

**CARE OF CRITICALLY ILL PATIENTS DURING INTER-
HOSPITAL TRANSPORTATION: A DESCRIPTIVE STUDY IN
DAR ES SALAAM, TANZANIA.**

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**MSc. Nursing (Critical Care and Trauma) Dissertation
Muhimbili University of Health and Allied Sciences.
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Muhimbili University of Health and Allied Sciences
Department of Nursing



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By

Tito William

**A dissertation submitted in (partial) Fulfillment of the Requirements for the
Degree of Masters of Nursing (Critical Care and Trauma) of**

**Muhimbili University of Health and Allied Sciences
October, 2017**

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled; “*Care of critically ill patients during inter-hospital transportation: A descriptive study in Dar es Salaam, Tanzania*”, in (partial) fulfillment for the requirement for Masters of Science in Nursing (Critical Care and Trauma) of Muhimbili University of Health and Allied Science.

Dr. Dickson Ally Mkoka PhD, RN
(Supervisor)

Date.

DECLARATION AND COPYRIGHT

I, **Tito William**, declare that this **dissertation** is my own work and that it has not submitted to any other university or academic institution for a similar purpose of academic award.

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Date_____

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DEDICATION

This dissertation is dedicated to my lovely wife Frida and beloved son William.

ABSTRACT

Background: Inter-hospital transfer (IHT) of critically ill patients (CIPs) may save lives, but it is a challenging process as it exposes them to various complications such as hypoxia, hypotension, bradycardia/tachycardia, arrhythmias, aspiration and cardiac arrest. However, little is known about care given when transporting such patients.

Aim: To assess and describe the care provided to CIP during transportation from peripheral public hospitals to the tertiary referral hospital, Muhimbili National Hospital (MNH) in Dar es Salaam, Tanzania.

Methodology: A cross-sectional descriptive design, employing a quantitative approach was used. The study recruited 130 escorting personnel transporting CIP to MNH via the Emergency Medicine Department (EMD).

Results: Majority of the 130 respondents were non-qualified personnel Enrolled Nurse 38.5% (50) and Health Attendants 32.3% (42), with only 8.5% who had received ambulance training. Knowledge about Basic Life Support (BLS) and Advanced Cardiovascular Life Support (ACLS) was low 45.4% (59) and 6.2% (8) respectively among the escorting personnel. There was a little monitoring of patient's oxygen status, respiratory rate, heart rate, and blood pressure during transportation, with no documentation provided. Among the critically ill patients, 17.7% required airway support, and 8.7% received it. Many (67) patients required oxygen; however 12 were escorted with oxygen. While 9/14 ambulances had a functional oxygen cylinder, only three had suction and one contained a portable monitor.

Challenges identified by the escorting personnel included; Lack of essential equipment, lack of consumables, insufficient ambulance training and transporting more than one patient in the ambulance.

Conclusion: CIP are escorted mostly by non-trained and non-qualified personnel, namely Enrolled Nurses and Health Attendants. Care/monitoring provided to such patients is suboptimal: Contributing factors include lack of a specialized transport team, lack of formal training, and minimal knowledge about BLS and ACLS. Moreover, this inadequate monitoring is also compounded by a lack of essential, required equipment and supplies in the ambulance. **Recommendations:** Improvement of patient safety and care during IHT requires a multi-faceted approach to educate escorting personnel and ensure fully equipped ambulances are available.

Key words: Inter-hospital transfer, escorting personnel, critically ill patient, care

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ABBREVIATIONS

ACLS	- Advance Cardiovascular Life Support
BLS	- Basic Life Support
CCU	- Coronary Care Unit
CIP	- Critically ill Patient(s)
EMD	- Emergency Medicine Department
ICU	- Intensive Care Unit
IHT	- Inter-Hospital Transport/Transfer
MICU	- Mobile Intensive Care Unit
MNH	- Muhimbili National Hospital

CHAPTER ONE

INTRODUCTION

Background

Critically ill patients are those patients with life-threatening injuries or illnesses with surgical and nonsurgical pathologies that are associated with reduced or exhausted physiological reserves that require continuous monitoring. The burden of critical illness is very high in developing countries including Tanzania, due to the increased number of severe infections such as pneumonia, diarrhea, HIV and malaria, together with increased number of traffic crashes and surgical emergencies (Baker, 2009). These critical illnesses cut across all age group, the majority being children and young adults who have a high chance of recovery. A critically ill patient requires critical care. In Tanzania, the majority of district hospitals and some of the regional hospitals do not have intensive care facilities, emergency care centers and trauma centers. Also, they lack advanced diagnostic investigations such as computed tomography (CT) scan, magnetic resonance imaging (MRI), electrocardiogram (ECG) and echocardiogram machines. Furthermore, these hospitals lack specialized services that provide expertise in areas such as cardiac, burn injury, pediatric, orthopedic and obstetric care. Muhimbili National Hospital (MNH) is the tertiary government referral hospital located in the Dar es Salaam region, having several specialized experts and advanced medical equipment that is required for critically ill patients. As a result, most of the critically ill patients from across the country are transferred to this hospital.

Transportation of critically ill patients

Critically ill patients can come from pre-hospital settings directly to an emergency department, or from one hospital facility to another hospital, or they may need to be moved from one area (department) to another area within the hospital setting (Stefano, Alberto, Diego, & Elisa, 2015). These critically ill patients are transported within areas of the hospital or across the city from one facility to another due to a number of reasons, including seeking advanced diagnostic procedures, therapeutic interventions, and for the need of a more appropriate level of care. Additionally, these patients can be transported to and from operating rooms and emergency departments to the ICU for more advanced specialized care, treatment and monitoring (Blakeman & Branson, 2013; Markakis et al., 2006; Stefano et al., 2015; Wong & Levy, 2005).

Another reason for the rise in the number of inter-hospital patient transfers is the increased demand for super-specialty treatment and specialized care for trauma, burns, cardiac or neurology patients. This leads inter-hospital transfers of patients to be an integral process and essential component of the health-care system (Sethi & Subramanian, 2014).

Transportation of critically ill patients exposes them to additional risks and requires the services of highly trained and skilled practitioners with essential equipment (Limprayoon, Sonjaipanich, & Susiva, 2005; Sethi & Subramanian, 2014). In order to have safe transportation of critically ill patients, accurate assessment and stabilization is required before transport, and there should be appropriate planning of transportation and a clear channel of communication between referring, transporting and receiving staff, at a senior level. Apart from the vehicle operator, the transporting team should have a minimum of two medical personnel and must be familiar with their transport equipment, particularly power and oxygen supply limitations. This team needs to have adequate clinical understanding of the patient's medical condition and potential transport complications. The team must also be aware of the treatment options available to them prior to and during transportation of the patient. The majority of the guidelines regarding inter-hospital transportation of critically ill patients have stressed pre-transport coordination and communication, qualified and trained accompanying personnel, appropriate transport equipment, standard monitoring and documentation as key elements of a safe transfer of critically ill patients (Sethi & Subramanian, 2014).

Types of transportation of critically ill patients

Transport of critically ill patients may be required in three sets of circumstances or categories, namely, pre-hospital (primary) transport, intra-hospital transport, and inter-hospital (secondary) transport. Pre-hospital transport refers to transport of a critically ill patient from the scene of trauma or illness to their first hospital contact (emergency department) (A. Gray, Bush, & Whiteley, 2004). Intra-hospital transport refers to transportation of critically ill patients from one area of a hospital to another area within the hospital (Stefano et al., 2015). Whereas an inter-hospital transfer (also known as inter-facility or secondary transfer) is the transfer of a patient from the Emergency Department, or ward or Intensive Care Unit of one hospital to that of another, on the advice of clinical staff (A. Gray, Bush, S., Whiteley, S., 2004).

In Tanzania, all three mentioned types of transportation are employed, with intra-hospital and inter-hospital transportation being the most frequently used when compared to pre-hospital transportation. Muhimbili Hospital is the National hospital and is the last referral government hospital whereby all other public and private hospitals in the country are referring their patients, based on the agreed referral system. All referred patients to Muhimbili National Hospital must pass through the emergency department for their initial assessment and treatment before they are admitted to their respective ward or unit for definitive management.

Modes of transportation of critically ill patients

There are basically two modes of transfer in common use, which are ground and air transport. Most critically ill patients are transported either via ground or air ambulance (Walcott, Coumans, Mian, Nahed, & Kahle, 2011). For the ground transportation mode, there are various types of ambulances and these are categorized as providing basic life support and advanced life support. They are appropriately equipped and staffed for transporting patients with non-life-threatening and life-threatening medical or traumatic emergencies respectively. The most advanced care can be provided by Mobile Intensive Care Units (MICUs) which are operated by specialist retrieval teams. The purpose of a MICU is to make it possible to safely transport unstable patients with severe respiratory and cardiovascular failure, over long distances. Another type of ambulance is the patient transport ambulance, which is used to transport stable patients for scheduled visits to hospital or clinics for treatment, physical examination or diagnostic investigations or for transfer from one hospital to another and they can be either buses, vans or other vehicles (Sethi & Subramanian, 2014).

Recently there has been an increase in the use of air medical transport across the world due to its advantages such as reduced transport time and increased care provided by specialized air medical crews. For some patients, such as those with ST-segment elevation myocardial infarction, ischemic stroke and traumatic injuries, where prognosis depends on urgent access to timely medical intervention, availability of air transport is of critical importance (Sethi & Subramanian, 2014). In Tanzania, ground transportation with the use of an ambulance is the most common mode of transport for critically ill patients. Due to long travelling times caused by traffic jam and rough road, this method delays definitive care and leads to poor patient outcomes.

Care during transportation

Inter-hospital transfers may save lives, but it is challenging and risky as it is associated with a risk of physiological deterioration and adverse events. Therefore, understanding various types of possible adverse events and their risk factors are important for improving the safety of inter-hospital transfers (Absalom, Zijlstra, Ligtenberg, Smit, & ogh, 2015; Sethi & Subramanian, 2014). Critically ill patients should have the minimum standard of continuous monitoring of pulse oximetry, electrocardiography, non-invasive blood pressure and respiratory rate during transportation. Additional monitoring such as capnography, invasive monitoring for arterial, central venous and intracranial pressure may be required based on patient's clinical status (Warren et al., 2004). Advanced airway management, arrhythmia identification and treatment together with intravenous therapy should be provided, and the escorting team should have basic and advanced life support skills (Sethi & Subramanian, 2014; Warren et al., 2004). While this is the case in the ideal transportation of a critically patient, in the Tanzanian context very little is known about the level of care given to such patients while they are being transferred from lower level health care facilities to higher level and more specialized hospitals. Furthermore, limited studies have been found describing the care of critically patients during inter-hospital transportation. Such studies are important to identify gaps that need to be considered in the ongoing strategic plan to improve the quality of critical care given to patients in the country during transportation.

Problem statement

Inter hospital transfers of critically ill patients have remained a challenging part in the continuation of quality care to such patients (Absalom et al., 2015). It is a risky process that subjects' patients to various complications such as hypoxia, hypotension, convulsions, bradycardia, tachycardia, arrhythmias, cardiac arrest, aspiration, accidental extubation, bronchospasm, pneumothorax, agitation, and intracranial hypertension (Absalom et al., 2015; Crandon, Harding, Williams, & Cawich, 2008; Sethi & Subramanian, 2014). Currently, many studies have shown that health care delivery systems depend on inter-hospital transfers of patients who need a higher level of care and advanced diagnostic procedures (Swickard, Swickard, Reimer, Lindell, & Winkelman, 2014).

Due to this reason, most of the health care systems in developed countries have formulated guidelines to govern/conduct the safe inter-hospital transport of critically ill patients that synchronize with the health care system of their countries (Crandon et al., 2008; Sethi & Subramanian, 2014). The majority of these guidelines emphasize pre-transport coordination and communication, qualified and trained accompanying personnel, appropriate transport equipment, standard monitoring and documentation as the key elements of a safe transfer of a critically ill patient (Sethi & Subramanian, 2014). However, such components are not in place in many developing countries, including Tanzania.

Despite the fact that most of the critically ill patients are being transferred from a low level care hospital such as district hospitals, to a high level (tertiary) hospital such as Muhimbili for specialized critical care and advanced interventions, little is known on the standard of care given when transporting such patients. Furthermore, there are no clear guidelines that state the transfer process of critically ill patients in the country and there is no formal training or education program for health care providers to qualify to be ambulance personnel. These factors may all contribute to patient receiving suboptimal inter-hospital care which is unsatisfactory. Therefore, the aim of this study is to describe the extent of care offered during inter-hospital transfers of critically ill patients to the Emergency Medicine Department at MNH, and to make recommendations for improvement of the transfer process, if required.

Significance of the Study

The study was anticipated to describe the current practice in caring for critically ill patients during their transfer and uncover the areas that need improvement. The findings and information obtained are expected to be used in strengthening the safe transport of these patients from lower resourced health care facilities to higher resourced health care facilities. This will ensure vulnerable group of patients receive the quality care they require. Also, the findings are expected to serve as baseline data describing care during inter- hospital transfers, and give clues about the process and structure of transportation systems of critically ill patients.

The obtained findings could be helpful in highlighting areas that will need to be explored more, and will give the policy/decision makers information to aid in the formulation of protocols and guidelines for critically ill patient transfer.

In addition, the findings obtained are expected to provide an insight into the needs of various hospital organizations to formulate their ambulance crews, guidelines and equipment checklists for the safe transfer of critically ill patients.

Furthermore, the study was expected to identify the proportion of escorting health personnel with knowledge about the care of critically ill patients during inter-hospital transfers in Tanzania.

Finally, the study was expected to identify challenges that escorting personnel encounter when transporting critically ill patients.

Objectives

The general objective in this study was to assess and describe the care of critically ill patients during transportation from peripheral hospitals to the tertiary referral hospital (MNH) in Dar es Salaam region, Tanzania.

The specific objectives were the following:

1. To determine the proportion of escorting personnel with knowledge about how to care for critically ill patients during inter-hospital transfers in Dar Es Salaam.
2. To determine the type of care given to critically ill patients during transportation in Dar Es Salaam.
3. To identify the challenges health care providers face, that affects the provision of care when transporting critically ill patients in Dar es Salaam.

Hypotheses of the study

The hypothesis of this study was that the inter-hospital transfer process of critically ill patients is inadequate and unsatisfactory; hence the care offered is suboptimal.

Conceptual model

This study was guided by a modified conceptual model describing selected components for the safe and smooth transfer of critically ill patients (Sethi & Subramanian, 2014). These components are the key elements in this model that indicate how a safe and smooth transfer of critically ill patients could be achieved. The elements in this model are: pre-transport coordination and communication; accompanying personnel; transport equipment; monitoring of patient/care; and documentation. This model describes the safe and smooth inter-hospital transportation of critically ill patients as the dependent variable, which relies on several independent variables.

Without well trained and skilled escorting personnel, patient's safety during transportation will be compromised as there may be no proper respiratory and hemodynamic monitoring (care) of patients which may result into more adverse events. However, in order to achieve safe patient transport, the escorting personnel must have all necessary equipment for en-route monitoring of the patient, and must be aware of its limitations. And there must be proper documentation of the patient's parameters before and during transfer, together with medical management given whilst in transit.

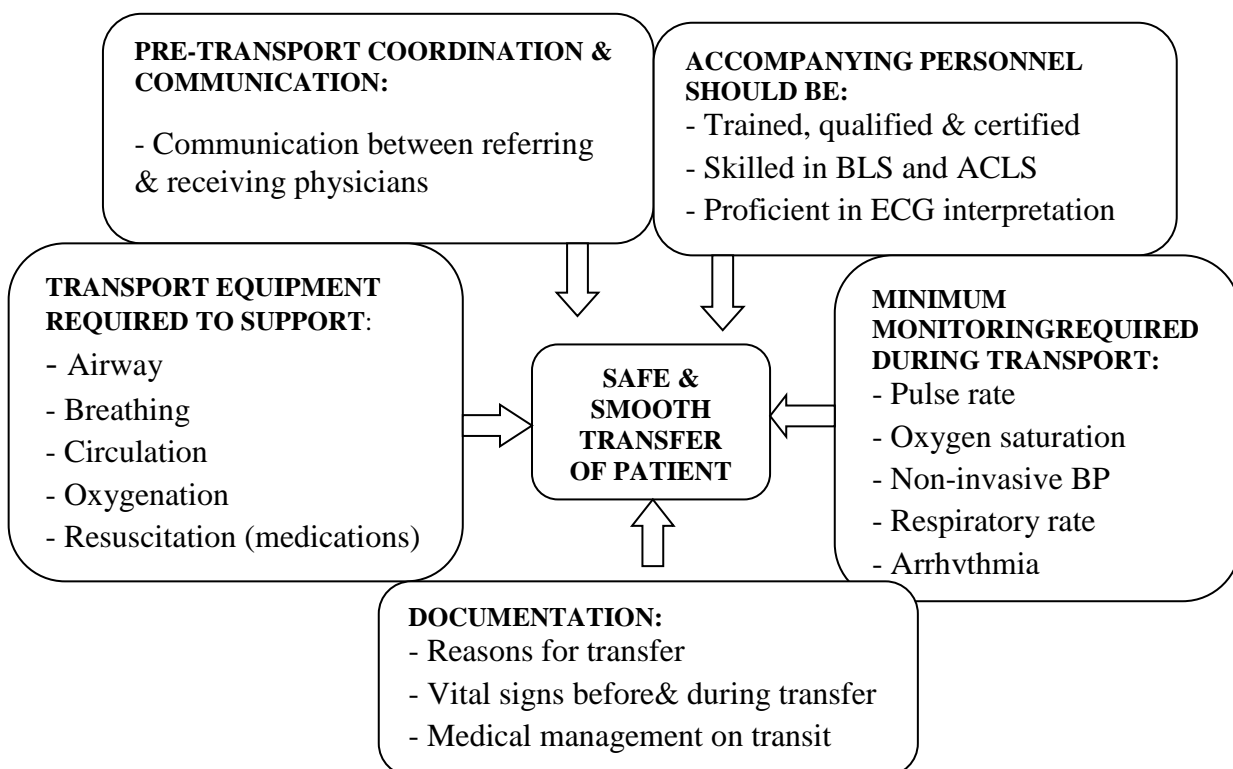


Figure 1: Modified Conceptual model describing selected component for the safe and smooth transfer of critically ill patient (Sethi & Subramanian, 2014).

CHAPTER TWO

LITERATURE REVIEW

Critical illness

Critically ill patients have life-threatening illnesses or injuries. Such patients may be unstable, have complex needs, and require intensive and vigilant medical and nursing care. Several conditions can lead to critical illness including: gunshot wounds; traumatic injuries; cardiovascular disorders; respiratory disorders; gastro-intestinal and hepatic disorders; renal disorders; cancers; and various types of shock (Cutler, 2010). The burden of critical illness is increasing in developing countries including Tanzania, and caring for critically ill patients requires a well-organized system of triage, emergency management and intensive care (Baker, 2009). Due to limited resources in low income countries, intensive care is challenging (Towey & Ojara, 2007), and many critically ill patients are cared for in regular wards because most of the district hospitals lack major intensive care units, which are only found in most of the tertiary hospitals (Dünser, Baelani, & Ganbold, 2006). Hence, the transfer of critically ill patients to tertiary referral hospitals is aimed to improve patient outcomes, though circulatory or ventilator complications may arise in the ambulance during transportation. Monitoring capacities are also limited due to fewer and less skilled personnel available compared with the ICU environment (Zijlstra et al., 2005). Therefore adverse events may arise during transportation. Adverse events are defined as life threatening conditions that require urgent therapeutic intervention (Fanara, Manzon, Barbot, Desmettre, & Capellier, 2010; Stefano et al., 2015). Critically ill patients are more prone to these adverse events due to progression of underlying diseases, the physical stress of transport, or care delivered before or during transport (Senften & Engstrom, 2015; Singh, MacDonald, Bronskill, & Schull, 2009). And have a maximum rate of 34% during inter-hospital transfer (Stefano et al., 2015). These adverse events may include cardiovascular events such as severe hypotension or hypertension, bradycardia, tachycardia, arrhythmia and cardiac arrest. Respiratory events can either be hypoxia, aspiration, accidental extubation, bronchospasm, pneumothorax, or patient ventilator dyssynchrony. Neurological events can either be agitation or intracranial hypertension.

Equipment malfunction or technical incidents such as electrical or power failure, uncharged batteries, gas supply problems, oxygen or IV line disconnection, monitoring equipment malfunction, missing or damaged equipment, and vehicle breakdown may also be a source of these adverse events. Adverse events that can be caused by human includes drug errors, inadequate monitoring, inability to use equipment and patient mix up (Absalom et al., 2015; Limprayoon et al., 2005; Sethi & Subramanian, 2014).

Inter hospital transfer of critically ill patients

Inter-hospital transfer of critically ill patients, either children or adults is common, whether the purpose is to receive specialized treatment or diagnostic procedures, but the benefits of transport must be weighed against the risks (Blakeman & Branson, 2013; Fan et al., 2006). The transfer process of these patients is complex, made up of several phases and involves healthcare professionals mainly being doctors and nurses, and requires careful planning for the prevention of potential complications undermining the patients' safety outside the critical care environment (Stefano et al., 2015). Inter-hospital patient transfer is hazardous process that exposes patients to numerous complications such as hypoxia, hypotension, hypercarbia, convulsions, extension of intracranial hematoma and neurological deterioration (Crandon et al., 2008). Therefore, the transport itself must be as safe as possible and should not pose additional risks to the patient (Zijlstra et al., 2005).

Severely ill patients can be safely transported if an early transfer is made, resuscitation is done before transfer, continuous medical care involving appropriate hemodynamic stabilization and monitoring is offered during the journey, and a slower and smoother transport of the patients is undertaken by a specialized transport team (Absalom et al., 2015). A lot of guidelines and check lists on inter-hospital and intra-hospital transfers of critically ill patients have been made by various scientific associations, and these guidelines are the tools used to prevent complications and adverse events during transportation of the patients (Stefano et al., 2015).

Pre-transport coordination & communication:

Current medical practice regulations demand a competent patient, guardian or legally authorized representative of an incompetent patient to give informed consent after a detailed discussion of the risks and benefits of transfer (Sethi & Subramanian, 2014; Warren et al., 2004).

These discussions need to be documented in the medical record before the transfer occurs. Signed consent should be obtained and in a situation when that is not possible, both the indications for transfer and the reason for not attaining consent should be documented in the patient's medical record. It's important to remember that this process should occur simultaneously with stabilization and treatment of patient, when needed, before transfer (Warren et al., 2004). The referring physician is required to identify a destination hospital and contact an admitting physician at the receiving hospital to accept the patient in transfer and confirm that appropriate higher-level resources are available before the transfer occurs. A full description of the patient's condition needs to be given to the receiving physician and advice concerning treatment and stabilization can be made before transport (Sethi & Subramanian, 2014; Warren et al., 2004). Also, a nurse to nurse report between the two facilities should be made, but it can be given by a transport team on arrival at the destination hospital, and a copy of medical records including all relevant labs and radiographic studies should accompany the patient (Warren et al., 2004). In a study of patient transfer practices by hospitals in western Kenya, Kuremu and his colleague found that among 97 patients referred to Moi teaching and referral hospital, had prior notification of the patient transfer (Kuremu, Tenge, Wakuloba, & Wambati, 2008).

Accompanying personnel:

The inter-hospital transport of patients requires a team of highly skilled members. The team can be a combination of doctors, nurses, respiratory therapists and paramedics, with each being skilled in advanced airway management and advanced cardiac life support (Blakeman & Branson, 2013; Karlsen, Trautman, Price-Douglas, & Smith, 2011). Most of the guidelines recommend a minimum of two health care personnel, not including the vehicle operator, to escort a critically ill patient during an inter-hospital transport. They should be appropriately trained, qualified and certified before taking the responsibility of patient care during transport (Absalom et al., 2015; Andrews, Catlin, Lamb, & Christensen, 2008; Sethi & Subramanian, 2014). Certification courses required for transporting team include neonatal resuscitation program, basic life support, pediatric advanced life support, and advanced cardiovascular life support (Karlsen et al., 2011). Training of the escorting personnel is a significant determinant of the quality of care offered during the transfer, however studies shows that there is a lack of formal training in transfer medicine (Absalom et al., 2015).

For unstable patients, the transport team leader should be a physician or nurse, preferably with additional training in transport medicine. For critical but stable patients, the team leader may be a paramedic. The escorting personnel should be able to provide the essential skills of advanced airway management, intravenous therapy, dysrhythmia interpretation and treatment, and basic and advanced cardiac life support (Sethi & Subramanian, 2014; Warren et al., 2004). Orr and his colleagues found that inter-facility transport performed by a specialized pediatric critical care team, when compared with non-specialized teams, was associated with improved survival rates and fewer unplanned events during transport, regardless of the severity of the illness. Children transported by non-specialized teams had more than 2 times greater odds of death than did those transported by a specialized team. The rate of occurrence of more than 1 unplanned event during transport was 38 times higher for patients transported by a non-specialized team, compared with a specialized team (61.0% vs. 1.6%). These odds were more than 200 times greater than those for a specialized team, with adjustment for illness severity and other transport covariates (Orr et al., 2009). Crandon his colleagues found that 11.5% of trauma patients were accompanied by physicians, 82% by nurses as the senior medical personnel and 6.5% by non-medical personnel only (Crandon et al., 2008). While Kuremu and his colleagues found 60% of patients were accompanied by an appropriate nurse (Kuremu et al., 2008). Therefore, in order to minimize the risk, the individual facilities have the responsibility of monitoring and giving specialized training to their transport teams.

Transport equipment:

The recommended minimum equipment and medication transporting ambulances should have available for safe inter-hospital transport of critically ill patients includes all equipment needed for airway management, oxygenation, hemodynamic monitoring and all drugs for emergency resuscitation and stabilization. Also, all items should be checked regularly for expiration of sterility and/or potency, especially when transports are not frequent (Dunn, Gwinnutt, & Gray, 2007; Sethi & Subramanian, 2014; Warren et al., 2004). Equipment function should be verified on a scheduled basis, and not at the time of transport when there may be insufficient time to find replacements (Warren et al., 2004). In their study of inter-hospital transport of trauma patients in a developing country, Crandon and his colleagues found that most patients, 91.8% (112/122) were transported by public hospital ambulances and 0.8% (1/122) by private ambulance.

Machines to measure a patient's blood pressure and pulse rate were found in 99.1% (112/113) of ambulances, and an automated monitoring device that measured blood pressure, heart rate, and pulse oximetry was present in the one ambulance that was privately operated. Functional devices for suction were only present in 50% of all the ambulances (Crandon et al., 2008).

Monitoring/Care during transportation:

Patient monitoring during transportation is an important safety issue. Having the monitoring capabilities of the ICU as well as an array of equipment and supplies available in the ambulance enhances patient safety and avoids adverse events during inter-hospital transfers. One possible reason for the greater number of adverse events with the non-specialized escorting personnel group is that they tend to focus on getting the patient to definitive care quickly, rather than focusing on stabilization before and during transport (Blakeman & Branson, 2013). Bringing the ICU to the patient, including the appropriate level of care is the first step in decreasing the amount of complications during transportation. Therefore, utilizing specialized transport teams that focus on patient stabilization appears to be the most effective way to avoid potentially life-threatening events during transportation (Blakeman & Branson, 2013).

The minimum care of critically ill patients during transportation includes continuous monitoring of electrocardiography, pulse oximetry, blood pressure, heart rate, and breathing frequency. Depending on the patient's condition, monitoring of intracranial pressure, continuous arterial pressure, or capnography may also be beneficial to the patient's outcome. For those patients who are mechanically ventilated, the endotracheal tube must be properly secured, its position noted prior to transport and monitored until care is transferred at the receiving hospital (Blakeman & Branson, 2013). Therefore, continuation of high quality care is the major goal during transportation so as to prevent deterioration or incidents (Absalom et al., 2015).

Larsson his colleagues in their study of Swedish ambulance nurses experiences when transferring patients suffering from a cardiac arrest concluded that "ambulance nurses need regular training and education to be prepared for saving people's lives and also to be able to make the right decisions" (Larsson et al., 2013).

According to Crandon et al, among the transferred trauma patients 99.2% had intravenous access with infusions in progress, and urethral catheters were present in 43 patients.

Less than half (38/122, 31.1%) of transferred patients had cervical immobilization. Twenty-seven of 49 patients (55.1%) with a history of a road traffic accident had no cervical immobilization (Crandon et al., 2008). Only 24% (23/97) of en-route monitoring was found in Kuremu's study, and 50 patients needed respiratory support. Out these, seven (14%) were provided with airway management, while oxygen was only available for 16 (32%) patients during transfer. Intravenous fluids were required in 89 (94%) of the patients, and only 30 (34%) received it. Venous access though needed in all transferred patients was available in only 72%. 56 (59%) of the patients required urethral catheter but only thirteen (23%) of them had it placed (Kuremu et al., 2008).

Electrocardiogram (ECG) monitoring is one of the methods used for examination and diagnostic purposes in today's emergency medical services, which ultimately is of benefit to the patient's life and health. Ambulance nurses need to have knowledge and skills about ECG interpretation, so they are able to identify any fatal rhythms like ventricular fibrillation, ventricular tachycardia and acute myocardial infarction. In the study of ECG interpretation skills by ambulance nurses, Werner and his colleagues found that ambulance nurses had deficiencies in their ECG interpretation skills. This also applied to conditions where the ambulance crew had great potential to improve the outcome of the patient's health, such as during a myocardial infarction and cardiac arrest (Werner, Kander, & Axelsson, 2016). This implies that more education and training in ECG interpretation is needed among ambulance nurses.

Documentation:

The documents accompanying the patient should have information explaining the reason for transfer, including the referring physician's name, designation, contact details, as well as the date and time at which the decision to transfer was made. The personnel accompanying the patient during transport should ensure this is completed by the referring physician. The patient's clinical status and vital parameters before and during the transfer should be documented, together with any medical management that the patient received during the transport. A copy of the patient's medical records and results of investigations should be given to the receiving hospital (Sethi & Subramanian, 2014).

According to Kuremu and his colleagues documentation was provided in 82 (85%) of the patients out of 97 (Kuremu et al., 2008).

It is vital that the receiving hospital has all this documentation so they can optimize the care delivered to the patient and they do not waste any time initiating further care.

CHAPTER THREE

METHODOLOGY

Design

The study was cross-sectional descriptive design, employing a quantitative approach as the information was collected and described individually once at a time. This method was selected to allow accurate collection of information that was required for this research project. The study focused on determining and describing care of critically ill patients during inter-hospital transfer and a descriptive quantitative approach was suitable to describe the extent of care offered to these patients during the transfer.

Setting

The study was conducted at the Emergency Medicine Department of Muhimbili National Hospital located within Dar es Salaam region of Tanzania. The selection of the site was based on the fact that MNH is the national referral hospital and it has a well-organized emergency department, so they receive all critically ill patients from different hospitals within and outside the region. Most of the referred patients are very sick and are at the critical stage of their disease process.

Population

The study population for this study was all escorting personnel accompanying critically ill patients referred to MNH via the Emergency Medicine Department. All escorting personnel who came in an ambulance from other public hospitals within Dar es Salaam were included. However, for escorting personnel to qualify as providing care to a critically ill patient, the escorted patient ended up receiving care in the resuscitation rooms after arrival at EMD. All escorting personnel came between 07:00 am to 07:00 pm.

Sample size

The study done in western Kenya by Kuremu on patient transfer practices by hospitals indicated that 14% of the transferred patients who required respiratory support had airway support in transit. Therefore, the same proportion was used to calculate the sample size from the following formula as proposed by Xu (1999).

$$n = \frac{z^2 p (100 - p)}{\varepsilon^2}$$

Whereby; n - Is the minimum required sample size
 z- Is the percentage point of normal distribution corresponding to the level of confidence 1.96
 ε - Is the maximum margin of error (5%)
 p - Is the expected proportion with the characteristic of interest (14%)

Then by substituting the values, the sample size will be

$$n = [1.96^2 \times 14 \times (100 - 14)] / (5^2)$$

$$n = 185$$

Sampling procedure

In this study participants were selected purposively with a no-probability purposive sampling technique. Participants were selected based on characteristics of a population and the objective of the study, which was to describe care of critically ill patients in transit. All escorting personnel escorting critically ill patients from public hospitals within Dar es Salaam to the Emergency Medicine Department with an ambulance and their patients required care in resuscitations rooms were selected. The selected participants were asked for their participation in the study and signed a consent form if they agreed. The patient was then observed by the researcher to determine care given in transit and to check if there was any documentation of such care. The ambulances were also checked to ensure they had the appropriate and required equipment and materials.

Inclusion Criteria

All escorting personnel transporting critically ill patients, either medical, surgical or trauma by ambulance to MNH via emergency medicine department from any public hospital within the Dar Es Salaam region were included in the study.

Exclusion Criteria

Escorting personnel transporting critically ill patients from non-public hospitals, home or the site of injury or illness were excluded from the study.

Data collection

The data collection took place in April and May 2017. Permission for data collection was granted from MNH's Executive Director, and the Head of the Emergency Medicine Department, together with the nurse supervisor's, who were consulted and the purpose of the study was explained to them. Escorting personnel, after handing over the patient/patients to the responsible nurse, were approached face to face and oral information about the study was given. Upon agreement to participate the participants were given a written consent to sign before filling in the questionnaire. At the same time, the ambulance that brought the patient/patients was checked for the presence of essential, required equipment.

Data **were** collected using structured questionnaire (see appendix I), and an observation tool for the interventions done and a checklist of required essential equipment and materials were also used (see appendix II). The questionnaires were in both English and Swahili while the observation tool and checklist were in English. Both tools were developed by the researcher himself using literatures read by the researcher.

For each patient transfer, only one escorting personnel member was interviewed, if there was more than one escorting personnel accompanying the patient. Also, the referral form or documents accompanying the patient were observed to collect data on documentation of care/monitoring provided during the transportation.

Validity

Content and face validity of the tools used in this study were assessed by two experts who were experienced nurses with critical care specialty. They checked if tools had content that covered objectives, literature and whether questions **were** clear. Any modification of the tool or questions was done afterward. Content validity is concerned the degree to which an instrument has an appropriate sample of items for the construct being measured and is based on expert judgment (Polit & Beck, 2003).

Reliability

Reliability of the tool is the consistency with which it measures the targeted attribute (Polit & Beck, 2003). Internal consistency was used to measure reliability of seven items of the knowledge related to patient's care and patient monitoring in the questionnaire. Cronbach's alpha (α) of 0.673 was obtained; this value reflects a higher internal consistency of the tool.

To establish if participants in this study would be able to understand the instructions, the items and respond correctly, the first 10 subjects were used to as a pilot sample. There were no major difficulties in responding to the questionnaire, especially because the researcher clarified and concern from participants related to questions and the instructions was descriptive. Approximate time to fill the questionnaire was between 15 to 20 minutes.

Structured questionnaires

The questionnaire consisted of four parts. The first part was used to collect information pertaining to the participant's demographic status such as age, profession/qualifications, and the current hospital where the participant was working. The second part consisted of questions about the escorting personnel's experience in transferring patients and training received or attended that related to the care of critically ill patients during inter-hospital transfer. The third part of the questionnaire was used to collect information that related to the care or monitoring delivered by escorting personnel to the patient in the ambulance when in transit to MNH. The last part of the questionnaire asked participants to give their opinions on the challenges they frequently encounter that affect provision of care when transporting critically ill patients to MNH.

Checklist

The check list was divided into two parts. The first part was used to collect data on essential and required equipment and resources available in the ambulance which was categorized into five categories namely: airway support equipment; breathing support equipment; circulatory support equipment; resuscitation drugs; and other supporting equipment. The second part consisted of an observation tool for the evidence of interventions and care provided to the patient during the transfer, together with the evidence of documentation of the care offered to the patient.

Data analysis

In this study, descriptive statistics were used to analyze the data obtained from both the questionnaire and checklist using percentages, frequencies and graphs. Data were coded and entered into a computer program called Statistical Package for the Social Sciences (SPSS) version 23.0 to answer research objectives. 95% confidence interval set at a P-value less than 0.05 was calculated to show statistical significance of the data and presented in tables and bar charts.

Identified challenges were analyzed in frequencies and percentages in relation to the following categories: equipment; knowledge; and monitoring challenges.

Ethical considerations

Ethical clearance to conduct this study was obtained from the MUHAS Institutional Review Board (IRB) (see appendix III). Permission to conduct study at the study site was granted from Muhimbili National Hospital administration (see appendix IV). Informed consent, which explained the purpose & procedure of the study, was obtained from participants by signing a consent form (see appendix V). To ensure voluntary participation participants were informed on their right to withdraw from the study at any time.

Privacy and confidentiality was achieved by identifying participants through coded numbers during data collection to ensure anonymity. All collected data during the study was kept in the researcher's locked cabinet, in locked office.

Submission and dissemination of the findings

The research findings from this study provide useful information on the current practice of caring for critically ill patients during inter-hospital transfers, and recommend changes that will strengthen the safe transport of these patients from lower resourced health care facilities to the higher resourced health care facilities. This will have an impact on improving the patient's safety and the quality of care they receive, as well as influencing quality nursing practice when transporting patients. Therefore, copies of the results of this research will be disseminated to the School of nursing- MUHAS where it will be submitted for the award of Masters Degree in Critical Care and Trauma Nursing, the Muhimbili National Hospital, and the Ministry of health, Community Development, Gender, Elderly and Children. For the sake of spreading knowledge the results will be published in academic and professional journals, as well as professional conferences inside and outside Tanzania.

CHAPTER FOUR

RESULTS

This chapter includes a description of results, starting with an analysis of participants' demographic data, followed **by** analysis of data regarding the proportion of escorting personnel with knowledge on care and the types of care given to critically ill patients during inter-hospital transfers. The final part to be presented is the analysis of the perceived challenges affecting the provision of care when transporting critically ill patients.

General demographic data

A total of 130 participants completed the questionnaires. In order to analyse the data, participants were categorized into the following categories: age group; profession or qualifications; working department/units; working experience at the current department; and escorting experience of critically ill patients.

Among all participants, the majority were Enrolled Nurses (those with a certificate in nursing/midwifery who function at the operational level under the supervision of a registered nurse/midwife) 38.5% (50/130) and Health Attendants (these are not nurses but have basic training non-related to care) 32.3% (42/130). Registered Nurses (nurses trained at diploma level and above) were 26.9% (35/130) and 2.3% were student doing diploma in nursing. Most of the escorting personnel 44.6% (58/130) were working in a medical or surgical department in the referring hospitals. About thirty six per cent (47/130) of the participants had been involved in escorting critically ill patient to Muhimbili National Hospital for more than 4 years (See Table 1). Fifty percent of all participants in this study were found to be in the age group between 20 and 29 years (figure 2).

Table 1: Demographic characteristic of study participants (n 130)

Characteristics	Frequency (n)	Percentage (%)
Qualification/Professional:		
1. Enrolled Nurse	50	38.5
2. Health Attendant	42	32.3
3. Registered Nurse	35	26.9
4. Student Nurse	3	2.3
Working unit:		
1. Med/Surgical ward	58	44.6
2. Outpatient department	36	27.7
3. Emergency unit	20	15.4
4. ICU	6	4.6
5. Others	10	7.7
Escorting experience:		
1. < 1 year	33	25.4
2. (1-3) years	41	31.5
3. > 4 years	47	36.2
4. No experience	9	6.9

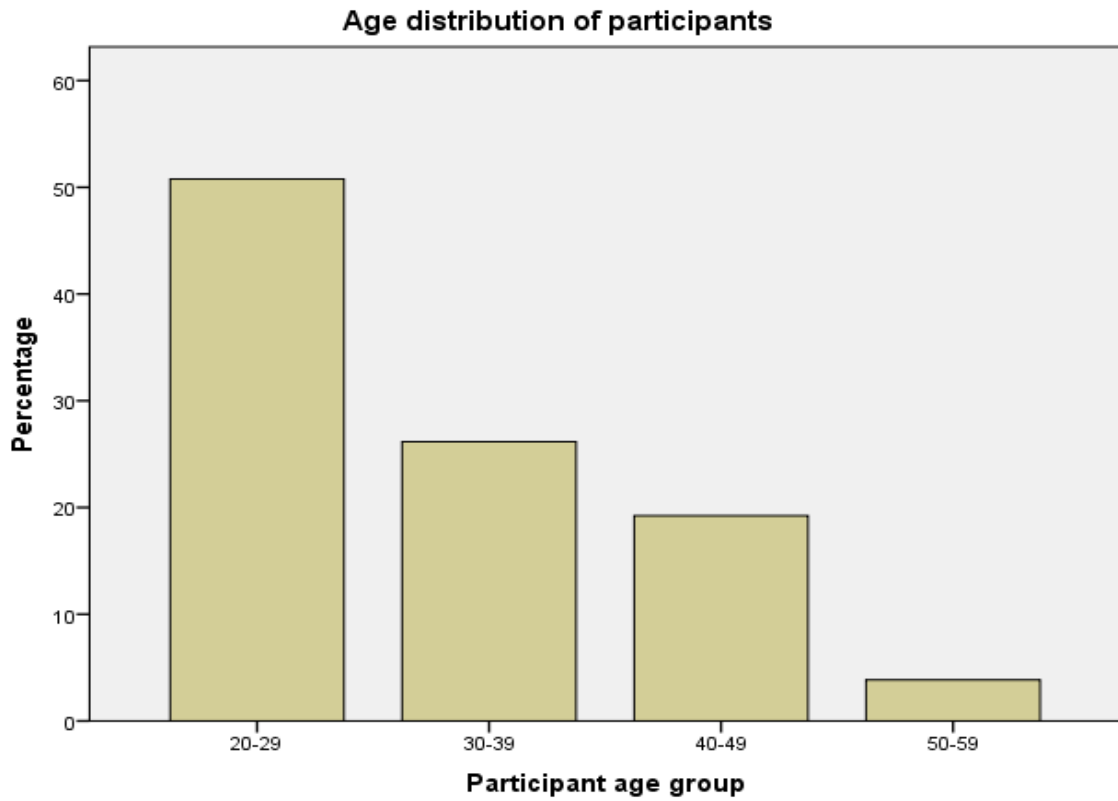


Figure 2: Age distribution of escorting personnel transporting critically ill patients



Figure 3: Escorting personnel's experience in escorting patients to EMD-MNH

Number of escorting personnel and patient per each transfer

The majority of escorting personnel 77.7% (101) came alone with the patients, without any assistance, while 16.2% (21/130) of escorting personnel had the assistance of one other staff in the ambulance and 6.2% (8/130) of respondents had the assistance of two staff in the ambulance during transportation. Interesting, from observation most of these assistant staff were health attendants and student nurses. Also this study showed that the majority of escorting personnel 77.7% (101) escorted one patient per transfer, and 15.4% escorted two critically ill patients in one ambulance per transfer, whereas nine escorting personnel (6.9%) escorted more than two critically ill patients per ambulance per transfer (Table 2).

Table 2: Number of escorting personnel, and patients per transfer

	Detail of characteristics	Frequency (n)	Percentage (%)
Escorting personnel per each transfer	Alone (without assistant staff)	101	77.7
	With one assistant	21	16.2
	With two assistant	8	6.2
No. of patients per each transfer	One patient	101	77.7
	Two patients	20	15.4
	More than two patients	9	6.9

Proportional of escorting personnel with knowledge about the care during IHT, BLS and ACLS

Among the interviewed participants only 8.5 % (11/130) reported to have received formal training to work in some ambulance or as escorting personnel caring for critically ill patients (Table 2). Fifty-nine participants (45.4%) reported to have knowledge and skills on Basic Life Support (BLS) while only 6.2% of participants (8/130) reported to have knowledge and skills on Advanced Cardiovascular Life Support (ACLS) (Table 3).

Table 3: Participant responses on formal training, BLS, ACLS related to IHT of critically ill patient.

Item	Yes		No	
	(n)	(%)	(n)	(%)
1. Received any formal training to be ambulance nurse/escorting personnel	11	8.5	119	91.5
2. Have knowledge and skills of Basic Life Support	59	45.4	71	54.6
3. Have knowledge and skills of Advance Cardiovascular Life Support	8	6.2	122	93.8

For those participants (11/130) who reported to have received formal training for transporting critically ill patients eight of them 72.7% (8/11) reported to have trained on basic emergency care, 18.2% (2/11) stated to have trained in knight support (agency) paramedic course and only one (9.1%) stated to have trained in acute care course.

Monitoring of critically ill patients during inter-hospital transfer

Of the 130 participants who escorted critically ill patients to the Emergency Medicine Department (EMD), only 12.3% (16/130) reported to have monitored their patient's oxygen saturation during the transport, while 31.5% (41/130) reported to have monitored patient's respiratory rate, and 18.5% (24/130) reported to have monitored patient's heart rate, and only 7.7% (10/130) stated to have monitored patient's blood pressure during transportation (Table 4). The referral letter/form of 130 transferred patients were checked by the researcher assessing documentation of any intervention (including recording of vital signs) that were done to the patient while on transit. The findings showed that there was no (0/130) any documentation of care made by the escorting personnel while transporting these patients to emergency medicine department.

Table 4: Patient monitoring during transportation

Item	Yes		No	
	(n)	(%)	(n)	(%)
1. Patient's oxygen saturations monitored during transfer	16	12.3	114	87.7
2. Patient's respiratory rate monitored during transfer	41	31.5	89	68.5
3. Patient's pulse/heart rate monitored during transfer	24	18.5	106	81.5
4. Patient's blood pressure monitored during transfer	10	7.7	120	92.3

During the study period 130 transfers were made, each transferred patient was clinically observed and assessed by a researcher to determine whether patient needed any intervention prior transportation or during transportation and if such intervention was correctly done to the patient before arriving at emergency department. This study finds that among the critically ill patients who were escorted 23 (17.7%) required airway adjuncts, of which only 2 (8.7%) had it placed. Those who required oxygen therapy while in transit were 67 patients (51.5%), but only 12 of them (17.9%) were escorted with oxygen therapy. Twenty four patients (18.5%) who were transported required cervical spine protection but only nine of them (37.5%) had a neck collar placed. Fifteen patients (11.5%) required immobilization or limb splinting, however only eleven patients (73.3%) had it done during transportation.

An intravenous catheter was placed in 93.1% (121) of the patients transferred to the EMD, but only 70.2% (85) of these catheters were appropriate for the patients' needs. Here it means that a large bore cannula or catheter on both hands is appropriate for a poly-trauma or diabetic ketoacidosis (DKA) patients, and all adult patients should have adult IV catheter inserted instead of having paediatric intravenous catheter placed. The indication for a nasogastric tube (NGT) and urinary catheter among the transferred critically ill patients were 27.7% (36) and 82.3% (107) respectively, but those who had it in place were 18 (50.0%) and 82 (76.6%) respectively.

Table 5: Interventions required by critically ill patients during inter-hospital transfer

Item	Yes		No	
	(n)	(%)	(n)	(%)
Patients required airway adjuncts during transfer	23	17.7	107	82.3
Airway were placed and secured	2	8.7	21	91.3
Patients required oxygen therapy during transfer	67	51.5	63	48.5
Oxygen therapy given during transfer	12	17.9	55	82.1
Patient required c-spine protection during transfer	24	18.5	106	81.5
C-spine protection was available	9	37.5	15	62.5
Patients have intravenous catheter during transfer	121	93.1	9	6.9
Intravenous catheter appropriate for patient's needs	85	70.2	36	29.8
Patient required immobilization/splinting during transfer	15	11.5	115	88.5
Immobilization correctly done	11	73.3	4	26.7
Patients required or had indication for NGT	36	27.7	94	72.3
NGT were placed	18	50.0	18	50.0
Patients required or had indication for urinary catheter	107	82.3	23	17.7
Urinary catheter was placed	82	76.6	25	23.4

Challenges faced during inter-hospital transfers of critically ill patients

In this study, participants identified multiple challenge perceived to affect provision of care during inter-hospital transfers of critically ill patients. Most participants identified lack of essential equipment in the ambulance 70% (91) as the challenge affecting provisional of care, followed by traffic jam or rough road 26.9% (35). Lack of materials or supplies in the ambulance such as oxygen, masks, medications, and airway adjuncts was identified by 20% (26) of participants. Lack of training or knowledge and skills in transporting critically ill patient was identified by eight (6.2%) of participants in this study. Transportation of more than one critically ill patient was also identified as one of the challenges that affected the provision of care during inter-hospital transfers by fourteen participants (10.8%). Five percent (7) identified transporting a patient whom you did not know (just simply called from other ward and ordered to escort a patient) as challenges that were faced by escorting personnel during inter-hospital transportation of critically ill patients. (Table 6)

Table 6: Challenges affecting provision of care during IHT

Challenges during transportation of patients.	Frequency (n)	Percentage (%)
Lack of essential equipment in the ambulance e.g monitors, pulse oximeter, suction machine	91	70
Traffic jam or rough road	35	26.9
Lack of materials or supplies e.g oxygen, mask, medications, airway adjuncts	26	20
Transporting more than one patient	14	10.8
Lack of training or lack of knowledge and skills	8	6.2
Transporting patients whom you don't know	7	5.4
Patients' relative in the ambulance	2	1.5

Essential equipment and materials required in the ambulance

In this study, there were 130 patient transfers to EMD from public hospitals in Dar es Salaam region. Only 14 different ambulances were used to carry out this transfer to MNH. Four (4) ambulances were from Kinondoni municipality hospitals, five (5) ambulances from hospitals in Ilala municipality and another five from Temeke municipality hospitals. Each ambulance was assessed once by a researcher for the presence of essential equipment and materials required. With regard to airway equipment, only three ambulances were found to have airway support equipment, which were oropharyngeal airway adjunct and working suction machine, and only one ambulance had nasopharyngeal airway adjunct. For the breathing support equipment, only nine ambulances (9) had oxygen cylinder (with oxygen) and bag valve mask. Oxygen and nebuliser masks were present in eight (8) ambulances and three ambulances (3) respectively. Neither intubation set nor portable monitor was present in all fourteen ambulances. For equipment needed for circulation; syringes and needle were present in 13 ambulances ; intravenous catheter or lines were present in 11 ambulances; intravenous fluids in 10 ambulances; pulse oximeter were present in 4 ambulances; non-invasive blood pressure machine were present in 3 ambulances; and only one ambulance had portable cardiac monitor (7.1%). With regards to minimum drugs for resuscitation: anaphylaxis and hypoglycaemia agents were present in four ambulances; three ambulances had drugs for convulsions, pain, and sedation; drugs

for cardiac arrest and emergency hypertension/hypotension were present in only two ambulances; and neither ambulance had drug for cardiac dysrhythmia. Other supportive materials such as gloves were present in 12 ambulances, antiseptic lotion/solution were present in only 5 ambulances, spinal board in three ambulances, and no ambulance had either checklist for drugs and expiration date or checklist for the equipment present in the ambulance (table 7).

Table 7: Required equipment and materials present in the ambulance during IHT

Item	Present	Item	Present
Airway support equipments		Circulatory support equipment	
1. Oropharyngeal-airway	3/14	1. Syringes and needles	13/14
2. Suction machine	3/14	2. Intravenous catheter/lines	11/14
3. Nasopharyngeal airway	1/14	3. Intravenous fluids	10/14
4. Emergency surgical airway set	0/14	4. A sharp disposal container	7/14
		5. Pulse oximeter	4/14
		6. Non-invasive BP	3/14
		7. Monitor/defibrillator	1/14
Breathing support equipments		Drugs for resuscitation:	
1. Oxygen cylinder with O ₂	9/14	1. Anaphylaxis	4/14
2. Bag valve mask (BVM)	9/14	2. Hypoglycaemia	4/14
3. Oxygen mask	8/14	3. Convulsions	3/14
4. Nebuliser mask	3/14	4. Pain	3/14
5. Endotracheal tubes	1/14	5. Sedation and paralysis	3/14
6. Intubation set	0/14	6. Cardiac arrest	2/14
7. Portable ventilator	0/14	7. Hypertension/Hypotension	2/14
		8. Cardiac dysrhythmia	0/14
Other supportive equipment			
1. Gloves	4/14		
2. Bandages and tapes	4/14		
3. Antiseptic lotion	3/14		
4. Spinal board	3/14		
5. Nasogastric tube and bag	3/14		
6. Urinary catheter and bag	2/14		
7. Checklist for drugs	2/14		
8. Checklist for equipment	0/14		

CHAPTER FIVE

DISCUSSION

This chapter begins with the discussion of study findings in correlation to the specific objectives of the study. It is then followed by a discussion on the limitations as well as implications of this study for the care of critically ill patients during inter-hospital transportation in Tanzania.

Care of critically ill patients during inter-hospital transfer

Patient monitoring during transportation is an important safety issue. Having the monitoring capabilities of the ICU as well as an array of equipment and supplies available in the ambulance enhances patient safety and avoids adverse events during inter-hospital transfers. With well-trained escorting personnel, having basic and advanced knowledge and skills on life support when transporting such a patient, the focus shifts from getting the patient to definitive care quickly by rushing them, to monitoring and stabilizing them before and during transport. Therefore, utilizing specialized transport teams that focus on patient stabilization appears to be the most effective way to avoid potentially life-threatening events during transportation.

1. Type of escorting personnel

This study identified four groups of escorting personnel that accompany critically ill patients to EMD; the first group identified was registered nurses which constitute about twenty seven percent of the participants. Registered Nurses (RN) are those with a Diploma, Bachelor or Masters' Degree in Nursing/Midwifery and they are registered and certified by the Tanzania Nursing and Midwifery Council (TNMC) to provide care and monitoring to all kinds of patients, including critically ill patients in ICU. They are assumed to have higher clinical knowledge and skills of care, compared to other levels of nurses. The second group identified was Enrolled Nurses (EN) which constitutes about thirty nine percent of participants. These are nurses with a Certificate in Nursing/Midwifery who function at the operational level, under the supervision of a Registered Nurse/Midwife. This group contributes the highest proportion of escorting personnel compared to other groups, however in their course of training they have little or no knowledge about advanced airway management, basic life support and advanced cardiovascular life support.

The third group identified was Health Attendants (H/A) and they constitute thirty two percent of all participants. Health attendants are not nurses, but have basic training non-related to care, and they are not registered with the Tanzania Nursing and Midwifery Council at all because they are not nurses or midwives. They should not be left as the sole care provider to a critically ill patient as they do not learn about how to assess, monitor, plan, implement and provide care to critically ill patients. The last group identified were Student Nurses completing a Diploma in Nursing that constituted a small number of participants, about two percent. They are not registered by the Tanzania Nursing and Midwifery Council and they are not licensed to practice other than learning under the supervision of senior staff. Both Health Attendants and Student Nurses do not have the knowledge and ability to escort a critically ill patient on their own.

The inter-hospital transport of patients requires a team of highly skilled members. The team can be a combination of doctors, nurses, respiratory therapists and paramedics, with each being skilled in advanced airway management, basic life support and advanced cardiac life support; moreover the team should be appropriately trained, qualified and certified, and be able to provide IV therapy, identify and provide treatment for arrhythmias (Blakeman & Branson, 2013; Sethi & Subramanian, 2014). Due to its complexity, mainly doctors and nurses are involved in transporting critically ill patients (Stefano et al., 2015). In this study only twenty seven percent of Registered Nurses escorted these critically ill patients to EMD. This finding is different from the study done in western Kenya by Kuremu and his colleagues, whereby an evaluation was done for 97 patient transfers requiring critical/emergency care, and they found that an appropriate escort by a nurse was provided for 60% (58) of patients (Kuremu et al., 2008). Crandon Ivor W. (2008) and his colleagues in their study of inter-hospital transfers of trauma patients in a developing country, found 69.7% (85/122) of the transfers were accompanied by nurses as the senior health personnel, A. Gray (2003) and his colleagues in their study of descriptive epidemiology of adult critical care transfers from the emergency department found 84% (294) patients were accompanied by a nurse during transfer (A. Gray, Gill, Airey, & Williams, 2003). Despite the minimal knowledge attained by Enrolled Nurses during their academic training program pertaining to the care of critically ill patients, this study found a high number of Enrolled Nurses, 38.5% (50) being used in escorting patients.

This finding is three times higher when compared to the findings of Crandon Ivor and his colleagues who found 12.3% (15/122) were Enrolled Practical Nurses (Crandon et al., 2008).

Despite the recommendations of inter-hospital transfer guidelines which state who is supposed to accompany a critically ill patient, this study found that there were higher number of Health Attendants, who are non-medical personnel (supporting staff) escorting patients to EMD, which is about five times higher when compared to the findings of Crandon et al who found 6.6% (8/122) of transfers were escorted by non-medical personnel (Crandon et al., 2008). However, other medical personnel such as doctors, physicians, and respiratory therapists can also be involved in escorting patients, but in this study there was no transfer that was carried out by a doctor or physician. This finding is in contrast with the findings of Crandon Ivor W. and his colleagues who found 11.5% (14/122) of patients were accompanied by physicians (Crandon et al., 2008).

2. Knowledge of escorting personnel

Most of the guidelines for the inter-hospital transportation of critically ill patients recommend the transporting team be appropriately trained, qualified and certified. This recommendation is contrary to the findings of this study, whereby only a small proportion of participants 8.5% (11/130) reported to have received formal training to work in ambulance. With all participants in the study only 6.2% reported to have knowledge about advanced cardiovascular life support; moreover less than half of the participants (45.4%) stated they had knowledge about basic life support. This proportional is very low compared to the proportional obtained from National survey of neonatal transport team in the united states by dedicated team where 36.8% (39) had certificate in advanced cardiovascular life support and 88.7% (94) had certificate in basic life support (Karlsen et al., 2011). This finding shows a huge gap in knowledge about the care of critically ill patients that all escorting personnel should have before taking responsibility for escorting critically ill patients during inter-hospital transportation. Among eleven participants who reported to have received formal training for transporting critically ill patients, eight of them (72.7%) reported to have been trained with a short course on basic emergency care and two of them (18.2%) were trained through a Knight Support Paramedic Course and only one participant (9.1%) was trained in by attending an acute care course.

These findings correlate with the findings of a study done in the UK to determine whether Emergency Departments in the UK have the appropriate equipment, monitoring, staff training systems, and processes of care for transportation of the critically ill patient. They found that out of 139 emergency departments who responded, only 5 EDs (4%) had medical staff who received formal transfer specific training, with the majority of the staff training being carried out "in house" or in the form of supervised transfers. Supervised transfers occurred in 82 EDs (59%). Only 3 EDs (2%) provided formal training in patient transfers for nursing staff, however, there was in house training or accompanied supervised transfer training in 89 EDs (64%) (Stevenson, Fiddler, Craig, & Gray, 2005). Therefore, both medical and nursing escorting personnel staff mostly received little or no formal training prior to undertaking transfers of critically ill patients during inter-hospital transfer. The existing gap of knowledge among escorting personnel in the Dar es Salaam region, indicates little ability of the escorting team to perform resuscitation when a patient's condition deteriorates during transportation. The escorting team should be well trained with the knowledge and skills of how to properly transport and stabilize patients and be able to perform emergency procedures such as endotracheal intubation, defibrillation, and CPR. Therefore, for a safe, smooth and quality transportation, there should be a national standard for team composition of escorting personnel and they must have received formal training to have knowledge and skills about the care required for critically patients in transit. The team should include nurses (registered), physicians, and paramedics. By so saying competency based training and assessment is now recommended, specific staff training courses for transporting critically ill patients should be developed in this country.

3. Types of care given to critically ill patients on transit

This study found that there was minimal care given to patients during transportation, however continuous monitoring of a patient's vital signs while in transit is mandatory for every critically ill patient. In this study among 130 escorting personnel who accompanied critically ill patients to the Emergency Medicine Department, only 12.3% (16/130) stated they monitored their patient's oxygen saturation status (Spo₂) during the transport, 31.5% (41/130) stated they monitored their patient's respiratory rate (RR), 18.5% (24/130) stated they monitored their patient's pulse rate (HR), and only 7.7% (10/130) reported to have monitored their patient's blood pressure during the transport (table 4).

These findings reflect insufficient care and monitoring being given to the patient by escorting personnel while in transit. All critically ill patients should have their oxygen saturations, respiratory rate, heart rate, and blood pressure monitored and recorded at least every fifteen minutes while in transit.

Guidelines for the inter- and intra-hospital transport of critically ill patients recommends all critically ill patients undergoing inter-hospital transport must have minimum standards of monitoring that include, continuous pulse oximetry, electrocardiographic monitoring, and regular measurement of blood pressure (non-invasive) and respiratory rate (Blakeman & Branson, 2013; Sethi & Subramanian, 2014; Warren et al., 2004). Patient monitoring during transportation is of crucial importance as it helps to prevent potential complications and adverse events that might arise while transporting such a patient, and sometimes these complications may arise from inappropriate practices of the transporting team (Stefano et al., 2015). The impacts or adverse events can be either minor or life-threatening incidents requiring urgent therapeutic interventions, and it may include: Cardiovascular events such as severe hypotension or hypertension, arrhythmias or a cardiac arrest. Adverse respiratory events include hypoxia, aspiration, accidental extubation, bronchospasm, pneumothorax, patient ventilator dyssynchrony and neurological events such as agitation, intracranial hypertension (Sethi & Subramanian, 2014). From the low rate of monitoring of patients in this study, is not clear whether it is a knowledge deficit of escorting personnel or they do not know how to do it or they do not know if they were supposed to do it.

Transportation of critically ill patients between facilities for whatever reason, are expected to have many interventions provided to them, in order to have a safe and smooth transport that prevents further complications to the patient. These interventions can be done at the referring hospital or by the escorting personnel after assessment, while in transit. These interventions include; opening of airway and securing cervical spine if compromised, providing oxygen if the patient has breathing problems, immobilization or limb splinting due to different types of fractures, establishing intravenous access for medications and fluid resuscitation, insertion of a nasogastric tube and an indwelling urinary catheter. Through clinical observation of the patients when they arrived at the Emergency Department, this study found that about eighteen percent (23/130) of the transferred patients needed airway to be opened and supported, but only 8.7% (2/23) had airway adjuncts placed.

Insertion of an airway adjunct, either oropharyngeal or nasopharyngeal is a lifesaving intervention, that should be provided to any patient who requires it, and every escorting personnel should know when and how to insert it when transporting a critically ill patient. Twenty four patients (18.5%) required cervical spine protection, but only nine (37.5%) had a neck collar made from a rolled up bed sheet placed and secured to protect their cervical spine. About fifty two percent (67/130) of the patients required oxygen therapy while in transit but only 17.9% (12/67) were escorted with oxygen. Immobilization or splinting was required by 11.5% (15/130) of patients due to the different types of fractures they had, however, only eleven (73.3%) had immobilization or splinting done during transportation. Intravenous catheters, though required in all patients being transferred either for fluid resuscitation or for life saving drugs during transportation, were in place for 93.1% (121/130) of patients, and among them, only 70.2% (85/121) had an appropriate intravenous catheter for the patients' needs. About twenty eight percent of the patients transferred (36/130) had an indication for a nasogastric tube, but only half of them (50%) had it placed. An indwelling urinary catheter was required by 82.3% (107/130) of patients, but it was only present in 76.6% (82/107) of the patients transferred (table 5).

These findings from clinical observation of the patients have similarity with the results of a study done in Kenya by Kuremu evaluating patient transfer practices by hospitals. That study showed that among 97 transferred patients, fifty required respiratory support but only 7 patients (14%) were provided with airway support, while oxygen was available for 16 (32%) of them while in transit. Venous access though required in all patients being referred, was available in only 72% of the transferred patients. Nasogastric intubation was required in 27 (28%), yet only eight (30%) of these patients were provided with a nasogastric tube that was functional at the time of evaluation in the emergency department. Urethral catheterisation was required in 56 (59%) of the patients and only thirteen (23%) of them had a catheter placed. Nine (50%) of the patients with long bone fractures were splinted and 3% of those who required cervical spine stabilisation before confirmation of the status of the same had a collar (Kuremu et al., 2008).

Consistent with the findings that showed minimal or suboptimal patient monitoring, there was not any documentation of monitoring or charting of vital signs monitoring during transportation on the patient's referral form. This result is similar to the findings of Limprayoon, in his study titled "Transportation of Critically Ill Patients to Pediatric

Intensive Care Unit, Siriraj Hospital", where they found that in 36 patients transferred, there was not any documentation about a patients status or medical procedures performed during the transport (Limprayoon et al., 2005). This goes against the guideline that requires or recommends patient's status and management during transport to be recorded and filed in the patient's medical record at the referring facility and that copies should be provided to the receiving institution/hospital.

4. Challenges affecting care on transit

In this study multiple challenges affecting care were identified by participants. Seventy percent (91/130) of escorting personnel perceived lack of essential equipment in the ambulance as the largest challenge that affected the quality of care provided to critically ill patients. Lack of equipment, such as cardiac monitors, pulse oximeters, portable ventilators and suction machines makes monitoring of a patient's parameters difficult or impossible, hence leading to unsafe transportation that will result in more adverse events to the patients. Twenty percent of participants (26/130) were able to identify a lack of materials/supplies such as oxygen, masks (for oxygen administration), airway adjuncts, intravenous fluids, and medications as one of the challenges also affecting the provision of care while in transit. With the absence of these supplies in the ambulance, resuscitation of a patient while in transit cannot be achieved, hence may result in a severely adverse event, including death.

The above identified challenges were well supported by the findings of observations on ambulances for the presence of required equipments and supplies (table 7). This study found that only three ambulances out of fourteen (21.4%) had an oropharyngeal airway and suction available for supporting the airway, and only one had a nasopharyngeal airway. Oxygen cylinders with oxygen and a bag valve mask were present in nine ambulances (64.3%), however, no ambulance had an intubation set or a portable monitor. Pulse oximeters were present in 4 ambulances (28.4%), blood pressure machines were present in 3 ambulances (21.4%), and a cardiac monitor was present in only one ambulance (7.1%). However syringes and needles, and intravenous catheters were present in almost all ambulances and intravenous fluids in 10 ambulances (71.4%). Crandon and his colleagues found that there were facilities to measure blood pressure and pulse rates in 112/113 (99.1%) ambulances, but automated monitoring devices to measure blood pressure, heart rate and pulse oximetry were only present in one ambulance (0.8%), that was privately operated.

Functional facilities for suctioning were present in 50% (61/122) of the ambulances and oxygen in 99.1% (121/122) (Crandon et al., 2008). The study done in the UK by Stevenson and his colleagues on Emergency Department organisation of critical care transfers, found that there was no transport ventilator for 18 Emergency Departments (13%), while 9 (6%) had no transport monitor and 9 (6%) had no syringe pump. However, these items, if required, were available from another department in the hospital (Stevenson et al., 2005). The availability of these supplies and the pharmaceutical agents are necessary for emergency resuscitation and stabilization of a patient when their condition deteriorates, as well as for maintenance of vital functions of a transported patient. With the absence of these supplies in the ambulance, there can be no care delivered or interventions done to resuscitate and stabilize the patient until they reach the destination hospital for further management, if they survive.

Another challenge that was identified to affect the care of critically ill patients while in transit was the transportation of more than one critically ill patient 10.8% (14/130), by only one staff member, which makes monitoring and interventions difficult to perform due to lack of enough space in the ambulance. And the escorting personnel are only to provide care for one critically ill patient at a time. This is supported by the findings in table 5 that shows two patients per ambulance were transferred in 20 transfers (15.4%), and more than two patients per ambulance in 9 transfers (6.9%). Interestingly, despite the insufficient care and monitoring offered to critically ill patients during transfer, only 6.2% (8/130) of escorting personnel in this study stated a lack of knowledge and skills, or not having special training about transporting patients, was one of the challenges that affected the provision of quality care while transporting these patients.

Limitations of the study

The first limitation was that the findings of this study are derived from a small sample size of public hospitals only within the Dar es Salaam region. Therefore, a generalization that care provided to all critically ill patients transferred to Muhimbili National Hospital via the Emergency Medicine Department from low resourced public hospitals is suboptimal cannot be made. However, participants were selected purposively from all referring hospitals (public) within the region that have the mandate to refer patients to MNH.

And patients have to attend these referring hospitals before they come to MNH, so those hospitals are responsible for the largest amount of patient transfers. But also, it involved staff of different positions, levels of knowledge, and experience in escorting critically ill patients.

The second limitation was that the desired or calculated sample size was not met because the number of participants was repetitive (the same escorting personnel returned several times when escorting patients to the Emergency Medicine Department). In addition to this, some of the escorting personnel refused to participate with reasons such as they were in hurry because either they left their wards with one fellow staff member or the ambulance was needed by another nearby hospital. However, the use of different approaches to collect data used by the researcher, such as the checklist to review the availability of essential equipment and medications in the ambulance, review of the referral letter and the use of an observation tool for counter checking the interventions required to be done or done to the patient, added weight to the findings and conclusion of this study.

The third limitation was the researcher bias. The researcher used his clinical expertise and experience in making observations of whether the patient needed a certain intervention to be provided to him/her and if so, was the intervention done to the patient. This information was used by the researcher to determine the level of care provided to the critically ill patients by escorting personnel during inter-hospital transportation. But there was not any attempt made by the researcher to verify this by asking fellow clinical experts in that area.

Implications of the findings for the care of critically ill patients during inter-hospital transfer

Based on the results of this study, several implications arose;

1. Nurses, as a major group in escorting critically ill patients during inter-hospital transfers in this study, demonstrated inadequate care and monitoring to such patients. This implies that poor quality care is offered, which endangers a patient's safety while in transit, which is caused by lack of formal training, and having escorting personnel with little knowledge and skill about BLS and ACLS. This knowledge gap should be met through in-house training programs until formal training system for escorting personnel is established in the country.

However, it could also be assumed that nurses registered with the TNMC have enough training and knowledge to know they should monitor and document basic vital signs for a critically ill patient such as heart rate and respiration rate, as this requires only a time keeping device and basic skills. This implies that the nursing curriculum is not adequate in teaching nurses minimum care requirements, and it should be reviewed.

2. Lack of essential required equipment and supplies in the ambulance also affected the provisional of care and monitoring of critically ill patients during transportation. With the absence of equipment and supplies nurses cannot effectively resuscitate a patient during transportation. Hence the empowerment of escorting personnel also needs provision or availability of equipment and supplies in the transporting ambulance.

3. No guideline for inter-hospital transportation was found in the country, but also no checklist for the equipment and medications was found in any of the ambulances surveyed. This means nurses (escorting personnel) are transporting critically ill patients based on routine process and individual experience, without any tool to guide their practices.

Recommendations

1. Hospitals administration within the Dar es Salaam region should first formulate their own transport team/crew that will be responsible in providing care to critically ill patients when transferring them to Muhimbili National Hospital instead of calling or choosing any unskilled staff available from other wards within the hospital to accompany a patient to Muhimbili.

2. Hospital administration should develop a specific staff training/education that will be provided via an in-house training program specific to address critical care basics, basic life support skills, and advance cardiovascular life support skills for all individuals (transport team) who will be transporting critically ill patients to other hospitals or institutes. This in-house training program for staff should be conducted in a way that it addresses the knowledge and skills gap identified in this study among individuals transporting or escorting critically ill patient.

3. Ministry responsible for health, Health universities, together with critical care organizations in the country should develop a curriculum for formal training courses for transporting critically ill patients.

This training should be competency based training, preparing an individual to specialize in providing care and monitoring a patient's condition while in an ambulance. Therefore staff should receive formal training prior to undertaking transfers of critically ill patients.

4. Hospital administration should develop guidelines that will facilitate the inter-hospital transfer process, and restrict nurse students and other unskilled staff from accompanying critically ill patients on their own, unless for the sake of learning purposes, of which they should then be accompanied with a trained person.

5. Since most of the ambulances used to transfer patients did not have adequate equipment and supplies, including medications, it makes monitoring and resuscitation of a patient impossible while in transit. Therefore, in order to improve this, the hospital administration should make efforts to ensure that all necessary equipment and medications are available in the ambulance and each escorting personnel is aware of them. By doing so, critically ill patients will be cared for and monitored during transportation, and there will be a safe and smooth transfer of patients, rather than being rushed to the next hospital. If possible, the hospitals' ambulances should have equipments that are standardized across the critical care network in the country.

6. Hospital administration should also ensure that each ambulance has both a checklist for drugs required and expiration dates and a checklist for equipment, and they should be checked every day during the handover of the shift.

7. Since the findings of this study are based on one region that is more modern than others, in order to have clear picture of the inter-hospital transfer process, the same research can be repeated involving a larger sample size of escorting personnel from different hospitals in the country, and hence would be able to generalize the results.

8. Another clinical study should be done to determine the most common adverse events or complications of inter-hospital transfers of critically ill patients in Tanzania.

Conclusion

This study shows that critically ill patients are escorted mostly by non-qualified personnel namely enrolled nurses and health attendants during inter-hospital transportation. Care or monitoring provided to such patients during IHT is suboptimal: this is mainly due to the lack of a specialized transport team in the Dar es Salaam region; lack of formal training of escorting personnel; and minimal knowledge and skills about basic life support (BLS) and advanced cardiovascular life support (ACLS).

Moreover, this inadequate resuscitation or monitoring is also compounded by a lack of essential, required equipment and supplies in the ambulance, together with the lack of tools such as guidelines for inter-hospital transportation and checklists for equipment and resuscitation medications.

Therefore, improvement of patient safety and care by minimizing complications and adverse events during transportation will go parallel with the introduction of a transporting team and the introduction of formal training to escorting personnel before they undertake the responsibility of transporting such a patient, together with the improvement or availability of all required equipment and supplies in the ambulance with the presence of guidelines and checklists.

This study provides some initial information that serves to stimulate further inquiry into this important field that has not been developed in this country, but is emerging worldwide.

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APPENDICES**Appendix I: Structured questionnaires on care of critically ill patient during inter-hospital transfer to EMD**

Number:

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Demographic data: Put \checkmark in the box for appropriate answer

1. What is your age?

- a) 20 - 29 yrs
- b) 30 - 39 yrs
- c) 40 - 49 yrs
- d) 50 - 59 yrs

2. What is your professional/qualification?

- a) Doctor
- b) Registered Nurse
- c) Enrolled Nurse
- d) Health Attendant
- e) Other, specify.....

3. What is your working department?

- a) Outpatient Department
- b) Emergency department
- b) Medical or Surgical department (ward)
- c) ICU department
- d) Other, specify.....

4. How many years of working experience do you have at the working department?

- a) < 1 yr
- b) 1 - 3 yrs
- c) > 4 yrs
- d) None

5. How many years of experience do you have in escorting patient in ambulance to MNH?

- a) < 1 yr
- b) 1 - 3 yrs

c) > 4 yrs

d) None

Escorting Personnel

6. How many patients have you brought in the ambulance during this transfer?

a) 1 Patient

b) 2 Patients

c) > 2 Patients

7. How many escorting personnel came with you in the ambulance during this transfer?

a) None

b) 1 escorting personnel

c) 2 escorting personnel

8. Have you received any formal training to be ambulance nurse/escorting personnel?

a) Yes

b) No

9. If yes in question 8 above, what was the name of the course?

.....

10. Do you have knowledge and skills of Basic Life Support?

a) Yes

b) No

11. Do you have knowledge and skills of Advance Cardiovascular Life Support?

a) Yes

b) No

Monitoring During Transportation

12. Did the patient's condition change while you were transporting them?

a) Yes, the condition changed []

b) No, the condition did not change []

13. Did you assess/check the Glasgow Coma Scale of the patient during transportation?

a) Yes, and was..... []

b) No []

14. Did you monitor patient's Oxygen saturation during transportation?

a) Yes

b) No

15. If yes in question 14 above, did you document it anywhere?

a) Yes

b) No

16. Did you monitor patient's RR during transportation?

a) Yes

b) No

17. If yes in question 16 above, did you document it anywhere?

a) Yes

b) No

18. Did you monitor patient's Arterial Pulse during transportation?

a) Yes

b) No

19. If yes in question 18 above, did you document it anywhere?

a) Yes

b) No

20. Did you monitor patient's Blood Pressure during transportation?

a) Yes

b) No

21. If yes in question 20 above, did you document it anywhere?

a) Yes

b) No

22. Did the referring physician contact MNH prior to patient transfer?

a) Yes

b) No

Challenges during transportation that affect provisional of care

23. Did you encounter any challenges during the transfer of this patient?

a) Yes

b) No

24. Please list the most common challenges you face when transferring patient that affect provisional of care

.....
.....
.....

Appendix II: Observation tool for interventions to be done to the patient during transportation

S/N	INTERVENTION	YES	NO
1	Does patient require any airway adjunct?		
2	If yes, is the airway adjunct appropriate placed and secured?		
3	Does patient require C-spine protection?		
4	If yes, is C-spine neck collar correctly placed and secured?		
5	Does patient require oxygen therapy?		
6	If yes, is the oxygen therapy given to patient with appropriate method?		
7	Does patient have intravenous catheter?		
8	Is the IV catheter appropriate for patient needs? e.g poly-trauma patient need two large bore cannula.		
9	Does patient have IV fluid connected and running?		
10	Does patient require immobilization/splinting?		
11	If yes, is immobilization or splinting correctly done?		
12	Does patient have indication for NGT?		
13	If yes, is NGT correctly placed and secured?		
14	Does patient have indication for urinary catheter?		
15	If yes, is urinary catheter correctly placed and secured?		

16. What is the diagnosis of the patient?

.....

17. What is/are the reason/s for transfer?

.....

18. Is there any documentation of patient care delivered during the transport?

.....

Appendix III: Checklist of required equipments and materials during transportation.

1. AIRWAY SUPPORT EQUIPMENTS	YES	NO	NA
- Oropharyngeal airway			
- Nasopharyngeal airway			
- Emergency surgical airway set			
- Suction machine of appropriate standard and working			
2. BREATHING SUPPORT EQUIPMENTS	YES	NO	NA
- Oxygen mask			
- Nebuliser mask			
- Bag valve mask (BVM)			
- Intubation set with appropriate size blades			
- Endotracheal tubes			
- Oxygen supply/Oxygen cylinder with oxygen			
- Portable ventilator			
3. CIRCULATORY SUPPORT EQUIPMENTS	YES	NO	NA
- Monitor/defibrillator/external pacer			
- Pulse oximeter			
- Non-invasive BP device with appropriate sized cuffs			
- Intravenous Catheter (peripheral)			
- Syringes and needles			
- Intravenous fluids and pressure set			
- A sharp disposal container			
4. DRUGS FOR RESUSCITATION	YES	NO	NA
- Cardiac arrest			
- Hypotension and Hypertension			
- Cardiac dysrhythmia			
- Anaphylaxis			
- Hypoglycaemia and Hyperglycaemia			
- Convulsions			
- Pain			
- Sedation and Neuromuscular paralysis			
5. OTHER SUPPORT EQUIPMENTS AND PERSONEL	YES	NO	NA
- Nasogastric tube and bag			
- Urinary catheter and bag			
- Spinal board			
- Antiseptic lotions			
- Bandages, Tapes			
- Gloves			
- Checklist for drugs and expire date			
- Checklist for equipments			

Appendix IV: Informed consent form**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED HEALTH SCIENCES****DIRECTORATE OF RESEARCH AND PUBLICATIONS**ID NO:

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Greetings! My name is **Tito William**; I am a postgraduate student pursuing MSc. Critical Care and Trauma Nursing at Muhimbili University of Health and Allied Sciences. Currently I am conducting a research study on **Care of critically ill patient during inter-hospital transportation; a descriptive study in Dar es salaam, Tanzania.**

Purpose of study

To describe the current practice or status in caring critically ill patients during inter-hospital transfer as well as identifying the knowledge and skills of escorting health personnel in Tanzania.

Sponsor

Emergency Medicine Association of Tanzania and Muhimbili National Hospital.

Participant's involvement

Participation in the study will be voluntarily and the participant will be required to answer questions in relation to inter-hospital transfer care and knowledge of resuscitation. It will take about 20 minutes to fill both the questionnaire and checklist.

Confidentiality

The collected information will be concealed and maintained by using codes. No names will be asked or required during data collection. Collected information on questionnaire and checklist will be entered into computers with only the study identification number. If the findings of this study have to be published or presented in a scientific meeting, names and other information that might identify you will not be used.

Benefits

There will be no direct benefit for your participation; however the study findings will help to describe the current practice or status of care on critically ill patient during inter-hospital transfer as well as identifying the knowledge and skills of escorting health personnel. This will help to improve and strengthen the safe transport of critically ill patients from lower resourced health care facilities to the higher resourced health care facilities in Tanzania by alerting the policy or decision makers to formulate protocols and guidelines for critically ill patient transfer. Also it will give an insight into the needs of various hospital organizations to formulate their ambulance crew, and checklists for the transfer of critically ill patients.

Compensation

There will be no compensation of any kind in participating in this study.

Risk to participant

The study will not harm you physically, psychologically or emotionally.

Rights to Withdraw and Alternatives

Participation in this study is voluntarily and you have the right to refuse to participate or withdraw from the study even if you have already given your consent. Refusal to participate or withdraw from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Who to Contact

If you ever have questions about this study, you should contact the principle investigator Mr. **Tito William**, +255 (0) 716 810 887, P. O. Box 65000, Dar es salaam. If you ever have questions about your rights as a participant, you may contact or call Acting Director of Research and Publications Committee Dr. Joyce Masalu at MUHAS, P.O. Box 65001, Dar es Salaam. Tel: 2150302-6.

Do you agree to participate?

Yes No

I, _____ have read the contents in this form and my questions have been answered. I therefore agree to participate in this study.

Signature of Participant _____

Signature of the Researcher _____

Date _____.

Appendix V: Permission later to conduct a study at MNH**MUHIMBILI NATIONAL HOSPITAL**

Cables: "MUHIMBILI"
 Telephones: +255-22-2151367-9
 FAX: +255-22-2150534
 Web: www.mnh.or.tz



Postal Address:
 P.O. Box 65000
 DAR ES SALAAM
 Tanzania

In reply please quote:
 Ref: MNH/TRC/ Research/ 2017/ 034

Date: 19th April, 2017

Tito William
 MUHAS.

RE: PERMISSION TO COLLECT DATA AT MNH NO: 2017/ 034

Name	Tito William
Title	Care of Critically ill patient during Inter-Hospital Transportation: A Descriptive study in Dar es Salaam, Tanzania.
Institution	MUHAS
Supervisor	Dr. Dickson Ally Mkoka
Period	20 th April, 2017 – 19 th June, 2017 3months

You have been permitted to collect data in respect to the undertaking of the above mentioned study.

Please ensure that you abide to the ethical principle and other conditions of yours approval.

Sincerely,

Dr. Faraja Chiwanga (MD, M. Med, Msc)
 Head, Teaching, Research and Consultancy Coordination Unit

CC: Head, Emergency Medicine Department

Appendix VI: Ethical clearance from MUHAS IRB

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES**

P.O. Box 65001
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Tel G/Line: +255-22-2150302/6 Ext. 1015
Direct Line: +255-22-2151378
Telefax: +255-22-2150465
E-mail: dpgs@muhas.ac.tz

Ref. No. MU/PGS/SAEC/Vol. IX/56

20th March, 2017

Mr. Tito K. William,
MSc. Nursing Critical Care and Trauma,
MUHAS.

RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED "CARE OF CRITICALLY ILL PATIENT DURING INTER-HOSPITAL TRANSPORTATION; A DESCRIPTIVE STUDY IN DAR ES SALAAM, TANZANIA"

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from 21st March, 2017 to 20th March, 2018. In case you do not complete data analysis and dissertation report writing by 20th March, 2018, you will have to apply for renewal of ethical clearance prior to the expiry date.

Please liaise with the Directorate of Finance to get your research funds.


Prof. Andrea B. Pembe
DIRECTOR OF POSTGRADUATE STUDIES

Cc: Director of Research and Publication
cc: Dean, School of Nursing