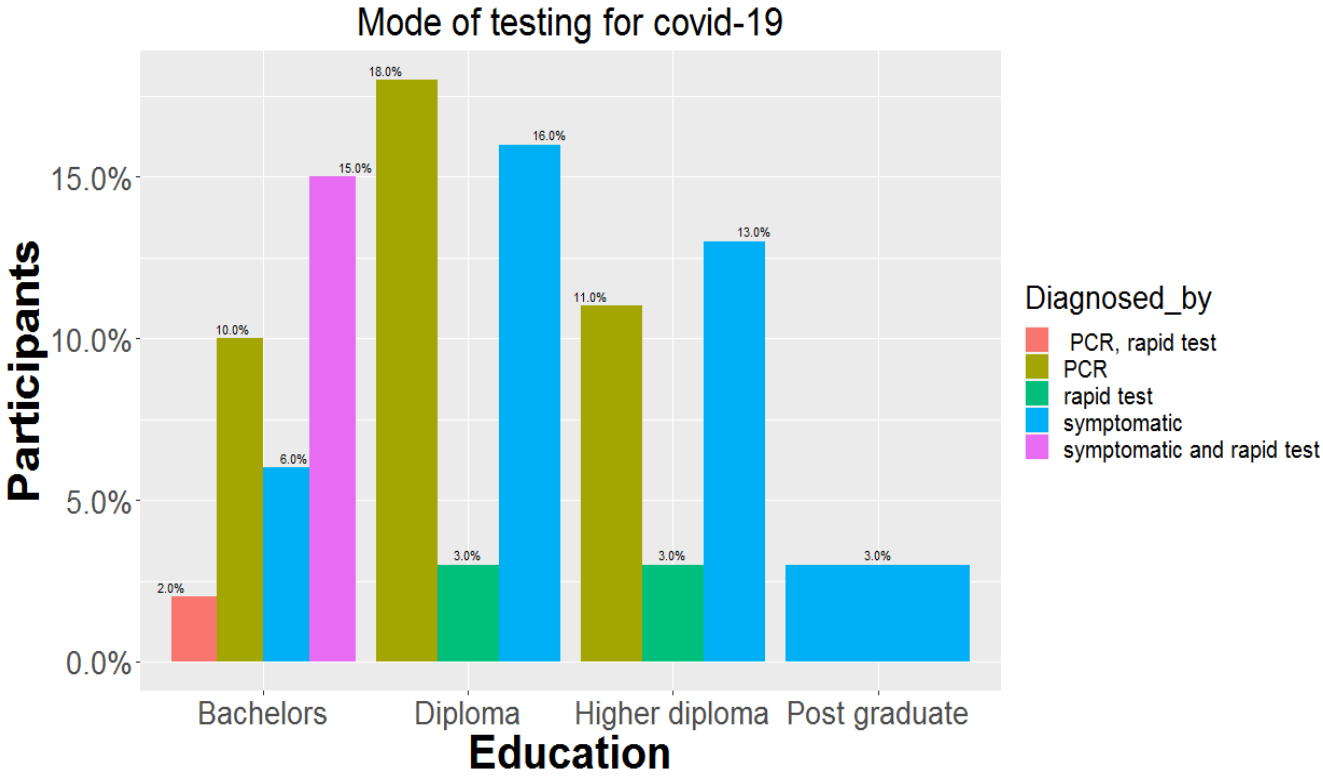


**Figure 4. 3: Comparison between knowledge on the mode of testing used and level of education**

### 4.4 Institutional preparedness

#### 4.4.1 Nurses' awareness of COVID-19 protocols

COVID-19 protocols are among the measures that institutions put to facilitate uniform and accurate management of patients with COVID-19. Availability and implementation of the protocols was an indicator used to measure institution preparedness for management of the COVID-19 patients.

The respondents were asked whether they were aware of the availability of COVID-19 protocols, and the following responses were provided. In terms of awareness of COVID-19 protocols, 85% (n = 53) were aware that there were COVID-19 protocols in the hospital and department, while 15% (n = 9) were not aware, as indicated in the pie chart in figure 4.4.

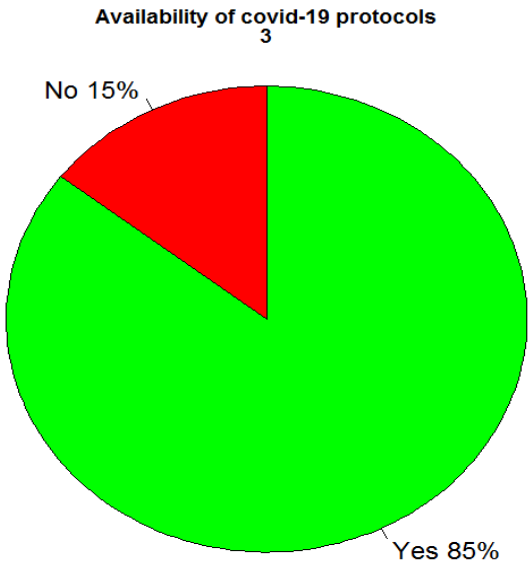


**Figure 4. 4: Percentage of participants aware of the availability of COVID-19 protocols**

The respondents who said they were aware of the availability of COVID-19 protocols were asked whether they had read them, and they replied as shown in the pie chart in figure 4.5. Of those aware of COVID-19 protocols, 11% had not read them, while the majority, 89%, had read them.

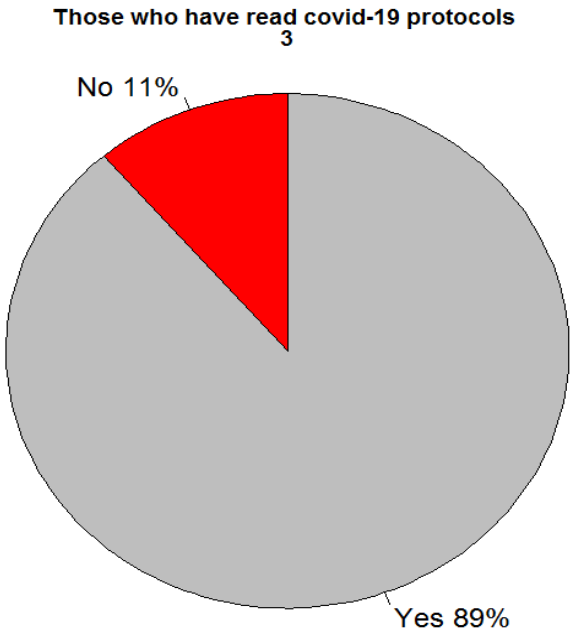


**Figure 4. 5: Percentage of participants who had read the protocols**

### 4.4.2 Nurses' application of protocols in the management of COVID-19 patients

Among the respondents who had read the COVID-19 protocols, a question was posed as to whether they knew what the protocols stipulated when it came to managing COVID-19 disease. The respondents were at liberty to choose more than one answer, and therefore the responses have been heaped into categories. As demonstrated in table 4.8, the majority of those who responded to this question, 80.6% (n = 50), chose management of patients in isolation, while only 30.6% (n = 19) chose ensuring adequate nutrition as part of management.

**Table 4. 8: Application of protocols in the management of COVID-19 patients**

| Management | Frequency (N) | Proportion (%) |
|---|---|---|
| Manage patient in isolation | 50 | 80.6 |
| Administer oxygen therapy as necessary | 45 | 72.6 |
| Nurse in prone position if necessary | 28 | 45.2 |
| Ensure adequate nutrition | 19 | 30.6 |
| Monitor input and output | 30 | 48.4 |

### 4.4.3 Nurses' application of protocols in preventing the spread of COVID-19

The respondents who had seen and read the protocols were asked about COVID-19 disease prevention according to the protocol. Several measures were provided, and the respondents were at liberty to choose more than one answer. The responses were as per table 4.9. Social distancing was chosen by the highest number of respondents, 72.6% (n = 45), closely followed by isolation of suspects at 67.7% (n=42). Hand washing points was chosen by the least respondents, 38.7% (n = 24). All the choices were correct answers.

**Table 4. 9: Application of protocols in preventing the spread of COVID-19**

| Prevention measures | Frequency (N) | Proportion (%) |
|---|---|---|
| Isolation of suspects | 42 | 67.7 |
| The social distancing between patients | 45 | 72.6 |
| Ensuring patients and relatives wear a mask properly | 28 | 45.2 |
| Hand washing points | 24 | 38.7 |
| Availability of sanitisers | 29 | 46.8 |

### 4.4.4 Training of nurses on COVID-19

Training on COVID-19 prevention and management is crucial, especially for the healthcare providers who contact COVID-19 patients. The investigator was interested in knowing how many nurses received training on COVID-19 and the areas they had been trained on.

The pie chart in figure 4.6 shows that 97% of the individuals who participated in this study had received training on COVID-19 disease. Only 3% of the participants had not been trained.

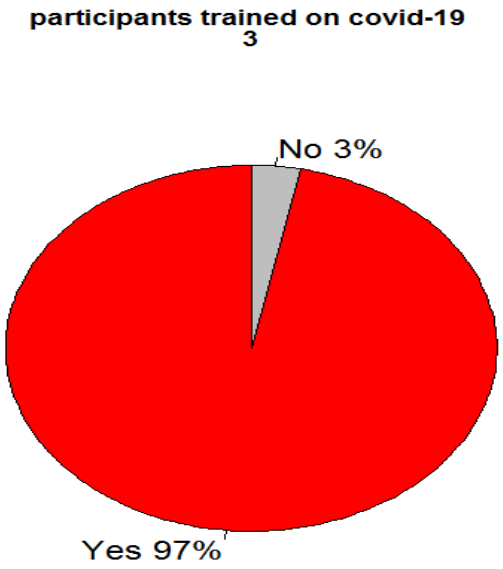


**Figure 4. 6: Percentage of participants trained on COVID-19**

### 4.4.5 Areas nurses were trained on regarding COVID-19

The investigator was also keen on knowing the areas that the respondents had been trained on regarding COVID-19 disease. Four critical areas on management and prevention of COVID-19 were provided as possible choices.

The analysis here focused on analysing the areas of training with regards to the different specialities. From table 4.10, it is clear that the majority of those who had received COVID-19 training were either A & E nurses or those with basic nursing training without specialisation. Majority of the respondents 62.9% (n = 39) said they had been trained on triaging and identification of patients of which 51.3% (n = 20) had no specialized training, while 33.3% (n = 13) were A & E trained nurses. 58.1% (n = 36) of the total respondents said they had been trained on the proper use of PPE, whereby 52.8% (n = 19) of these had no specialised training while 41.7% (n = 15) were A & E trained nurses.

**Table 4. 10: Comparison between specialisation and areas trained on COVID-19**

| **Training area** | **Speciality** | | | |
|---|---|---|---|---|
| | **A & E (n/%)** | **Critical care (n/%)** | **None (n/%)** | **Total (n/%)** |
| Triaging and identification of suspected COVID-19 patients | 13 (33.3) | 6 (15.4) | 20 (51.3) | 39 (62.9) |
| Management of COVID-19 patients | 11 (45.8) | 4 (16.7) | 9 (37.5) | 24 (38.7) |
| Isolation procedures | 13 (41.9) | 5 (16.1) | 13 (41.9) | 31 (50) |
| Proper use of PPE | 15 (41.7) | 2 (5.6) | 19 (52.8) | 36 (58.1) |

**Test of association**

To check whether there was an association between an area of training and specialisation, we employed fisher's exact test because more than 20% of the cells had counts of less than 5. The p-value from this test was 0.78, showing no association between the area of training on COVID-19 disease and the nurses' area of specialisation.

### 4.4.6 Availability of resources in A & E

The primary resources targeted by this objective were medical supplies and personal protective equipment. These two are very crucial in the management and prevention of COVID-19 disease, respectively. The researcher was seeking the nurses' opinion on how available the resources were.

From table 4.11, there seemed to be not much difference in responses provided for medical supplies and PPE as those who agreed were 19 and 23 respondents respectively, while those who disagreed were 9 and 10 respectively.

**Table 4. 11: Availability of resources**

| **Response** | **Resources** | |
|---|---|---|
| | **Medical supplies** | **PPE** |
| Agree | 19 | 23 |
| Strongly agree | 6 | 3 |
| Neutral | 27 | 23 |
| Disagree | 9 | 10 |
| Strongly disagree | 1 | 3 |

## 4.5 Challenges encountered by nurses in the management of COVID-19 patients

The respondents were asked which challenges they had experienced during the management of physiologically unstable patients with severe COVID-19. A list

was made indicating challenges identified in previous studies, and the respondents were to select all the challenges they had experienced. They were also free to add other challenges that were not on that list.

The results are as shown in table 4.12. The most experienced challenge among the nurses was lack of PPE n = 19 followed by fear of contracting the virus n = 18. The least experienced challenge was colleagues' lack of collaboration and cooperation and uncertainty in the correct management at n = 9 and n = 8, respectively.

**Table 4. 12: Challenges experienced by nurses**

| **Challenges** | **Frequency** |
|---|---|
| Uncertainty in the correct management | 8 |
| Lack of adequate PPE | 19 |
| Lack of necessary medications and supplies | 11 |
| Lack of collaboration/ cooperation from colleagues | 9 |
| Increased workload | 12 |
| Fear of contracting the virus | 18 |
| Fear of spreading the virus (especially to loved ones) | 17 |
| Stigmatisation | 16 |

### 4.5.1 Signs of burnout experienced by nurses

Under the challenges experienced in managing physiologically unstable COVID-19 patients, respondents were then assessed on whether they could identify any signs of burnout they had experienced, and the results were as displayed in table 4.13. In this question, respondents were asked to tick all that applied.

Fatigue was chosen by 90.3% (n = 56) of the respondents as the most common sign of burn out followed by decreased motivation at 69.4% (n = 43) of the

respondents. Increased errors as a sign of burnout was the least chosen sign by 17.7% (n = 11).

**Table 4. 13: Signs of burnout experienced**

| Signs | Frequency (N) | Proportion (%) |
|---|---|---|
| Anxiety | 31 | 50 |
| Decreased motivation | 43 | 69.4 |
| Fatigue | 56 | 90.3 |
| Headache | 37 | 59.7 |
| Increased errors | 11 | 17.7 |
| Insomnia | 29 | 46.8 |
| Irritability | 35 | 56.5 |
| Reduced energy and efficiency | 33 | 53.2 |

### 4.5.2 Mechanisms for coping with the challenges

Respondents were also asked how they coped with the challenges they experienced while managing COVID-19 patients. Out of the 62 respondents, only 41 answered this question, and their responses were as shown in table 4.14.

Under coping mechanisms, professional help and debriefing with colleagues were the two best mechanisms preferred by respondents at 24.4% (n = 11) each. The least chosen option of the five coping mechanisms per the respondents was the use of substances (drugs and alcohol) which was 8.8% (n = 4).

**Table 4. 14: Coping mechanisms**

| Coping mechanism | Frequency (N) | Proportion (%) |
|---|---|---|
| Professional help (including therapy) | 11 | 24.4 |
| Debrief with colleagues | 11 | 24.4 |
| Talking to loved ones/friends | 10 | 22.2 |
| Taking time off work | 9 | 20 |
| Use of substance (drugs/alcohol) | 4 | 8.8 |

### 4.5.3 Emotional and psychological support

Still, under challenges, respondents were asked whether they had adequate emotional and psychological support to face the challenges at the workplace. The responses were ranked on a Likert scale, as shown on the bar graph in figure 4.7.

On emotional and psychological support at the workplace, 26 of the respondents, who were the majority, agreed that emotional and psychological support was adequate, closely followed by those who strongly agreed at 22. None of the respondents disagreed, while five strongly disagreed. The rest were neutral.

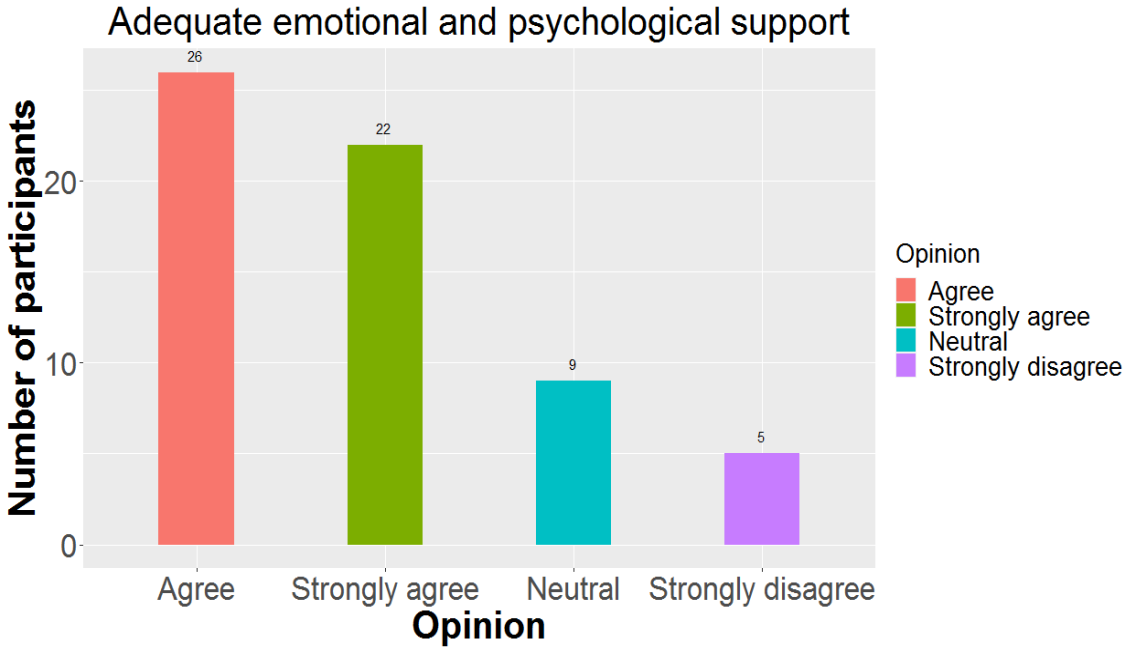


**Figure 4. 7: Availability of emotional and psychological support**

### 4.6 Nurses' preparedness in management of COVID-19 patients

Respondents were also asked what their perception was in terms of their preparedness to manage COVID-19 patients. They were given three choices to choose from: not prepared, moderately prepared, and confidently prepared. The responses given to this question are shown in the pie chart in figure 4.8.

On preparedness to manage physiologically unstable COVID-19 patients, 52% (n = 32) of the respondents were moderately (somehow) prepared, while 47% (n =

29) of them were confidently prepared. The remaining 2% (n = 1) of the participants were not prepared to manage physiologically unstable COVID-19 patients.

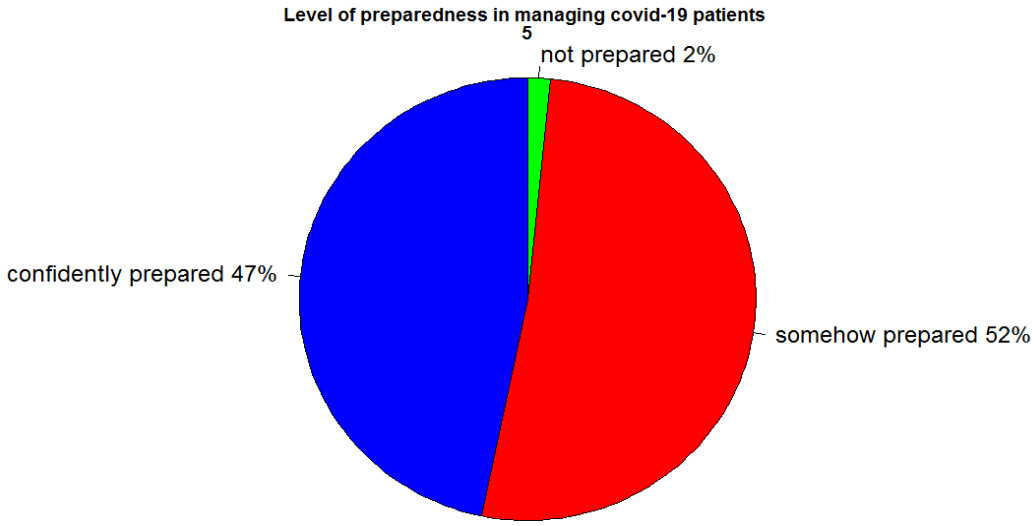


**Figure 4. 8: Participants' perception of their level of preparedness**

**Test of hypothesis on preparedness**

H0: Nurses in accidents and emergencies are not adequately prepared to manage physiologically unstable COVID-19 patients.

From the results on perception of preparedness, 61 nurses were prepared to manage COVID-19 patients while only one was not. In this case, we used a proportion test to see whether there was significant preparedness to either reject or fail to reject our hypothesis. A test of proportion yielded a p-value of 6.7e-14 at 95% confidence interval (0.9017, 0.9992). The p-value was less than 0.05, meaning a significant level of preparedness among A & E nurses to manage COVID-19 patients. The confidence interval also does not include zero hence a significant level of preparedness, and we, therefore, reject our null hypothesis of no preparedness.

### 4.7 Association of variables

Several measures of association methods were considered in this study. A binary logistics method was considered, but too many cells with zeros made it challenging to compute the odds ratio. The other options were the chi-square test or fisher's exact test. Chi-square was considered but not used because numerous cells (more than 20%) had frequencies of less than 5. The fisher's exact test was, therefore, the most suitable measure of association for this study. The ordinal logistic regression model was employed in our multivariate analysis of the ordered outcome variables of the respondents' perception regarding their preparedness to manage COVID-19 patients.

**Bivariate analysis**

1. **Respondents' level of education**

   Here we look at whether there was an association between the respondents' level of training and their perception of their preparedness to manage COVID-19 patients.

   The fisher's exact test of association is generated from table 4.15. More than 20% of the cells were in the table with frequencies of less than five; hence, we used fisher's exact test instead of the chi-square test. The test yielded a p-value of 0.019 at a 95% confidence level. This p-value was less than 0.05, and we, therefore, reject the null hypothesis that there is no association between level of education and readiness to manage COVID-19 patients. We conclude an association between a participant's level of education and readiness to manage physiologically unstable COVID-19 patients.

**Table 4. 15: Comparison between the perception of preparedness and level of education**

| perception | Bachelors | Diploma | Higher .. | Post gr.. | Total |
|---|---|---|---|---|---|
| confidently prepared | 14 | 7 | 8 | 0 | 29 |
| not prepared | 1 | 0 | 0 | 0 | 1 |
| somehow prepared | 5 | 16 | 9 | 2 | 32 |
| Total | 20 | 23 | 17 | 2 | 62 |

## 2. Respondents' specialisation

The fisher's exact test produced a p-value of 0.746, which is more significant than 0.05 at a 95% confidence level. Therefore, we fail to reject the null hypothesis that there is no association between specialisation and readiness to manage COVID-19 cases. In this case, we conclude that there is no association between readiness to manage physiologically unstable COVID-19 patients and nurses' specialisation.

**Table 4. 16: Comparison between the perception of preparedness and specialisation**

| | specialization | | | | |
|---|---|---|---|---|---|
| perception | A &E | Critica.. | None | Oncology | Total |
| confidently prepared | 10 | 4 | 15 | 0 | 29 |
| not prepared | 1 | 0 | 0 | 0 | 1 |
| somehow prepared | 14 | 3 | 14 | 1 | 32 |
| Total | 25 | 7 | 29 | 1 | 62 |

### 3. Training on COVID-19 disease

As in the two cases above, the fisher's exact test was applied to associate respondents' training on COVID-19 and their readiness to manage COVID-19 cases. The test yielded a p-value of 0.509 at a 95% confidence level. The p-value is greater than 0.05; thus, we fail to reject the null hypothesis. We, therefore, conclude that there is no association between training on COVID-19 disease and preparedness to manage COVID-19 patients.

**Table 4. 17: Comparison between the perception of preparedness and COVID-19 training**

| | covid_training | | |
|---|---|---|---|
| perception | No | Yes | Total |
| confidently prepared | 0 | 29 | 29 |
| not prepared | 0 | 1 | 1 |
| somehow prepared | 2 | 30 | 32 |
| Total | 2 | 60 | 62 |

### 4. Level of experience

Like all the other tables above, more than 20% of cells had counts of less than 5. The p-value from fisher's exact test was 0.154, which is greater than 0.05. We fail to reject the null hypothesis that there is no association between experience level and preparedness to manage physiologically unstable COVID-19 patients. Our conclusion, therefore, is that there is no association between level of experience and preparedness to manage physiologically unstable COVID-19 patients.

**Table 4. 18: Comparison between the perception of preparedness and level of experience**

| | experience | | | | | |
|---|---|---|---|---|---|---|
| perception | 1-5 years | 11-15 y.. | 6-10 ye.. | <1 year | >15 years | Total |
| confidently prepared | 16 | 2 | 6 | 1 | 4 | 29 |
| not prepared | 0 | 0 | 0 | 1 | 0 | 1 |
| somehow prepared | 11 | 7 | 5 | 3 | 6 | 32 |
| Total | 27 | 9 | 11 | 5 | 10 | 62 |

**Multivariate analysis**

Considering the ordered outcome variable of perception, we employed ordinal logistic regression in our multivariate analysis. The test evaluated the predictors' contribution to the respondents' perception regarding their preparedness to manage COVID-19 patients.

Two proportional ordinal logistic regression models were fitted, and the best model was selected using Akaike's Information Criterion (AIC). The best model had reduced predictors, whereby specialisation as a predictor was dropped. In addition, some coefficients on the final were evaluated and dropped as the model found them without information. The coefficient estimates and p-values are shown in table 4.19.

**Table 4. 19: Coefficients**

| **Coefficients** | **Estimates** | **SE** | **t-value** | **p-value** |
|---|---|---|---|---|
| Education: Higher diploma | 0.435 | 0.702 | 0.620 | 0.535 |
| Education: Bachelors' | 1.420 | 0.720 | 1.980 | 0.048 |
| Education: Postgraduate | -10.515 | 1.06e-5 | -9.836e+5 | 0.000 |
| Experience :(1-5 years) | -0.501 | 0.619 | -0.810 | 0.147 |
| COVID-19 training: Yes | 9.044 | 5.100 | 1.198e+4 | 0.000 |
| **Intercepts** | | | | |
| Not prepared \|somehow prepared | -0.502 | | | |
| Somehow\| confidently prepared | 9.044 | | | |

From this model, two regression equations are fitted for the two intercepts.

**Equations**

$$\ln\left(\frac{\Pr(\text{preparedness}) = not\ prepared|somehow\ prepared}{\Pr(preparedness) = somehow\ or\ confidently\ prepared)}\right)$$

$$= -0.502 + 0.435\ Higher\ diploma + 1.420\ Bachelors'$$

$$- 0.10.515\ post\ graduate$$

$$- 0.501\ experience\ (1 - 5\ years) + 9.044\ covid$$

$$- 19\ training\ (yes)$$

$$\ln\left(\frac{\Pr(\text{preparedness}) = not\ prepared\ \ or\ somehow\ prepared}{\Pr(preparedness) = confidently\ prepared)}\right)$$

$$= +0.435\ Higher\ diploma + \ 1.420\ Bachelors'$$

$$- 0.10.515 post\ graduate$$

$$- 0.501\ experience\ (1 - 5\ years) + 9.044 covid$$

$$- 19\ training\ (yes)$$

**4.8 Interpretation of results**

The interpretation of the above model was made using p-values whose significance was evaluated at a 95% confidence level. From the table of p-values, it is clear that having a bachelors' degree p-value of 0.048, a postgraduate education p-value 0.000 and training on COVID-19 disease p-value 0.000 is statistically significant in determining preparedness to manage COVID-19 patients. On the other hand, having a higher diploma p-value of 0.535 and experience between 1-5 years p-value 0.157 is not statistically significant in determining preparedness to manage physiologically unstable COVID-19 patients.

# CHAPTER 5: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

## 5.1 Introduction

The COVID-19 disease put much strain on healthcare services worldwide. Being a new disease, it brought many challenges to the healthcare workforce (Ramaci et al., 2020). Due to the severity of the disease, most patients have had to be managed in critical care units. A constant stream of severely ill patients into hospitals led to the depletion of beds in these units leading to a spillover of patients to accident and emergency departments (Carter et al., 2020).

Given the above problems created by COVID-19 disease, this study sought to examine the situation at Kenyatta National Hospital's accident and emergency department. The study interviewed nurses as they make up the bulk of the healthcare workforce. The main focus of this study was the pressure put on the department by severely ill COVID-19 patients, the ability of the nurses to manage the said patients and the challenges faced by nurses in their daily work. The availability of resources for the job and factors that influenced nurses' preparedness to manage the severely ill patients who contracted COVID-19 were also scrutinised. The discussion is based on the demographic characteristics of the study participants and the study objectives, as demonstrated in the following sections.

## 5.2 Demographic characteristics

The study established that female participants were slightly more (54.8%), with men making up almost half of the respondents. Nursing is a predominantly female profession worldwide, with female nurses making up to 65% of the nursing profession (Boniol et al., 2019). The proportion of male nurses in studies

involving accident and emergency departments and situations is higher than the national averages, similar to what has been observed in this study (Hammad, 2010). Some institutions tend to place more male nurses in accident and emergency departments than their general distribution in the hospital. This is because men are perceived to have more physical strength than female colleagues, which could explain the high proportion of male nurses in this study compared to the general trend of male nurses (Msn et al., n.d.).

About a third of the participants were diploma holders at 37.1% (n = 23), while postgraduate holders were the least at 3.2% (n = 2). In terms of specialisation, the majority of the nurses only had basic nursing training with no specialisation at 46.8% (n = 29), followed by those who specialised in accidents and emergency nursing at 40.3% (n = 25). More than half of the respondents (51.6%) had less than five years of experience in nursing. This can be attributed to high turnover rates among the nurses over time, particularly those with specialised training and higher levels of experience, and those in the public hospitals due to various factors such as inadequate resources, dissatisfaction with working conditions and with pay and benefits (Sang J et al., 2021)

### 5.3 Knowledge of nurses

#### 5.3.1 Knowledge of nurses on assessment and management of COVID-19 patients

In line with the first objective, most of the nurses working in the Accidents and Emergency department, 77.4%, had managed severely ill patients with COVID-19 disease. Most of the nurses caring for COVID-19 patients found managing severely ill patients with COVID-19 a new experience, needing a different approach altogether. However, nurses found it a professional obligation to care

for COVID-19 patients despite having limited knowledge (Rathnayake et al., 2021).

About half of the respondents were able to identify all the signs and symptoms of COVID-19 disease, while the rest would identify some signs and symptoms and omit others. No participant chose none of the signs and symptoms; thus, they were all somewhat knowledgeable on the signs and symptoms. Prompt and accurate identification of signs and symptoms of COVID-19 disease is vital in reducing transmission as the required preventive measures such as isolation are adopted early. Adequate knowledge is essential as it contributes to better management of the patients and reduces the spread of the disease within hospitals. Previous studies identified inadequate knowledge as one of the risk factors for disease transmission, and it was shown to lead to low levels of care being offered to the patients (Elhadi et al., 2020).

Similarly, about half of the respondents were also able to correctly identify signs of hypoxia which is one of the manifestations of a patient with severe COVID-19 disease. The majority were knowledgeable on the emergency signs in triage and prioritisation of the patients' management. Patients with severe COVID-19 tend to rapidly deteriorate unless managed promptly, hence the need for proper assessment during the initial stages of arriving at the hospital (World Health Organization, 2020b). Therefore, it is vital for nurses at A & E departments to properly assess and identify severely ill COVID-19 patients since they are the first contacts of patients who come to the hospital.

According to Wen *et al.*, 2021 in a study conducted on nurses to establish their knowledge level about COVID-19 disease, he found out that 65.3% of the respondents believed they had a good command on assessment of COVID-19

patients (Wen et al., 2021). The findings were similar to the findings of this study. The results demonstrated that just below half of the respondents could identify all signs and symptoms of a COVID-19 patient (48.4%) and the signs of hypoxic patients (48.4%). However, the majority were able to identify emergency signs and prioritise patients that had them (72.6%) and knew of the comorbidities to look out for (92%). On average, 65.35% of respondents were knowledgeable of the various aspects of the assessment of COVID-19 patients.

About half of the respondents (46.8%) selected the proper management of a patient with severe respiratory distress, which was oxygen administration using 15 litres per minute via a non-rebreather mask. About a third of the nurses (32.3%) chose to intubate the patient. There have been conflicting literature on the benefits of early intubation of COVID-19 patients versus late intubation. The criteria used for early intubation have been highly criticised as it has not proven that intubated patients have better outcomes than those on other treatment modalities (Pisano et al., 2021). With the well-documented complications of invasive mechanical ventilation nurses, prefer using non-invasive methods of oxygenating COVID-19 patients only result in intubation when necessary. Such complications include ventilator-associated pneumonia, delirium, intensive care acquired weakness, nosocomial infections, and barotrauma (Ibrahim et al., 2021). In addition, it is argued that most patients without a compromised airway can be successfully managed by using non-invasive techniques to raise their oxygen saturation levels (Dondorp et al., 2020). Shortages in ventilators and ICU beds have also discouraged unnecessary intubation of patients (Oketch, 2021).

Chronic conditions have been associated with poor outcomes when patients with those comorbidities contract COVID-19 disease (Jamil et al., 2020). This study

established that almost all (90%) of the respondents were able to identify diabetes as one of the conditions that would lead to poor prognosis in COVID-19 patients. In support of the above, a poor prognosis has been observed in patients with advanced age and comorbidities such as diabetes, obesity, cardiovascular disease, including hypertension and chronic lung diseases (Jamil et al., 2020). Other chronic conditions such as cancer have also been identified to worsen outcomes in COVID-19 patients (Osibogun et al., 2021). The other conditions provided in the choices (depression, peptic ulcer disease and epilepsy) have not been found to contribute to the prognosis of COVID-19 disease in any literature.

### 5.3.2 Nurses' knowledge of Personal Protective Equipment (PPE)

The study sought to establish nurses' knowledge on the necessary PPE they were required to use to protect themselves from contracting the highly contagious COVID-19 while managing patients with the disease. During the COVID-19 pandemic, guidelines on personal protective equipment requirements were put in place to reduce the spread of the virus at the community level and in hospitals to protect healthcare workers. Different levels of protective gear were needed at the community level and for different procedures within hospitals (World Health Organization, 2020a).

This study established that most of the respondents (80.6%) had the appropriate knowledge on necessary PPE as they correctly identified all the appropriate PPE (coveralls, gloves, N95 mask and face shields) as applicable during intubation of a COVID-19 patient. It is recommended that while working with COVID-19 patients, health care providers need to protect themselves by wearing proper PPE (Cook, 2020). Aerosol generating procedures such as intubation pose a higher risk for transmission. Thus those performing the procedures need to wear a fit-tested

N95 respirator or mask, face or eye protector such as a shield, gown and gloves (Orser, 2020).

### 5.4 Institutional preparedness

#### 5.4.1 Institutional preparedness - protocols

Since the COVID-19 disease outbreak, the Ministry of Health in Kenya provided various directives to slow the spread of COVID-19 disease. Hospitals were expected to generate protocols in line with the ministry of health guidelines to facilitate proper triaging and prompt isolation of COVID-19 suspected cases and their management. The protocols also covered preventive measures that were to be observed by everyone in the hospitals: the patients themselves and the staff. KNH was no exception, and this study sought to identify whether the nurses at the A & E department of KNH were familiar with the protocols and whether they were following them.

The main ways that have been shown to prevent the spread of the virus include proper hand hygiene, social distance and early screening, diagnosis and isolation or quarantine of the confirmed positive cases (Güner et al., 2020). Social distancing was chosen by the highest number of respondents (72.6%), closely followed by isolation of suspects at (67.7%). Wearing of face masks and handwashing were the least chosen methods at 45.2% and 38.7%. Contrary to the finding of this study, wearing face masks and handwashing were identified by 90.9% of nurses as the preferred methods of COVID-19 prevention in prior studies (Rathnayake et al., 2021). This is likely because social distancing and isolation options may not have been viable options at the sites of previous studies because of the large number of patients they received without additional space. Therefore, the use of face masks and handwashing were more practical and

realistic options. The nurses at KNH might have chosen the ideal options for preventing spread which were not necessarily the most practical.

### 5.4.2 Institutional preparedness – availability of resources

This study sought to identify whether KNH had the required medical resources to manage physiologically unstable COVID-19 patients and whether the staff were provided with adequate PPE.

Under resource availability at the hospital, less than half (41%) of the nurses confirmed that they received adequate medical supplies to manage COVID-19 patients. The remaining 59% either remained neutral, disagreed, or strongly disagreed. This indicates inadequate medical resources available for the management of severely ill COVID-19 patients, which agrees with previous studies. The large numbers of COVID-19 patients seeking medical attention put a strain on many hospitals, resulting in shortages of resources required for their management, resulting in additional healthcare workers, regular and intensive care beds, ventilators, and general medical supplies (Godderis et al., 2020).

On provision of PPE, less than half (42.6%) either agreed or strongly agreed that the hospital provided enough personal protective equipment to manage patients with COVID-19 disease. The remaining 57.4% who formed the majority either remained neutral, disagreed, or strongly disagreed. Most of the respondents were unhappy with the PPE they were provided with to manage COVID-19 patients. Lack of adequate PPE predisposes healthcare workers, including nurses, to contracting the disease as it is highly contagious. Inadequate PPE was one of the contributing factors to high cases of COVID-19 infections and deaths among nurses and other healthcare workers (Ranney et al., 2020). In support of this study, a study conducted in Saudi Arabia reported that more than half (50.3%) of

healthcare workers reported that they did not receive enough PPE (Al Baalharith and Pappiya, 2021). In Libya, the PPE provided by hospitals were so inadequate that healthcare workers even had to buy some for themselves (Elhadi et al., 2020). This confirms the strain the health system experienced where the demand for PPE superseded supply.

### 5.5 Challenges experienced

Regarding the challenges nurses managing physiologically unstable patients with severe COVID-19 had experienced, the main one reported was lack of adequate PPE, followed by fear of contracting the virus and fear of spreading the virus to loved ones. Lack of collaboration and coordination from colleagues and uncertainty regarding correct management of severe COVID-19 disease were the challenges cited by the few respondents. These findings agreed with a study by Mehta et al., which stated that healthcare workers had continued providing care despite the challenges they faced, such as exhaustion, risk of infection and fear of transmitting the disease to loved ones. Insufficient resources and lack of specific treatments for COVID-19 were other challenges experienced identified in that study (Mehta et al., 2021).

Most respondents highlighted various signs of burnout they had experienced while managing patients with severe COVID-19 disease. Almost all the respondents (90.3%) reported fatigue, while 69.4% had decreased motivation. About half of the respondents reported having experienced headaches, irritability, reduced energy and efficiency, anxiety, and insomnia. COVID-19 has had several negative impacts on healthcare workers, including nurses, such as severe fatigue and burnout, as they are forced to serve more patients without additional staffing (Ramaci et al., 2020). The findings of this study were similar to those of other

studies that demonstrated that management of severely ill COVID-19 patients had a psychological and emotional impact on the healthcare providers, including the nurses. Burnout was experienced in about half of healthcare workers providing care to severely ill COVID-19 patients (Jalili et al., 2021). Psychological experiences noted in a study conducted in France in 2020 during the peaks of the COVID-19 pandemic were anxiety, depression, peritraumatic dissociation, stress disorder and burnout, which were noted to be incredibly high among nurses (Azoulay et al., 2020).

### 5.6 Nurses' perception of their level of preparedness

To effectively manage COVID-19 patients, healthcare workers have to be well prepared (Hou et al., 2020). This study established that generally, in terms of nurses' preparedness, almost all (97%) of the respondents felt they were prepared to manage COVID-19 patients. This meant that majority of the nurses were confident whenever they came across a physiologically unstable COVID-19 patient. They would identify, triage, and manage these patients appropriately, and they knew the correct PPE needed to protect themselves from getting sick. Prior studies conducted also had similar findings and once established that 95% of the nurses were prepared to manage a COVID-19 patient (Al Baalharith and Pappiya, 2021).

### 5.7 Association between nurses' characteristics and level of preparedness

This study also sought to establish the association between nurses' characteristics and preparedness to manage COVID-19 patients. Among the factors looked into were level of education, specialisation, experience and whether a nurse had some training on COVID-19 disease.

Of these four variables, only the level of education was significantly associated with a nurses' preparedness to manage physiologically unstable COVID-19 patients while analysed independent of other factors. The fisher's exact test yielded a p-value of 0.019. Additionally, a multivariate analysis from this study identified that a nurse who holds a bachelor or postgraduate degree and received training on COVID-19 was significantly prepared to manage physiologically unstable COVID-19 patients as it yielded p-values 0.048 and 0.000 for the two, respectively. In contrast to these findings, a study by (Wu et al., 2020) did not find any association between the level of nurses' education and preparedness to manage COVID-19 patients. The discrepancy most likely arose from the difference in study setups and how the responses were given.

Regarding the level of experience, this study had no association with preparedness to manage COVID-19 patients as it yielded a p-value of 0.154. This was similar to the findings of a study in Libya which showed that the nurses' years of experience had no association with their preparedness to care for COVID-19 patients (Elhadi et al., 2020). This is likely because COVID-19 was a new disease and no number of years working in nursing could have prepared one sufficiently for the magnitude of this pandemic. Contrary to the findings of this study, however, some previous study findings suggested an association existed. One study found that highly experienced nurses were better prepared to manage COVID-19 patients as they could quickly and accurately assess them and provide quality care (Anton et al., 2021). This was particularly true for the nurses who had managed patients in previous outbreaks of highly fatal diseases such as ebola, cholera, and SARS (Deressa et al., 2021). The different outcomes studies might have been due to the differences in study areas in which the studies were

conducted. Kenya has had fewer outbreaks compared to other countries. Therefore, the nurses in the country have not had opportunities to work in such high-risk situations before compared to nurses in other countries that have regular disease outbreaks.

In this study, training on COVID-19 had no association with preparedness to manage COVID-19 patients as this yielded a p-value of 0.509. This was contrary to what many studies had predicted that training healthcare workers on COVID-19 would improve preparedness. Minimal knowledge of the new disease was one of the challenges experienced by nurses who were managing COVID-19 patients (Mehta et al., 2021). This difference in outcome was likely since the nurses had to go through frequently changing information and guidelines on the presentation and management of patients with COVID-19, what PPE they were required to use, and how to use them. Thus, they continued to struggle to distinguish between accurate information and misinformation even with training (Mehta et al., 2021).

Regarding specialised training, this study showed no association with preparedness to manage COVID-19 patients as it yielded a p-value of 0.746. This disputes previous studies that associated nurses with specialised training with being better prepared to manage COVID-19 cases. Nurses with specialised training, such as critical care nurses, were better prepared to manage physiologically unstable patients with severe COVID-19 than those with basic training (Lauck et al., 2021). The difference in the outcomes might have been because almost half of the respondents in this study only had basic nursing training, which may have contributed to the analysis outcome.

## 5.8 Conclusion

The findings of this study were that most of the nurses had enough knowledge to assess, manage and prevent the spread of COVID-19 disease. Most of the challenges nurses face in this study are universal across developing countries, especially regarding medical supplies and personal protective equipment. Fatigue and other signs of burnout were also widespread challenges among the nurses.

Some levels of education were found to be significant in preparing nurses to manage COVID-19 patients, contrary to what other studies have established in the world. By itself, training nurses on COVID-19 did not have an association with their level of preparedness. However, when combined with some levels of education (bachelors and postgraduate), it showed a significant association to preparedness. Contrary to most studies, essential variables such as the years of experience and specialisation, which were thought to be influential in nurses' preparedness to manage COVID-19 patients, were found not to be as significant.

## 5.9 Recommendations

There is a need for multi-site studies of this kind to increase the distribution of respondents' characteristics to allow for an informed comparison and generalizability of study findings. In addition to the above, the more extensive studies may need to be multi-centre to collect data on a wide range of experiences.

The accident and emergency department of KNH were noted to have provided training to the nurses on various aspects of COVID-19, which was commendable. Despite the study findings showing no association between training on COVID-19 and the preparedness of nurses to manage COVID-19 patients, they should be maintained to enable nurses in the department to keep up with the ever-changing

guidelines. More studies should be conducted in other departments within the hospital and other facilities, and the findings compared to those of this study.

There were some challenges which the nurses faced in their management of severely ill COVID-19 patients. Many respondents felt there were insufficient medical supplies to manage COVID-19 patients and the PPE was inadequate to protect them. Therefore, the medical supplies and PPE should be increased to ensure they are inadequate to facilitate proper management of severely ill COVID-19 patients and protect the nurses from getting infected.

In addition, most nurses had various signs of burnout, with the majority sighting fatigue and decreased motivation. The KNH administration should ensure the nurses get adequate rest by either increasing the staffing or providing them more off days. Adequate rest is likely to increase their motivation and the quality of care they provide to COVID-19 patients.

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## APPENDICES

### APPENDIX 1: Informed Consent Form

My name is Alice Nyakaro Muneri, a student at the University of Nairobi undertaking a Master of Science in Critical Care Nursing. I am conducting a study titled "Assessment of nurses' preparedness in management of physiologically unstable patients with severe COVID-19 disease at the Accident and Emergency department, Kenyatta National Hospital, Nairobi".

I kindly request that you participate in my study. Your participation will entail filling in a questionnaire which will take you approximately 10 minutes to fill.

The study intends to determine whether the nurses at A & E are adequately prepared to manage physiologically unstable patients with severe COVID-19 disease. The identified gaps and challenges will be highlighted in the recommendations and will hopefully influence policies that will improve their preparedness.

There will be no direct benefits like monetary gains or gifts. There are also no risks involved in participating in the study.

All information you provide in the study process will be kept confidential, and your privacy upheld. Your name will not appear anywhere in the questionnaire.

Your participation is entirely voluntary, and you may withdraw participation at any time.

In the event you want to contact the researcher or the supervisors for any reason or clarification, please do feel free to reach out to any of the following contacts:

1. Researcher: Alice Nyakaro Muneri - mobile number 0717792999; email anmuneri@gmail.com

2. Supervisor: Dr. Eunice Omondi – mobile number 0722728123; email eaomondi@uonbi.ac.ke
3. Supervisor: Dr. Samuel Kimani - mobile number 0722384917; email tkimani@uonbi.ac.ke
4. SECRETARY, KNH/UON-ERC contact 2726300; email uonknh_erc@uonbi.ac.ke , P.O. BOX 19676 – 00202 Nairobi

**Participants Statement:**

I have read the consent explanation and was given a chance to ask questions. I have understood, and I voluntarily agree to participate in the study.

Participant´s signature: …….. Date: …….

Researcher's signature: ……. Date: ……

**APPENDIX 2: Study Questionnaire**

TOPIC: ASSESSMENT OF NURSES' PREPAREDNESS IN MANAGEMENT OF PHYSIOLOGICALLY UNSTABLE PATIENTS WITH SEVERE COVID-19 AT THE ACCIDENT AND EMERGENCY DEPARTMENT, KENYATTA NATIONAL HOSPITAL, NAIROBI

Study Code: …….. Date: ……

Instructions

1. Do not indicate your name or any identification on the questionnaire
2. Kindly answer all questions
3. Answer the most appropriate answer by ticking in the boxes or filling in the spaces provided

SECTION A: SOCIAL DEMOGRAPHIC DATA You can create boxes for ticking the correct answers

1. What is your gender?

a) Male ☐

b) Female ☐

2. What is your age group (in years)?

a) 20-29 ☐

b) 30-39 ☐

c) 40-49 ☐

d) 50-59 ☐

e) >60 ☐

3. What is your highest level of education?

a) Diploma ☐

b) Higher Diploma ☐

c) Undergraduate Degree ☐

d) Postgraduate Degree ☐

4. What is your specialisation?

a) Accident and Emergency Nurse ☐

b) Critical Care Nurse ☐

c) None ☐

d) Other (specify)……

5. How long have you been in the nursing profession (in years)?

a) <1 ☐

b) 1-5 ☐

c) 6-10 ☐

d) 11-15 ☐

e) >15 ☐

SECTION B: KNOWLEDGE

6. Have you ever managed a physiologically unstable COVID-19 patient at the A & E department?

a) Yes ☐

b) No ☐

7. While at the triage station, which of the following patients would you suspect of having COVID -19?

a) History of a dry cough and fever ☐

b) Patient with chest pain and difficulty in breathing ☐

c) Patient with headache and loss of taste or smell ☐

d) All of the above ☐

e) None of the above ☐

8. Which of the following is not a sign of hypoxia that may occur in a COVID-19 patient?

a) Shortness of breath ☐

b) Confusion ☐

c) Fever ☐

d) Chest pain ☐

e) Cyanosis ☐

9. A patient comes to triage with signs of COVID-19. During history taking, the patient says he has a pre-existing medical condition. Which comorbidity might contribute to a poor prognosis of the patient?

a) Epilepsy ☐

b) Diabetes ☐

c) Peptic ulcers ☐

d) Depression ☐

10. Which of the following patients at the A & E will be a priority patient? A patient with:

a) Loss of taste and smell ☐

b) Shortness of breath with SPO2 of 80% ☐

c) History of cough with a respiratory rate of 14 breaths per minute ☐

d) Headache and fatigue ☐

11. What would be the appropriate management of a patient with difficulty breathing, inability to complete sentences, R.R. of 28 breaths per minute, saturating at 65% on room air?

a) Oxygen via nasal prongs at 2l/min ☐

b) Oxygen via face mask at 6l/min ☐

c) Oxygen via non-rebreather mask at 15l/min ☐

d) Endotracheal intubation with FIO2 of 100% ☐

12. A patient with difficulty in breathing, fever and unrecordable blood pressure comes to A & E department. Which of the following would be inappropriate management?

a) Propping up the patient's head of the bed to 30 degrees ☐

b) Fluid administration ☐

c) Discharge of the patient ☐

d) Reducing patient clothing ☐

13. Which of the following surgical mask is the best in the prevention of COVID-19 transmission?

a) Single-layer mask ☐

b) Double layer mask ☐

c) Triple-layer mask ☐

14. What PPE would you require during endotracheal intubation of a patient with severe COVID-19?

a) N95 mask ☐

b) Face shield ☐

c) Gloves ☐

d) Coverall ☐

e) All the above ☐

SECTION C: INSTITUTIONAL RESOURCES FOR COVID-19 MANAGEMENT

15. Are you aware of the availability of COVID-19 protocols at A & E KNH?

a) Yes ☐

b) No ☐

16. If yes, in number 15 above, where are the protocols found within the department?

a) In the nurse in-charge office ☐

b) Placed on public noticeboards within the department ☐

c) At the various units within the department ☐

d) I do not know where they are ☐

17. If yes, in number 15 above, have you read the protocols?

a) Yes ☐

b) No ☐

18. How is COVID-19 mainly diagnosed in A &E, KNH?

a) Symptomatic presentation ☐

b) PCR testing ☐

c) Antibody rapid tests ☐

d) Other (please specify) …….

19. What does the protocol say about the management of physiologically unstable COVID-19 patients (select all that apply)?

a) Manage patient in isolation ☐

b) Administer oxygen therapy as necessary ☐

c) Nurse in prone position if necessary ☐

d) Ensure adequate nutrition ☐

e) Monitor input and output ☐

f) Other (please specify) …….

20. What do the protocols stipulate regarding the prevention of the spread of COVID-19 in the unit? (select all that apply)

a) Isolation of suspects ☐

b) Social distancing between patients ☐

c) Ensuring patients and relatives wear a mask properly ☐

d) Proper PPE among staff ☐

e) Hand washing points ☐

f) Availability of sanitisers ☐

g) Others (please specify) …….

21. Does your institution (KNH) provide training related to COVID-19?

a) Yes ☐

b) No ☐

22. If yes to no. 21 above, what exactly have you been trained on?

a) Triaging and identification of suspected COVID-19 patients ☐

b) Management of physiologically unstable COVID-19 patients ☐

c) Isolation procedure of COVID-19 patients ☐

d) Proper use of PPE (donning and doffing) ☐

e) Other (please specify) ……

SECTION D: CHALLENGES EXPERIENCED BY NURSES

23. Have you experienced any challenges while managing physiologically unstable patients with severe COVID-19?

a) Yes ☐

b) No ☐

24. If yes to number 23 above, what challenges do you experience? (tick all that apply)

a) Uncertainty in the correct management ☐

b) Lack of adequate PPE ☐

c) Lack of necessary medications and supplies ☐

d) Lack of collaboration/ cooperation from colleagues ☐

e) Increased workload ☐

f) Fear of contracting the virus ☐

g) Fear of spreading the virus (especially to loved ones) ☐

h) Stigmatisation ☐

i) Others (please specify) ……..

25. Your facility has sufficient medical supplies and other consumables to facilitate the care and support of COVID-19 patients.

i. Strongly agree ☐

ii. Agree ☐

iii. Neutral ☐

iv. Disagree ☐

v. Strongly disagree ☐

26. Your facility has adequate PPE to protect the staff caring for and supporting COVID-19 patients.

i. Strongly agree ☐

ii. Agree ☐

iii. Neutral ☐

iv. Disagree ☐

v. Strongly disagree ☐

27. Have you experienced any of the following signs of burnout? (tick all that apply)

a) Fatigue ☐

b) Decreased motivation ☐

c) Reduced energy and efficiency ☐

d) Headache ☐

e) Insomnia ☐

f) Increased errors ☐

g) Irritability ☐

h) Anxiety ☐

i) None ☐

j) Other (please specify) …….

28. What mechanisms do you use to cope with those challenges while managing physiologically unstable patients with severe COVID-19? (select all that apply)

a) Professional help (including therapy) ☐

b) Debrief with colleagues ☐

c) Talking to loved ones/ friends ☐

d) Taking time off work ☐

e) Use of substances (drugs/alcohol) ☐

f) I do nothing ☐

g) Other (kindly state) ……..

29. I have adequate emotional and psychological support while caring for and supporting COVID-19 patients.

i. Strongly agree ☐

ii. Agree ☐

iii. Neutral ☐

iv. Disagree ☐

v. Strongly disagree ☐

30. Is there anything else you would like to tell us regarding your preparedness to manage physiologically unstable patients with severe COVID-19?

a) Yes ☐

b) No ☐

If yes, please state here

31. What is your general perception of how prepared you are to manage physiologically unstable COVID-19 patients?

a) Not prepared ☐

b) Somehow prepared ☐

c) Confidently prepared ☐

**APPENDIX 3: Permission to Collect Data**

Alice Nyakaro Muneri
University of Nairobi
Department of Nursing Sciences
P.O. BOX 19676 - 00202
Nairobi, Kenya
30th August 2021

To The Chief Executive Officer
Kenyatta National Hospital
P.O. BOX 20723 – 00202
Nairobi Kenya

Dear Sir,

RE: PERMISSION TO COLLECT DATA FOR RESEARCH

I am a second-year Masters student at the University of Nairobi School of Nursing Sciences pursuing a Master of Science in Critical Care Nursing. I am required to research in partial fulfilment of my degree. My research topic is an assessment of healthcare workers' preparedness in care and support of COVID-19 patients at the Accident and Emergency department and COVID-19 isolation units at Kenyatta National Hospital, Nairobi.

I kindly request your permission to perform this study at the aforementioned departments. Your support will be highly appreciated. Attached is a copy of my research proposal.

Thank you in advance.

Yours Sincerely,

Alice Nyakaro Muneri

**APPENDIX 4: Letter to KNH-UON Research Ethics Committee**

Alice Nyakaro Muneri
University of Nairobi
Department of Nursing Sciences
P.O. BOX 19676 - 00200
Nairobi, Kenya
30th August 2021

The Director
KNH-UON Ethics and Research Committee
P.O. BOX 20723 – 00202
Nairobi, Kenya

Dear Sir/ Madam,

RE: PERMISSION TO CONDUCT RESEARCH

I am a second-year masters student pursuing a Master of Science in Critical Care Nursing, and I would like to conduct research whose title is Assessment of health care workers preparedness in care and support of COVID-19 patients at the Accident and Emergency Department and COVID-19 isolation units at Kenyatta National Hospital, Nairobi.

I hereby present my research proposal for review and approval so that I can continue with the study. This research is undertaken in partial fulfilment of the requirement for the award of Master of Science degree in nursing. Please find attached a copy of my proposal. Thank you.

Yours sincerely,

Alice Nyakaro Muneri

## APPENDIX 5: KNH-UON ERC Letter of Approval

UNIVERSITY OF NAIROBI
FACULTY OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/387

25th October, 2021

Alice Nyakaro Muneri
Reg.No.H56/34446/2019
School of Nursing Sciences
Faculty of Health Sciences
University of Nairobi

Dear Alice

**RESEARCH PROPOSAL: ASSESSMENT OF NURSES' PREPAREDNESS IN MANAGEMENT OF PHYSIOLOGICALLY UNSTABLE PATIENTS WITH SEVERE COVID-19 DISEASE AT THE ACCIDENT AND EMERGENCY DEPARTMENT, KENYATTA NATIONAL HOSPITAL (P713/08/2021)**

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH-UoN ERC) has reviewed and approved your above research proposal. The approval period is 25th October 2021 – 24th October 2022.

This approval is subject to compliance with the following requirements:

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

This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website **http://www.erc.uonbi.ac.ke**

Yours sincerely,

**PROF. M.L CHINDIA**
**SECRETARY, KNH- UoN ERC**

c.c. The Dean-Faculty of Health Sciences, UoN
The Senior Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Chair, Dept. of Nursing Sciences, UoN
Supervisors: Dr. Eunice Akinyi Omondi, Dept. of Nursing Sciences, UoN
Dr. Samuel Thuo Kimani, Dept. of Nursing Sciences, UoN

**APPENDIX 6: KNH A & E Department Letter of Approval**

KNH/R&P/FORM/01

KENYATTA NATIONAL HOSPITAL
P.O. Box 20723-00202 Nairobi

Tel.: 2726300/2726450/2726565
Research & Programs: Ext. 44705
Fax: 2725272
Email: knhresearch@gmail.com

## Study Registration Certificate

1. Name of the Principal Investigator/Researcher
   ALICE NYAKARO MUNERI
2. Email address: anmuneri@gmail.com Tel No. 0717792999
3. Contact person (if different from PI) N/A
4. Email address: ..... Tel No. .....
5. Study Title
   Assessment of Nurses' Preparedness in management of physiologically unstable patients with severe covid-19 disease at the Accident and Emergency Department, Kenyatta National Hospital.
6. Department where the study will be conducted Accident and Emergency
   *(Please attach copy of Abstract)*
7. Endorsed by KNH Head of Department where study will be conducted.
   Name: DR. ROBAI Signature ..... Date 1/11/2021
8. KNH UoN Ethics Research Committee approved study number P713/08/2021
   *(Please attach copy of ERC approval)*
9. I Alice Nyakaro Muneri commit to submit a report of my study findings to the Department where the study will be conducted and to the Department of Medical Research.
   Signature ..... Date 29/10/2021
10. Study Registration number (Dept/Number/Year) A/190/2021
    (To be completed by Medical Research Department)
11. Research and Program Stamp

KENYATTA NATIONAL HOSPITAL 01 NOV 2021 Research & Programs Resource Centre

All studies conducted at Kenyatta National Hospital **must** be registered with the Department of Medical Research and investigators **must commit** to share results with the hospital.

Version 2: August, 2014

**APPENDIX 7: Google Map of KNH location**

**APPENDIX 8: Image of KNH A & E Department**

**APPENDIX 9: Plagiarism check**

NURSES' PREPAREDNESS IN MANAGEMENT OF PHYSIOLOGICALLY UNSTABLE PATIENTS WITH SERVERE COVID-19 DISEASE AT THE ACCIDENT AND EMERGENCY DEPARTMENT, KENYATTA NATIONAL HOSPITAL, NAIROBI

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DEPARTMENT OF NURSING SCIENCES
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24 NOV 2021
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P.O. Box 30197, NAIROBI

Dr Eunice Omondi
Supervisor
Department of Nursing
24/11/2021