SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

INFLUENCE OF EMERGENCY MEDICINE POLICY ON FACILITY CAPACITY AND QUALITY OF CARE AT GOVERNMENT HOSPITALS IN TAMALE

BY

KWASI OWUSU OFFEI

10701726

THIS THESIS IS SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES, UNIVERSITY OF GHANA, LEGON, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE MASTER OF PUBLIC HEALTH DEGREE

JULY, 2019

DECLARATION

, **Kwasi Owusu Offei,** hereby declare that this study is a result of my independent work. :eferences to other works have been duly acknowledged. I further declare that this study has not een submitted for award of any degree in this institution and other universities elsewhere.

WASI OWUSU OFFEI

TUDENT)

GNATURE: .....

ATE: 10/10/2019

DR. PATRICIA AKWEONGO

(SUPERVISOR)

SIGNATURE: .....

DATE: 10/10/2019

DEDICATION

I dedicate this work to my mum, Annie Odarchoe Golightly for all the love and support she has given me throughout the years and especially through this time.

Also, to the dreamer out there, everything is possible if only you believe and keep trying.

ACKNOWLEDGEMENT

I want to also thank my family, Dennis, Candy, Richard and Bennard for all their support

My sincerest gratitude goes to Gomda, Joseph Ayine, Derrick Anim-Ansong and Jonathan Boakye for being there for me and supporting me any way they can to make this happen.

My profound appreciation to my supervisor, Dr Patricia Akweongo for her patience, hard work, very enlightening advice and support through this process. You are awesome ma'am.

Finally, I wish to say a big thanks to Eben Quarcoo, Akua Asantewaa and the entire staff of Home Medics Co Ltd. You have all been exceptionally supportive and been in my corner through this journey. I am eternally grateful.

ABSTRACT

Health emergencies occur everywhere from the market place to the house to by the roadside, and each day they consume resources regardless of whether there are systems capable of achieving good outcomes or not. In a low resource country like Ghana policy and guidelines will play a very integral role in ensuring quality and efficiency of emergency services at all tiers of service. In 2011, the Accident and emergency policy was introduced to help strengthen the capacities of facilities in emergency care management. Northern region accounts for the most (20%) motorcycle fatalities in Ghana. The region is characterized by a huge land mass and population with poor communication and road network, lack of relevant data collection tools and low funding sources, leaves little doubt as to the reasons for poor health indices thus making it the weak link in the overall health system. Most facilities in Tamale are expected to be in the very early stages of implementation of the emergency policy and to have low capacity for emergency service delivery with a lack of strategic leadership, poor management and funding as postulated etiologies.

Employing current policy and guideline tools from both the Ministry of Health and the African Federation of Emergency Medicine (AFEM), this study assessed the current emergency service delivery capacity of Tamale, the capital of the northern region, in selected facilities.

This study was a descriptive cross-sectional study, which employed quantitative and qualitative methods to elicit responses to the specific objectives. Data were reviewed over a four -week period from selected facilities at all four government hospitals in Tamale.

Results from all four health facilities shows the unavailability of health supplies as the leading cause of non-performance of emergency procedures, followed by no training, lack of human resources and infrastructure. The unavailability of a policy was the least reason for non-performance showing that the policy exists and people are aware of the emergency policy. However, policy availability however did not translate into the needed accoutrements for proper capacity building.

Conclusions: There is currently not much influence of the emergency policy on facility capacity and quality of emergency care in government hospitals in Tamale.

Recommendations: There is the need to provide the needed supplies, equipment, training, infrastructure and human resource to help build needed capacity to provide emergency care at all levels.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A&E	-	Accident and Emergency
AFEM	-	African Federation of Emergency Medicine
BG	-	Blood Glucose
CHPS	-	Community Health-Planning Services
ECAT	-	Emergency Care Assessment Tool
EMoC	-	Monitoring emergency obstetric care
EU	-	Emergency Unit
GHS	-	Ghana Health Service
GLSS4	-	Ghana Living Standards Survey - Round 4
IVI	-	Intravenous infusion
LMIC	-	Low income and Middle-Income Countries
MOH	-	Ministry of Health
SARA	-	Service Awareness and Readiness Assessment
SDG	-	Sustainable Development Goals
SDA	-	Seventh Day Adventist
UNFPA	-	United Nations Fund for Population Activities
UNDP	-	United Nations Development Programme
UNSD	-	United Nations Statistics Division
WHO	-	World Health Organization

CHAPTER ONE

1.1 Introduction

There is enough information to hold credence for the effectiveness of emergency care as a public health strategy for secondary disease prevention. Figures show that more than half (54%) of worldwide morbidity and mortality can be attributed to emergency medical conditions (Chang, Abujaber, Reynolds, Camargo, & Obermeyer, 2016; Jamison et al., 2017; Razzak & Kellermann, 2002). Emergency care systems are increasingly becoming pivotal and recognized as an essential delivery platform in the prevention of a substantial proportion of death and disability, (Pines et al., 2011; Risko, Calvello, De Ramirez, Narayan, & Hirshon, 2011). Internationally, the global burden of disease is shifting towards a greater incidence of acute illness. This is creating the need for emergency care especially in most low income and middle-income countries (LMIC) where the shift seems to be very profound with a greater incidence of acute illness and injury occurring and requiring effective emergency care. The World Health Organization(WHO) through its Resolution 60.22 has created a support platform for member states in the establishment and strengthening of emergency service systems as well as for design of quality-improvement programs critically needed for competent and timely provision of essential trauma and emergency care'.(Anderson et al., 2012). Despite the rapid uprising facility-based emergency service delivery trends, quality assurance strategies have not been at par. Well-established emergency care systems in high-income countries tend to have quality improvement programs that has significant impact on standardization of service delivery the development of quality measurement, assurance and impact ,(Indictors, Facility, & Care, n.d.; Shevin T. Jacob, MD, MPH; Patrick Banura, MBChB,

MPH; Jared M. Baeten, MD et al., 2010; Voluntary & Standards, 2010). However, delivery of coordinated; quality emergency care is still in its infancy in many locations in LMICs. A brooding challenge has been the provision of a context relevant, pragmatic measurement of the state of emergency care in LMICs that provides an objective situational assessment that allows for an adequate framework for quality improvement. Perhaps because care is delivered through a heterogeneous network of facilities which sometimes leads to inefficiencies in medical records keeping, even for basic information such as patient identity and diagnosis (R. Hsia, Razzak, Tsai, & Hirshon, 2010; R. Y. Hsia & Carr, 2011; Mowafi et al., 2013). Until recently there was no national ambulance service in Ghana and very few privately owned ones. The main means of transport to a health care facility consisted of taxis, other commercial vehicles, and private vehicles,(Osei-Ampofo et al., 2013). Osei-Ampofo et al. again noted that victims of road traffic accidents, women with pregnancy-related emergencies, and patients with other medical emergencies did not have access to formal pre-hospital care. Emergency units or departments in Ghana have historically been staffed and run by medical officers, junior doctors or nurses with almost nonexistent training in emergency medicine. Many of these units did not have access to surgical cover. The few units that did have were manned by junior level surgical staff with little supervision. Without evidence supporting data, it is difficult for policy makers to make major investment.

Health care services are both heterogeneous and intangible hence makes quality assessment even more difficult to gauge and pinned heavily on service process and customer and service provider interactions (A. Mosadeghrad, 2012) . The African context

is not taken cognizance of in the formulation of many accepted emergency service indicators. Work done by Broccoli et al., 2018), recognized seven conditions addressing a vast majority (nearly 75%) of mortality in the African region to prioritize during indicator development. The result was a 72-indicator list which when adapted would provide an objective acceptable for purposes of standardization of emergency care, comparison of system strengthening and resource allocation. This study seeking to assess facilities capabilities to address emergencies and glean into the quality of care provided will help guide allocation and distribution of resources by policy makers.

1.2 Problem Statement

There is a current shift of disease burden from infectious to non-communicable diseases and injury coupled with advances in medical therapies. More people are therefore living longer with chronic diseases and as such there now are an increase in the frequency of acute exacerbations of many of these chronic conditions.(Survey,2014). The current health picture therefore is a combination of chronic, reemerging and new infectious diseases plus an increasing chronic non-communicable diseases and injuries with their attendant acute exacerbations.

In alignment with Sustainable Development Goals (SDG) 3 and 11, (UNDP, 2015) which sets a sound framework to encourage the promotion of quality emergency care in all member states, the government of Ghana through its policy statement provided direction for strengthening accident and emergency care service in 2011(A&E policy doc). In 2011, Ghana through the Ministry of Health (MOH) emphasized her commitment to

strengthening emergency care delivery by issuing a policy statement directing all health facilities to provide Accident and Emergency (A&E) services. Implementation of policy was at facility level. The result of policy was a guideline document detailing infrastructural, human resource and management process requirements for enhancing capacity to provide emergency care services at health facilities Various indicators have been created for monitoring and evaluation for quality improvement. These indicators at the facility level is broadly categorized into those assessing pre-hospital and referrals system, clinical care, health facility emergency department documentation and emergency department functioning. The first critique of the indicator list of this document is the lack of a clear indicator definition. Secondly it does not give a clear idea of how implementation of the document enhances the capacity of facilities to manage emergency cases or whether we can now tell what the different facilities' emergency management capacities are. The quality of emergency care also given has at yet to be ascertained.

Post implementation of emergency policy data should show increased strengthened emergency management capacities at all levels of healthcare service delivery. At the highest point of emergency care delivery in the northern region, preliminary data points to not only an increasing demand and utilization of emergency services but also an increase in mortality rates.

This study proposes to assess the current emergency care capacities of government facilities in Tamale using Emergency Care Assessment Tool (ECAT) ,which employs signal function, and to assess the quality of care provided at these facilities.

1.3 Objective

The general objective of this study is to assess the current capacity of government hospitals in the Tamale Municipality to provide quality emergency care.

1.3.1 Specific Objectives

The specific objectives of this study are to;

1. Determine capacity of facilities to perform signal functions at government hospitals in Tamale
2. Examine factors affecting capacity to perform signal functions at government hospitals in Tamale
3. Assess the quality of emergency care in government hospitals in Tamale

1.4 Research Questions

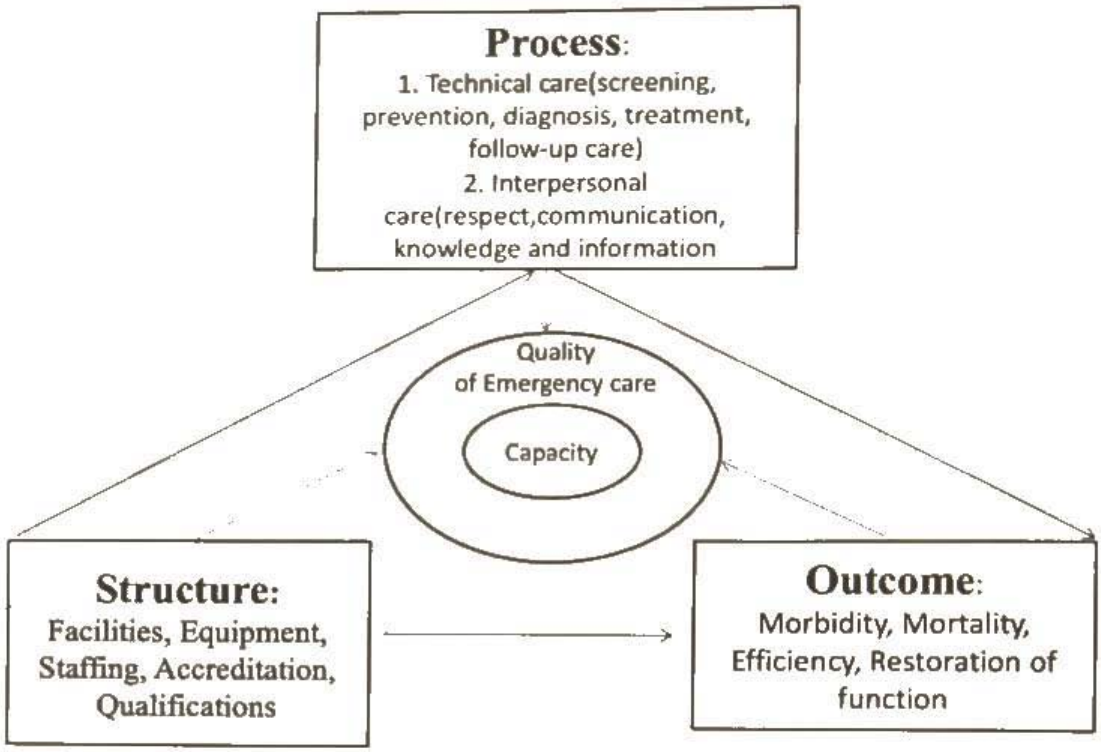
The research question to be explored under the study are;

1. What is the current capacity of government hospitals to perform signal functions in the Tamale Municipality?
2. What factors are affecting capacity to perform signal functions at government hospitals in Tamale?
3. What is the current quality of emergency care given in government hospitals in Tamale?

example, the length of time a patient waits for a senior clinical review, if a patient receives certain standards of care or whether patients are kept informed of delays when waiting to receive review dates etc. Structure measures examines the characteristics of the service/provider such as staff to patient ratios, infrastructure, provider competence, operating times etc. Good structure should promote good process and good process in turn should promote good outcomes.(Fund, 2013). The WHO framework describes health systems in terms of six core components or building blocks which include service delivery, health workforce, health information systems, access to essential medications, financing and leadership or governance. These building blocks contribute differently to the strengthening of health systems, improving quality of care, safety and access. Of these, medical products and technologies and service delivery, reflects the immediate outputs of the health systems

A corroboration of capacity is by processes and structures as well as outputs, (Agyepong, Anniah, Aikins, Akweongo, & Esena, 2015). As shown in the diagram, capacity and quality of emergency care are evidenced by process, structure and outcomes.

Figure 1: Conceptual framework of capacity and Quality of Emergency care



Donabedian (2003).

CHAPTER TWO

LITERATURE REVIEW

2.1 Burden of Emergency care

Emergencies by design can occur wherever, whenever; without exception healthcare facilities are bound to be faced with acutely ill patients, whether they are prepared or not, (Calvello, 2015). Emergency care is defined as care that is delivered in the first few hours after the onset of acute medical conditions or injury, (WHO,2016). Albeit to contributing to a quarter of the global burden of disease, sub-Saharan Africa, still lacks structured emergency care systems,(Aufderheide et al., 2013). Jamison D ed. (2006) corroborated this in his research which pointed this lack resulting in most low income countries suffering the highest rates of injury, maternal death due to complications of pregnancy, and acute complications of communicable diseases such as TB, malaria, and HIV. Aggravating the burden of acute disease burden is a rapidly growing prevalence of non-communicable disease, as patients from these countries also suffer the highest rates of mortality from acute complications of chronic diseases, (Mbugua P.K.et al,2005)

In Ghana the burden from communicable diseases is estimated to be fifty-two percent, with the potential to reduce to about forty percent in the next two decades,(GHS, 2010). The burden from or non-communicable diseases on the other hand is estimated to increase from forty-one percent to forty-seven percent during the same periods whiles injuries and accidents will increase two fold, (GHS, 2010).More people are therefore living longer with chronic diseases and as such there now is an increase in the frequency

of acute exacerbations of many of these chronic conditions, (MacKay M, et al, 2018) The country's health picture can then be said to be characterized by a mix of persistent, new and reemerging infectious diseases and increasing chronic conditions and injuries. This picture will lead to vital changes in the volume and composition of demand for healthcare; with a more complex case mix and more costly service utilization patterns observed, (Agyei-Mensah & De-Graft Aikins, 2010). To ensure seamless flow of care, both pre-hospital and facility-based emergency care are essential components. The amalgamation of acuity-based triage, rapid intervention , and a syndrome-based approach to undifferentiated patients-which together comprise effective emergency care practice, momentously reduces the indisposition and impermanence associated with a range of medical, surgical, pediatric, and obstetric conditions, (Langli, Mduma, Svensen, & Perlman, 2012; Shevin T. Jacob, MD, MPH; Patrick Banura, MBChB, MPH; Jared M. Baeten, MD et al., 2010). A such there is snowballing acknowledgement that emergency care system strengthening initiatives are an elemental part of tackling the global encumbrance of disease, (E. J. B. Calvello et al., 2013; Razzak & Kellermann, 2002).,. Launched in 2001, The Disease Control Priorities project, a partnership between Fogarty International Center of the US National Institutes of Health, the WHO, and The World Bank to identify policy vagaries and intervention strategies for the health problems of low-income and middle-income countries, estimates that 45% of deaths and 36% of disability in low- and middle-income countries could be attended to by the enactment of emergency care systems,(Kobusingye, 2013). To this end the World Health Assembly has called for its member states to develop "formal, integrated emergency care systems."(Anderson et al., 2012). Arguably, Ghana's existing emergency care system is

rudimentary in comparison to those in developed countries. Per se, the lack of timely, sufficient, inexpensive, evenhanded access to care means that many medical needs present not only as an emergency but often late.

2.2 Quality of Emergency care

The need to assess the kind of service being provided at all service points is important for quality improve especially so with the service of health care. The quality of health care is a subject that has longed been discussed over the decades with Mosadeghrad,(2013) observing literature around quality of hjealth care and medical practice emerging prominently throughout the late 1900s. By the early 90s there existed scaffolds and prototypes developed to guide implementation, assessment and measurement of quality of care. At the crust of these discussions though, was a very mottled understanding of the subject matter with modern quality assurance inquiry following two main corridors. The first has been with respect to defining what quality is whiles the other is preoccupied with finding ways of measuring it. Donabedian, regarded by sundry as the father of the academic enterprise of quality assessment in health however as early as the 19880s (Donabedian, 1983, 1988), provided a three-volume summary of the field. His definition couched healthcare quality as 'the application of medical science and technology in a manner that maximizes its benefit to health without correspondingly increasing the risk. He, among others, offered the categories of "structure," "process," and "outcome" as the three classes of potential objects of investigation. "Structure" examines the characteristics of the resources that are assembled to provide health care, including, for example, the

definition exists. It may Quality, therefore, has assumed definitions such as 'significance' (Feigenbaum, 1951); 'distinction' (Peters, Thomas J. and Waterman Jr, 1977); 'conformance to specifications' (Gilmore HL,1974); 'meeting and/or exceeding customers' expectations' (Parasuraman, Zeithaml, & Berry, 2016), and 'consistently delighting the customer by providing products and services according to the latest functional specifications which meet and exceed the customer's explicit and implicit needs and satisfy producer/provider'(A. M. Mosadeghrad, 2013). These perspectives also include that of healthcare providers', managers', patients', and policy-makers'.

John, (2009) demarcates quality care as the 'Provision of care that exceeds patient expectations and achieves the highest possible clinical outcomes with the resources available'. Developing a system for refining the quality of healthcare based on quality dimensions viewed in three different planes: professional, client, and management quality. From the management quality level, focus is on resource efficiency in the discharge of service whiles client quality critiques beneficiary's satisfaction of services. Professional quality is based on professionals' views of whether professionally assessed consumer needs have been met using correct techniques and procedures.

According to Schuster,(1998) good healthcare quality encompasses four key ingredients of technically competent manner, with good communication, shared decision making and cultural sensitivity in the provision of appropriate patient service . A. M. Mosadeghrad, (2013) identified 182 attributes of quality healthcare and grouped them into five categories: environment, empathy, efficiency, effectiveness and efficacy. Earlier in his

study he concluded that quality healthcare incorporates features such as availability, accessibility, affordability, acceptability, appropriateness, competency, timeliness, privacy, confidentiality, attentiveness, caring, responsiveness, accountability, accuracy, reliability, comprehensiveness, continuity, equity, amenities, and facilities (A. Mosadeghrad, 2012)

These factors can be broadly categorized under patient related, provider related and environmental factors.(A. M. Mosadeghrad, 2014)

The importance of quality indicators cannot be overemphasized in light of efforts improve quality assurance. Using easily accessible data, indicators allow hospitals to screen for potential quality and safety problems so as to liken themselves to other hospitals using national benchmarks of hospital care. Factors influencing quality of healthcare can be broadly looked at from three perspectives. These are the patients', health professionals and the environmental related factors. Accordingly, a patient's perspective of the quality of health care may be influenced by patient's socio-demographic factors, type of illness and patient's cooperation. Many elderly cancer patients for example have a preference for oral over intravenous medications mainly because of convenience, ability to receive treatment at home, side effects and cost,(Eek et al., 2016), and hence will not feel satisfied with services if a doctor does not prescribe an oral as part of their treatment. Sometimes the patient cannot afford the costs associated with his or her treatment and decides to cancel the treatment. About 1 in 10 adults report that they delayed or did not get care because of its cost. Uninsured adults are more likely to delay or go without care due to cost,(Terlizzi, Cohen, Ph, & Martinez, 2019). Krishna

(2006) identified the cost of treatment for illness to be the cause of 85% of all cases of impoverishment. Van Doorslaeret al, (2006) found that an additional 78 million people in 11 Asian countries would fall below the extreme poverty line if conventional poverty estimates incorporated out-of-pocket expenditure for health. If the patient does not follow the doctor's orders due to financial problems, the treatment will not be effective.

Quality of patient care depends directly on the quality of patient education and responsibility, (Carrillo,1999). Patients in the United Kingdom did not seem concerned about the age of their doctor as long as he or she was of an age normally practicing in the UK (27-65 years), (Mckinstry, 1994). They had some stereotyped views on the characteristics of older and younger doctors, but these were not held particularly strongly. Patients appeared to want a balance with the doctor being experienced and being up to date,(Mckinstry, 1994). Anecdotal evidence may suggest a reverse in Ghana where people are still gradually getting use to younger providers of healthcare services and preference for much older ones still high.

The quality of healthcare services mainly depends on practitioners' knowledge and technical skills or competence(A. M. Mosadeghrad, 2014). Competence can be defined as the ability to perform a specific task in a manner that yields desirable outcomes. This definition implies the faculty to employ knowledge, skills, and abilities successfully to new circumstances as well as to accustomed tasks for which prescribed criteria exist, (Lane and Ross, 1998). The competence a health worker acquires is gradual and ideally incremental, (Benner, 1984). Typically, pre-service education or an initial training

(2006) identified the cost of treatment for illness to be the cause of 35% of all cases of impoverishment. Van Doorslaeret al. (2006) found that an additional 78 million people in 11 Asian countries would fall below the extreme poverty line if conventional poverty estimates incorporated out-of-pocket expenditure for health. If the patient does not follow the doctor's orders due to financial problems, the treatment will not be effective.

Quality of patient care depends directly on the quality of patient education and responsibility. (Carrillo,1999). Patients in the United Kingdom did not seem concerned about the age of their doctor as long as he or she was of an age normally practicing in the UK (27-65 years), (Mckinstry, 1994). They had some stereotyped views on the characteristics of older and younger doctors, but these were not held particularly strongly. Patients appeared to want a balance with the doctor being experienced and being up to date,(Mckinstry, 1994). Anecdotal evidence may suggest a reverse in Ghana where people are still gradually getting use to younger providers of healthcare services and preference for much older ones still high.

The quality of healthcare services mainly depends on practitioners' knowledge and technical skills or competence(A. M. Mosadeghrad, 2014). Competence can be defined as the ability to perform a specific task in a manner that yields desirable outcomes. This definition implies the faculty to employ knowledge, skills, and abilities successfully to new circumstances as well as to accustomed tasks for which prescribed criteria exist, (Lane and Ross, 1998). The competence a health worker acquires is gradual and ideally incremental, (Benner, 1984). Typically, pre-service education or an initial training

collaborate with other health professionals or institutions is also considered essential to the delivery of high quality medical services.(A. M. Mosadeghrad, 2014)

2.3 Capacity to provide emergency care

Over the years in affluent countries, advances in clinical science and care delivery have dramatically improved process efficiency and patient outcomes for a range of acute conditions, (Rogers et al., 2000). The assorted networks of facilities and different cadre of professional with different organizational capacities makes measuring the state of emergency care in Low and middle income countries (LMICs) challenging, (R. Hsia et al., 2010; R. Y. Hsia & Carr, 2011). Even in non-crisis situations, small surveys, (Walline, Yu, & Jr, 2013) and anecdotal accounts, (Gawande, 2003) hint at high volumes of critically-ill patients seeking emergency care in LMICs. This makes emergency care different from other health settings – including primary care – where doctors typically see only 8–10 ambulatory patients per day, (Hammer, 2014). Ghana's existing emergency care system is still in its infantile stages in comparison to those in developed countries.(Osei-Ampofo et al., 2013) As such the lack of timely, adequate, affordable, equitable access to care means that many medical needs present as an emergency and often late. Until recently there was no national ambulance service and very few privately owned ones. The main means of transport to a health care facility consisted of taxis, other commercial vehicles, and private vehicles, (Osei-Ampofo et al., 2013). The country currently has 23 trained emergency physicians and 54 emergency trained nurses. Of these numbers the northern region has three emergency physicians and eight emergency trained

Skog, Tenner, & Wallis, 2015). The Pre-Hospital Trauma Care Systems Form 3 is a third tool which helps to identify the skills, supplies, and equipment that will enable community members and healthcare providers to assess, stabilize and transport injured victims to appropriate facilities. It focus is mainly with the pre-hospital phase of emergency care, whiles the Pre-hospital Trauma Systems Checklist (Bae, 2016) is the fourth tool which also is a checklist used for assessing knowledge, skills, equipment and supplies in trauma and injury care. This fourth tool however does not cover clinical skills, equipment, supplies or medicines commonly used to treat medical or obstetric emergencies (Bae, 2016). Lastly, Monitoring Emergency Obstetric Care Handbook, a fifth tool, is a guide used for defining health facilities with regard to their capacity to treat obstetric and newborn emergencies. These definitions are then used to guide users on the availability of the services at that facility. (http://informahealthcare.com/doi/abs/10.3109/01443611003791730) Since each of these tools catalogued above focused on either an aspect of emergency service provision or brings to the fore only a particular stratum of care they in no way provide a composite assessment of emergency service provision. The need therefore for a standardized assessment tool that will help in the advancement of the emergency care system as well as chaperon health care facilities in the implementation of affordable and effective emergency care cannot be highlighted.

According to Mbonye, et al, (2007), equipment, staff, infrastructure, drugs and supplies are important predictors of the level of preparedness for a health facility to manage obstetric emergencies using signal functions. This concept of "signal functions" that have

been effective in defining critical emergency obstetric interventions was considered by the African Federation of Emergency Medicine (AFEM) in its design of a tool to assess capacity of facilities in their ability to manage emergency cases. Signal functions are key medical interventions that, when completed successfully, reveal the existence of a functional system. This mitigates the daunting task to assess each individual component of a critical intervention. Succinctly, signal functions represent a culmination of knowledge, interventions, and supplies. For example, effective administration of parenteral antibiotics implies the presence of clinical judgment that the antibiotics are appropriate, the skill to place an IV, and the presence of IV tubing, catheters, and medication. The lack of a signal function component implies a defect or flaw in the system. Used this way, signal functions limit the number of items that need to be assessed to accurately characterize a system. Key emergency syndromes were agreed upon by emergency experts from different countries. The agreed upon sentinel emergency syndromes that represented acute illness highly likely to progress to death were: respiratory failure, shock states, altered mental status, dangerous fever and severe pain (including trauma). A search of the literature shows concept in obstetrics care has been implemented in Ghana with significant results,(GHS, UNFPA, & Amdd, 2011). This has resulted in the design of appropriate training programs for health care professionals in emergency obstetric care adapted to Tanzania, Kenya, Zimbabwe (Ameh, 2015) and South Africa. There is however none for assessing general emergency care. As such the capacity to perform signal functions in general emergency care is unknown in Ghana.

2.5 Measurement and Performance of Signal functions

Emergency Care Assessment Tool (ECAT) permits a practical, objective evaluation and designation of tiers of care based on the capacity for critical service provision, instead of a simple portfolio of materials available at a specific facility(Broccoli et al., 2018; Reynolds et al., 2014). The main indicator for ECAT is the provision of essential emergency services. The World Health Organization (WHO), in 2015, developed a tool targeting the specific clinical syndromes for obstetrical emergencies in Monitoring emergency obstetric care (EmOC), (E. J. Calvello et al., 2015).These obstetric and newborn emergencies include hemorrhage, sepsis, unsafe abortion, pre-eclampsia, eclampsia, and prolonged obstructed labour (E. J. Calvello et al., 2015). The WHO EmOC tool specifically uses "signal functions" to assess a facility's ability to deliver specific life-saving interventions to manage these emergencies. EmOC's signal functions were based on specific clinical syndromes that occur for obstetrical emergencies. Similarly, emergency conditions also have specific clinical syndromes, regardless of aetiology, that occur before death, called "sentinel conditions". Informed partway by the WHO Integrated Management of Adult and Adolescent Illness, the sentinel conditions for emergencies include: Respiratory failure, Shock states, Altered mental status, Dangerous fever, Severe pain, and Trauma, (WHO, 2009).The concept of "signal functions" , that has been effective in defining critical emergency obstetric interventions, was used in the design of ECAT. ECAT tool is a questionnaire which is divided into six main themes, in line with the modified sentinel conditions: Respiratory failure, Shock, Altered mental status, Severe pain, Trauma, and Maternal health. These sentinel conditions were selected and adapted from the three-delay model that was developed for reducing maternal

mortality. Calvello, (2015) emphasized that emergency medicine experts in the 2013 African Federation of Emergency Medicine (AFEM) meeting agreed that these concepts could be applied to emergency health services in low- and middle-income countries and have similar positive impacts as seen in maternal mortality reduction. The use of signal functions limits the number of items that need to be assessed to accurately characterize a system.(Reynolds et al., 2014). Reasons for a health worker's inability to perform these signal functions were grouped under the following with their respective definitions for clarity:

- Policies: Lack of policies and process that facilitate optimal patient care (e.g. triage system, timely patient movement to definitive care, automatic financial provision for emergent patient)
- Human resources: insufficient number of authorized cadres of health care workers to perform the desired function
- Health care worker training: authorized cadre is available but not trained, or there is a lack of confidence in providers' skills
- Supplies, equipment, medication: supplies and equipment are not available, not functional or broken, or needed drugs are unavailable
- Infrastructure: critical facility-based infrastructure, such as electricity, lab, blood bank, X-ray, CT scan, intensive care unit, are not available or not functional
- No indication: no client needing this procedure comes to this facility

Table 1: **Sentinel Conditions and Example Signal Functions**

Sentinel condition	Example signal functions
Respiratory failure	• Oxygen administration • Relieve obstruction of airway • Bag valve mask ventilation
Shock	• Packing and suturing for control of hemorrhage • Peripheral percutaneous venous access • Administration of epinephrine for anaphylactic shock
Altered mental status	• Check and/or administer glucose if required • Administer benzodiazepine for seizure • Perform lumbar puncture
Severe pain	• Administer opiate-based analgesia • Perform therapeutic paracentesis • Perform point of care ultrasound in the EU
Trauma	• Perform initial appropriate wound care • Immobilize fracture (basic) • Administer tetanus vaccine and IVI as indicated
Dangerous fever	• Perform source control with bedside techniques, including abscess and empyema drainage • Perform rapid cooling • Measure serial lactate

(Bae et al., 2018)

This study utilized the ECAT because it assesses a facility's ability to perform signal functions in relation to the six sentinel conditions, instead of categorizing facilities as "intermediate", or "advanced" like existing WHO tools do, (E. J. Calvello et al., 2015). Service Awareness and Readiness Assessment (SARA) tool was not chosen for this work because SARA focuses on the whole facility and not skewed towards emergency service delivery.

The other tool employed in this study was the AFEM Quality Indicator Tool which was used in assessing the quality of emergency care. This tool was designed in 2016 by AFEM taking cognizance of the African context. It lists a set of different indicators for process, structure and outcomes. All these indicators broadly took cognizance of the six modified sentinel conditions: Respiratory failure, Shock, Altered mental status, severe pain, Trauma, and Maternal health.

2.6 Factors affecting capacity to provide emergency care

Capacity is tightly linked with performance. "Capacity is defined as ability of individuals, organizations or systems to perform appropriate functions effectively, efficiently and sustainably." Applied in the field of health, capacity could be defined as following: Capacity of a health professional, a team, an organization or a health system is an ability to perform the defined functions effectively, efficiently and sustainably and so that the functions contribute to the mission, policies and strategic objectives of the team, organization and the health system, (UNDP, 1998).

Processes and structures as well as outputs are evidence of capacity, (Agyepong et al., 2015). This invariably means that factors affecting processes and structure will affect capacity. These factors include availability of clear policy, human resources, health care worker training, supplies, equipment, medicines and infrastructure.

Policy according to the World Health Organization refers to decisions, plans, and actions that are undertaken to achieve specific health care goals within a society such as emergency care. An explicit health policy can achieve several things: it defines a vision for the future and helps establish targets and points of reference for the short and medium term. The emergency policy details structures, processes and outcomes expected to help strengthen every emergency department or unit in Ghana. It outlines priorities and the expected roles of different groups; and it builds consensus and informs people. This is important in emergency care management since all actors from prehospital to facility levels are aware of the structure and systems of care needed to be followed in managing different emergency scenarios. With this understanding comes a more efficient and effective way of managing cases. Human resources are one of three principal health system inputs, with the other two major inputs being physical capital and consumables. As arguably the most important of the health system inputs, the performance and the benefits the system can deliver depend upon the knowledge, skills and motivation of those individuals responsible for delivering health services, (WHO,2000). The variation of size, distribution and composition within a county's health care workforce is of great concern. For example, the number of health workers available in a country is a key

indicator of that country's capacity to provide health care delivery and interventions, (WHO, 2003). As at the end of 2013 the National Ambulance Service had trained more than 1316 emergency medical technicians, (Oduro, 2015), whiles the Ghana Emergency Medicine Collaborative has over the past ten years trained about 50 specialist emergency physicians. There are many more nurses both graduated and in training currently. The vast majority of trained emergency doctors and nurses are concentrated in Kumasi with only a few in Tamale and Accra. The three northern regions for example currently only two emergency physicians and 12 emergency trained nurses. These numbers are insufficient to handle the growing number of emergencies in these parts of the country. Workforce training is another important issue.

It is essential that human resources personnel consider the composition of the health workforce in terms of both skill categories and training levels. New options for the education and in-service training of health care workers are required to ensure that the workforce is aware of and prepared to meet a particular country's present and future needs, (WHO,2003). A properly trained and competent workforce is essential to any successful health care system. Traditionally, poor performance of health workers is considered a result of poor education and a lack of knowledge and skills, and that as long as providers know the correct care and decisions to make, they would implement them (Brugha and Zwi 1998). The majority of interventions to improve health worker performance therefore, focus on education, training, and dissemination of evidence-based guidelines through didacticism. This, together with supervision with audit-and-feedback techniques usually proved an effective complement to training. Fritzen (2007) and Bach

CHAPTER THREE

METHODS

3.1 Introduction

This chapter sets out the methods and procedures that were used to undertake this study. These procedures were designed to meet the research objectives and to address data collection problems that may have arisen in a research of that nature. The method throws light on the general procedures that were used including contextual backgrounds and settings under which study was carried out. There also is an indication here of the ethical considerations that were observed.

3.2 Study design

This was a descriptive cross-sectional study which employed quantitative and qualitative methods to elicit responses to the specific objectives. Data were collected from all four (4) government hospitals over a two (2) week period in the month of June in the Tamale metropolis of the Northern region from doctors or nurses in charge of the emergency department or units. This was a descriptive cross-sectional facility-based survey aimed at determining emergency management capacity and quality of care using Emergency Care Assessment Tool (ECAT) and African Federation of Emergency Medicine (AFEM) Quality of Care tools.

3.4 Study Population

The study population will include all four government hospitals in the Tamale Metropolis, namely Tamale Teaching Hospital (Tertiary), Tamale Central (District), Tamale West Hospital (Regional),) and SDA hospital (Mission)

3.5 Sample Size

Data was collected from all four government hospitals in the Tamale Metropolis. This was a census. Each doctor or nurse in charge of the emergency department or unit as interviewed one -on- one. A total of four doctors or nurses in charge of emergency departments or units were interviewed.

3.6 Study Site

The Tamale Teaching Hospital is a regional hospital in Tamale in the Northern region of Ghana. It serves as a referral hospital for the three northern regions of Ghana. It cooperates with the University for Development Studies in Northern Ghana to offer undergraduate and graduate programs in medicine, nursing and nutrition. It is the third teaching hospital in Ghana after the Korle Bu Teaching Hospital and the Komfo- Anokye Teaching Hospital. The hospital was established in 1974 and was formerly known as the Tamale Regional Hospital. It was to provide various health care services to the people of the three Northern regions of Ghana namely, the Northern, Upper East and Upper West

regions.

In 2005 the Northern Regional Coordinating Council decided to partner the Ghana Health Service to upgrade the hospital to the status of a Teaching Hospital. The upgrade made the hospital the third teaching hospital in the country. The upgrade was to help with the training of health professionals from the University of Development Studies. The mandate of the hospital is set by Act 525 of the Ghana Health Service and Teaching Hospitals Act of 1996. The stipulation of the mandate empowers the hospital to function in three critical areas namely, the provision of advanced clinical health services, supporting the training of undergraduates and postgraduates in medical sciences and finally, undertaking research into health issues for the purpose of improving health care.

The Tamale West hospital serves as a referral Centre for clinics and nearby districts like, Tolon/Kumbungu, Central Gonja and Savelegu/Nanton all in the Northern Region of Ghana. It provides 24 hours' service and renders services including Emergency services, Medical services, ANC services, PMTC and VCT Services, Laboratory and X-ray Services, Ultra Sound Service, Eye Clinic, Gynecological Services, NHIS Service and surgical services.

The Tamale Central Hospital (Old hospital) formally was established in July 1928 and served as the Regional Hospital of Northern Region and also a referral points for the upper region until 1974 when it was closed down following the commissioning of the current Tamale Teaching Hospital. The structure then metamorphosed into offices for disease control activities, Guinea Worm eradication programs, places, of worship and schools. The hospital is located in the central business district of Tamale and shares

boundaries with the Tamale police barracks. The hospital has eleven (12) departments and units performing various specific functions. This includes emergency, record staffs, Laboratory, Mortuary, X-ray, Maternity/Wards, Theater, Dispensary, Kitchen, Laundry and Environmental Health Unit. The wards at the hospital are surgical, maternity and medical. These are subdivided into male and female. It has a blood bank, a dental unit, pediatric unit, and ENT (Eye, nose, throat) unit. It has over 120 bed capacity. The hospital has an average annual outpatient attendance of 65,000 and 10,500 admissions respectively.

The Seventh Day Adventist (SDA) Hospital started as a clinic in 1996 in a community called Jakalayili in Tamale metropolis, but later moved to its present location on the main road to Tamale Teaching Hospital adjacent the SDA cluster of schools on 2 February 2014. It assumed hospital status in February 2005. The 127-bed capacity SDA Hospital in Tamale was established by the SDA Church.

3.7 Inclusion criteria

All government hospitals with an emergency unit in the Tamale Metropolis.

3.8 Exclusion criteria

All health facilities, government or private that are not classified as hospitals.

3.9 Sampling Procedures

Using a purposive sampling method, (Maxwell, 2004), the in-charges of each of the four government hospitals in the Tamale Metropolis were selected to be interviewed. Yearly records spanning over the past four years (2015-2019) was used to calculate process, structure and outcome indicators.

3.10 Study variables

The dependent variables for this study were facility capacity and quality of care. The independent variable in this study was the emergency policy.

3.10.1 Table 1: Capacity to perform signal functions

Variable	Operational Definition	Scale of measurement	Indicator
Capacity	Evidence by process, outcome and process	Signal functions	Able to perform signal functions coded as 1 /Unable to perform signal functions. Coded as 0

Quality of care	Evidence by process, outcome and process	Mortality from trauma	% of patients with trauma related chief complaint who died within 24 hours of emergency unit presentation

3.11 Data collection techniques and tools

This research employed the use of questionnaires: The ECAT questionnaire and the AFEM Quality Indicators for Facility Based Care. These questionnaires contain structured questions.

ECAT is organized into six (6) thematic areas: Respiratory Failure, Shock, Altered Mental Status, Severe Pain, Trauma, and Maternal Health. These are the modified sentinel conditions. This tool was developed by AFEM through consensus building (using Likert scales) of 135 experts from 32 countries in an effort to develop a framework to meet the broad assessment needs of budding African emergency care systems. They identified the main life-threatening conditions (sentinel conditions), that should be able to be handled by a fully operational Emergency Unit (EU), and then identified the necessary functions that an EU must be able to perform to handle them well (signal functions). These signal functions were used as the foundation for a facility-based emergency care assessment framework in Africa.

The ECAT has a total of 72 items. Advanced facilities such as Tamale Teaching Hospital are expected to perform all 72 signal functions, while intermediate facilities should be able to perform 53. There were many barriers to the inability of facilities to perform these signal functions. These 'barriers to delivery' were evaluated for each signal function and defined as issues surrounding:

- Policies: lack of policies and processes that facilitate optimal patient care (e.g., no triage system, lack of timely patient movement to definitive care).
- Human resources: insufficient number of empowered healthcare workers to perform the desired function.
- Healthcare worker training: cadre is available but not trained or there is a lack of confidence in providers' skills
- Supplies/equipment/medication: supplies and equipment are not available, not functional or broken, or needed medications are unavailable.
- Infrastructure: critical facility-based infrastructure is not available or not functional (eg. electricity, lab, X-ray).
- No indication: no indication can be identified as to why the signal function cannot be performed at least 90% of the time.

3.11.1 Administration of the ECAT tool

After obtaining consent (Appendix E,F), the tool was administered to each respective facility's Head of Emergency in a face to face meeting. Each survey administration lasted about 45 minutes. The researcher was on hand to answer any questions as the Head of Emergency completed the form on paper in English.

Since ECAT is a prospective tool, the Head of Emergency was given the opportunity to provide detail with each signal function. For example, the researcher would ask, "If a patient with (sentinel condition) entered your health facility right now, would you be able to (signal function) at least 90% of the time." If the answer was "No" the respondent would be asked why, and the results classified under "Barriers to delivery". Any further details were collected under the "Comments" section.

3.11.2 Data collection procedures

First, interviewees read information about the study and the interviewer gave them the opportunity to ask questions. After clarification, the interviewees signed the consent form (Appendix E, F). They also completed a form collecting background information on their facility's capacity and on the interviewee's position and skill level at the facility (Appendix D). They were then explicitly encouraged to ask questions and provide comments during the survey. The interviewer explained and provided examples for each barrier to delivery and allowed time for additional questions. Within the consent form,

they were also given standardized information with definitions and examples to reference throughout the administration of the survey.

The ECAT interview is a series of yes/no questions with possible follow up questions based on the response. It was made clear that answering "yes" to a question was stating that the signal function was available at least 90% of the time, 24 hours a day, and 7 days a week. ECAT was administered using appropriate language explained in the previous section (i.e. "If a patient with (sentinel condition) entered your health facility right now, would you be able to (signal function) at least 90% of the time.") A "No" response would then be followed by clarifying questions classified under "Barriers to delivery". Reasons for not performing procedures are chosen from a predefined list as follows: Policies, Human resource, Healthcare worker training, Supplies, Equipment, Medication, Infrastructure, No indication, and other/comments. When the reason for not performing the procedure was not listed, a space was provided for documenting the new reason. It was important that the interviewer stressed that ECAT was assessing the capability of the health facility and not the knowledge base of the interviewees.

The quality indicators for facility-based care tool are also organized under process, structure and outcome tools. Expert ranking was in 3 domains from 1-3 with a maximum score of 9. The 3 domains were indicator of the health system function, patient value, and feasibility. From these expert rankings one indicator was chosen purposively due to availability of data and percentage of patients with trauma-related chief complaint who die within 24 hours of EU presentation (Outcome). Information regarding outcome indicator was collected from the hospital chart/ record.

reported in the form of frequency tables, and bar charts. Frequencies were determined for each marked barrier to delivery. Frequencies for responses from "barriers to delivery" were also recorded. These were added together to generate a total number for each barrier under the three categories of health services; tertiary and regional and district facilities). Responses from "barriers to delivery" were analyzed using simple descriptive statistics to determine how often a given barrier occurred for a signal function. The quality indicator used for this study was mortality from trauma (Outcome indicator) and defined as follows

1. Mortality from trauma = % of patients with trauma-related chief complaint who died within 24 hours of emergency unit presentation

   Numerator: number of deaths from trauma within 24 hours of EU presentation

   Denominator: number of patients with trauma-related chief complaints

3.13.1 Analytical approach

Analytical approach used in the analysis of the results pertaining to the third objective was simple ratios.

3.14 Assumption

All government hospitals in Tamale have implemented the emergency policy as stipulated in 2011 by the Ministry of health.

3.15.2 Risk/Benefits

This research did not pose any major risk to the population under study required to answer questions from the survey tool. This study highlighted the influence of emergency policy on facility capacity and quality of care at government hospitals in Tamale. Benefits related to this study will not be just for the sampled population but also academicians and policy and decision makers.

3.15.3 Privacy and Confidentiality

The Principal Investigator ensured that the interview was conducted in a secure place free from interaction of other on-going activities. The participation to these interviews was voluntary. Participants were informed of their right to stop and opt out of the interview at any point during the process.

3.15.4 Anonymity and Confidentiality

All information provided by the respondents was kept confidential. Names and identities of interviewees was needed for the study. The information provided was only identified by a code number and treated with strict confidentiality. The name of interviewees did not appear or be mentioned in any part of the report of the study.

3.15.5 Data Storage and Usage

All files, papers and data obtained from to the study is locked in a cabinet and on computers protected by passwords. Electronic data files are stored on an external drive with a secured password with access limited to only the principal investigator and supervisor. Research assistant do not have access to these documents except when granted permission by either the principal investigator. Data files will be kept for six months after which they will be destroyed.

3.15.6 Compensation and Declaration of Conflict of Interest

No monetary compensation was offered to participants except for by word of appreciation. The Principal Investigator had no conflict of interest in this research.

3.16 Description of Subjects in the Study

Participants of this study were the Emergency Physician/ Doctor/ Nurse-in- charge of Emergency department or unit of each of the four government hospitals in Tamale.

3.17 Funding for the Study

The Principal Investigator self-funded this study.

were directly responsible for the day to day running of the emergency units. And also partook actively in the clinical management of patients.

Table 2: Themes and the different number of procedures required under each theme

Themes	Respiratory failure	Shock	Altered mental status,	Severe pain,	Trauma	Maternal health
No. of procedures	15	18	10	8	17	4

There is a total of six themes being assessed with ECAT. Each theme provided a specific number of procedures or signal functions to be performed under them with Theme Trauma having the most of 17 procedures and Theme Maternal Health had the least of 4 procedures or signal functions. (Table 2)

Table 3: Number of procedures performed across all centres according to hospital types

Hospital type	Hospital Name	Procedures performed	Procedures not performed	Total procedure
Teaching Hospital	Tamale Teaching Hospital (TTH)	49	23	72
Regional Hospital	Tamale West Hospital (TWH)	40	32	72
District Hospital	Tamale Central Hospital (TCH)	34	38	72
Mission Hospital	Seventh Day Adventist church (SDA)	31	41	72

Overall, across the tertiary hospital was able to perform more procedures (49 out of 72) with 23 not performed in comparison to regional (40 out of 72) and district (34 out of 72) hospitals, whiles the mission hospital performed the least with (31 out of 72). A total number of 32,38 and 41 procedures were not performed by Tamale West, Tamale Central and SDA hospitals respectively. (Table 3). None of the four (4) hospitals was able to perform all the 72 procedures, (Table 3).

Table 4: Reasons (factors) for not performing procedures (Signal functions) by Theme in All Hospitals

eason for not erforming rocedures	Themes						
	Respiratory failure	Shock	Altered Mental Status	Severe Pain	Maternal Health	Trauma	Total
o Health 'areWorker([CW) 'raining	21	32	7	6	0	20	86
lo upplies/Equi ıment/Medica ions	25	32	16	11	0	30	114
No Human Resources	21	26	7	6	0	21	81
No Infrastructure	6	0	3	0	0	0	9
No Policy	0	0	3	0	0	0	3
No Indication	0	0	0	0	0	0	0
Total	73	90	36	23	0	71	

The procedures (signal functions) that were most affected in terms of the frequency in which health facilities were able to perform them were shocks (n=90), respiratory (n=73), trauma (71). For all hospitals, the lack of supplies was the commonest reason for not

being able to perform procedures across all themes. The lack of infrastructure, and policy did not seem to affect the teaching hospital whiles no infrastructure alone was a reason for non-performance of procedures at the other three lower facilities (Tamale West, Tamale Central and SDA hospitals). All facilities had clearly displayed policies and guidelines which aided in standardizing procedures and decision making, especially in facilities where training and senior expertise is limited and are therefore key to sustainability and coordination of emergency care. Having no indication was never a reason for non-performance of procedures across all themes. For maternal health, all facilities were able to perform all procedures required. These procedures included: administering uterotonics, performing assisted vaginal delivery, performing newborn resuscitation and access to surgical services like caesarean section. (Table 4).

The main reasons health facilities were unable to perform emergency procedures included foremost the unavailability of supplies/equipment and medications (e.g. chest tubes, IV fluids, CT scan), and where these supplies were available the lack of training on how to perform these procedures was the second main reason. It was observed in this study also that the lack of human resource (i.e. insufficient number of empowered healthcare workers to perform the desired function), affected the ability of all the facilities to perform these procedures. (n=81). Tamale Teaching hospital is the only facility with emergency physicians and emergency nurses (total number =3 and 7 respectively). The other three facilities had medical officers and nurses with no emergency medicine training. Tamale West had one (1) dedicated medical officer and 24 nurses for the emergency unit whiles Tamale central had one (1) medical officer and 17 nurses dedicated to the emergency. The Mission hospital also had a medical officer who

Unavailability of supplies, equipment and medications (n=36) and the lack of health care worker training (n=29) was again more at the district level hospitals than the higher-level hospitals (i.e. Regional and Tertiary level).

The mission hospital which is an equivalent of a district hospital was unable to perform procedures mainly due to no supplies, equipment and medications (n=35), no training (26) and human resources (31) respectively. Health infrastructure least affected performance of procedures in all facilities (Table 5).

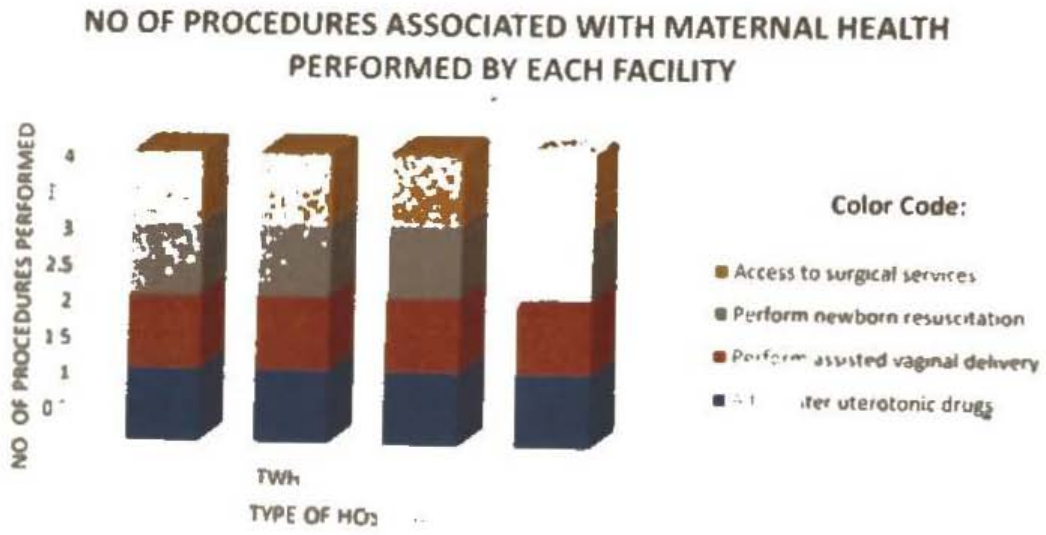
4.2 Respiratory Failure procedures for emergency care

The Respiratory theme had 15 different procedures broken down into procedures under obstructed airways (n=4) and respiratory distress(n=11) which each facility was supposed to be able to perform at all times. These included manual maneuvers, relief of obstruction, use of suction and surgical airway(cricothyrotomy). It also included complex procedures like invasive and non-invasive mechanical ventilation.

	Hospitals			
	TTH	TWH	TCH	SDA
Number of Respiratory procedures	10	9	7	6

Table 6: Number of respiratory procedures each facility performed

The teaching hospital was able to do more procedure under the respiratory theme than the other three facilities with SDA hospital being able to do the least (n=6). All of the facilities reported being able to perform all procedures related to obstructed airway except for surgical airway (cricothyrotomy;) of which only the Teaching hospital (1 out of 4 facilities) reported being able to perform (Figure 1).



*TTH: Tamale Teaching Hospital, TWH: Tamale West Hospital TCH: Tamale Central Hospital and SDA: Seventh Day Adventist

Figure 1: Frequency of procedures associated with obstructed airways performed by each facility

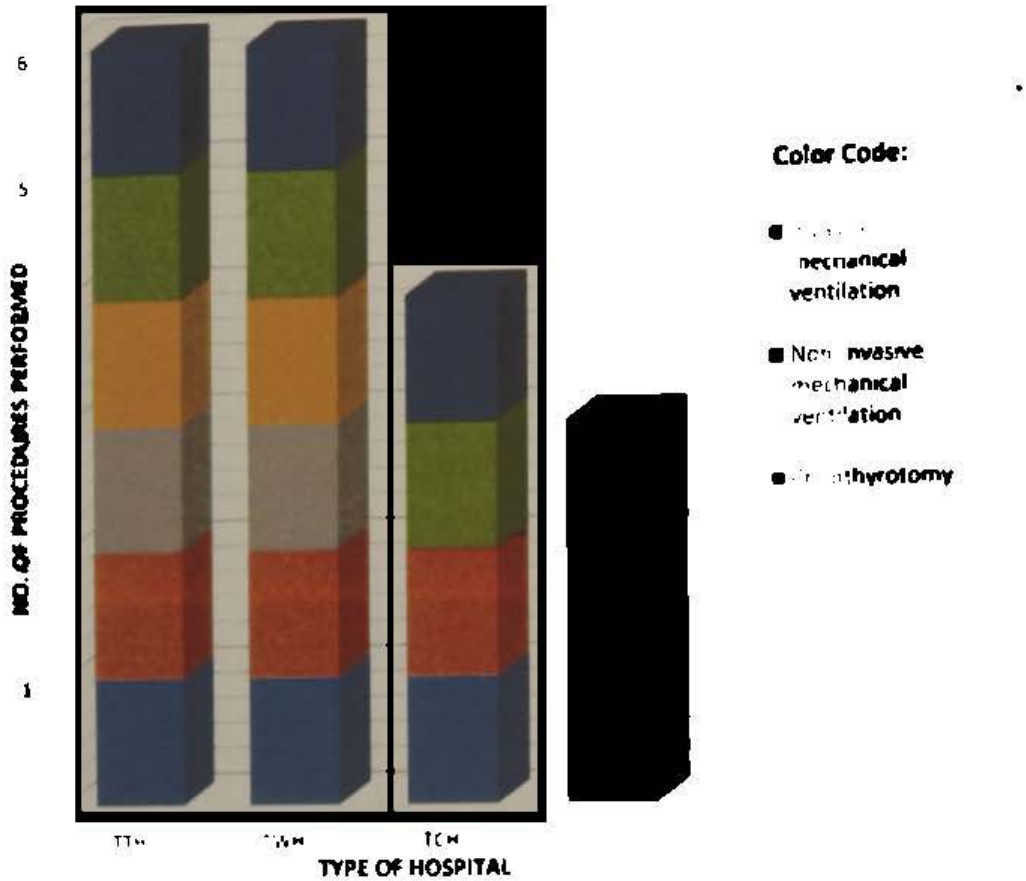


Figure 2: Frequency of procedures associated with respiratory distress performed by each facility

Of the four (4) facilities two (TTH and TWH) performed all 11 procedures under the subsection respiratory distress. Procedures such as endotracheal intubation, invasive and non-invasive ventilation could not be done by these two facilities (TTH and TWH) mainly because of the lack of supplies, equipment and medicines and in some cases because of the lack of human resources. Both Tamale Central and SDA hospitals were

able to perform four (4) and three (3) out of the eleven (11) of the procedures under subsection respiratory distress respectively. (Figure 2)

Table 7: Frequency of reason for not performing procedures related to respiratory failure

ions	No Training	No Supplies	No Human Resources	No Infrastructure	No Policy	No Indication
al uvers	0	0	0	0	0	0
of uction	0	0	0	0	0	0
cal airway	3	4	3	0	0	0
ie hing	0	0	0	0	0	0
f suction	0	0	0	0	0	0
gen nistration	0	0	0	0	0	0
inister cal peutics for tive ays disease	0	0	0	0	0	0
e-way sing	1	1	1	0	0	0
rtion of airway	1	2	2	0	0	0
valve mask tilation	0	2	2	0	0	0
raglottic	3	4	2	0	0	0

Table 8: Number of shock procedures by Facility type

	Hospitals			
	TTH	TWH	TCH	SDA
Number of Shock procedures	12	10	7	6

Teaching hospitals were able to perform more procedures than all the other levels of facilities. Though the SDA hospital is at the same level as a district hospital it performed less procedures, n=6 out of 17, (Table 8)

4.3.1 Hemorrhagic Shock

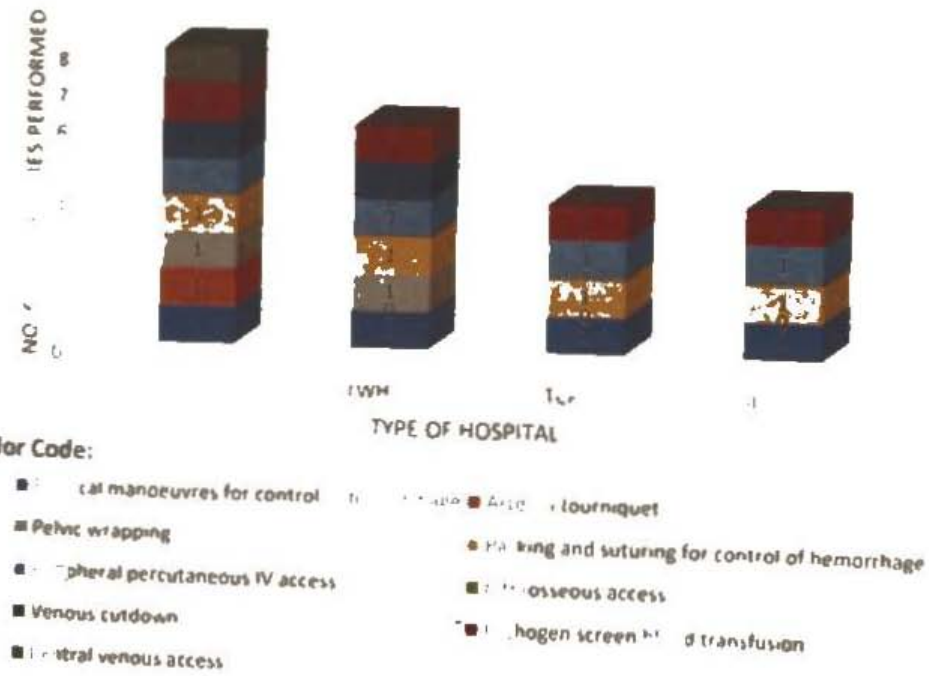


Figure 3: Frequency of procedures associated with hemorrhagic shock performed by each facility

All four facilities were observed to be able to provide peripheral percutaneous IV access, pathogen-screened transfusions, physical maneuvers, packing and suturing for control of hemorrhages, administration of IV isotonic fluids and antibiotics/antimalarials. Procedures related to the insertion of medical devices for intravenous access and central venous were reported to be available in two facilities (TTH and TWH) and only in one facility (TTH) respectively, except for intraosseous access, which none of the facilities could always provide. Pelvic wrapping was a procedure that was stated to be performed by only half (2 facilities, TTH and TWH) (Figure 3).

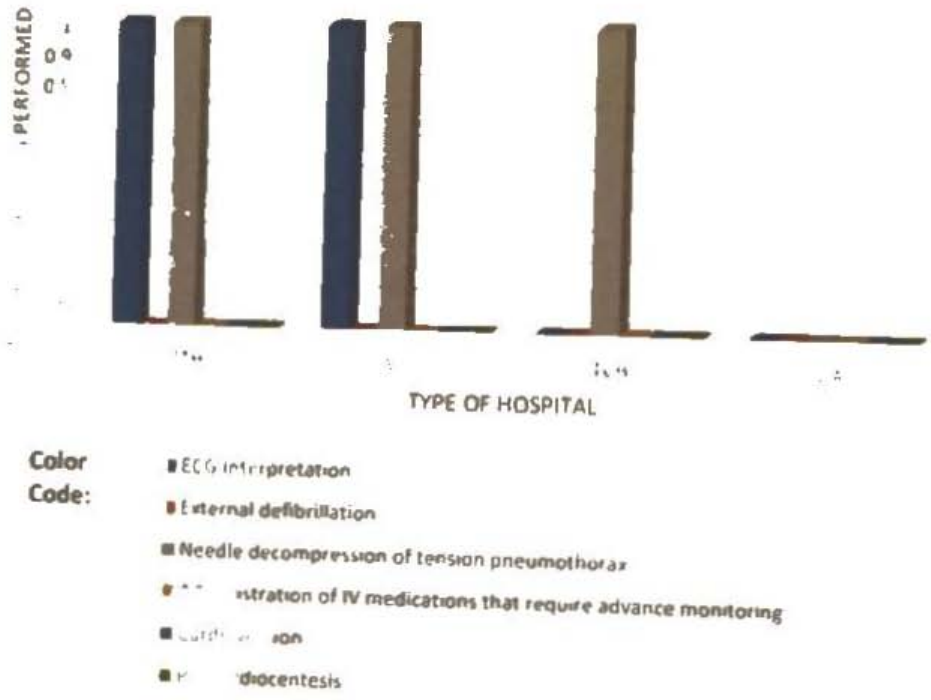


Figure 4: Frequency of procedures associated with other shocks performed by each facility

4.3.2 Facility ability to perform procedures for other forms of shock

Almost all facilities stated that they were able to perform needle decompression of tension pneumothorax (3 out of four facilities). All facilities on the other hand could not perform administration of IV medications that required advance monitoring, external defibrillation, cardioversion or pericardiocentesis. Two facilities out of four of the health facilities were able to interpret electrocardiogram (ECG); (Figure 4).

Table 9: Frequency of reason for not performing procedures related to shock and other forms of shock

NAL NCTIONS	NO TRAINING	NO SUPPLIES	NO HUMAN RESOURCES	NO INFRA-STRUCTURE	NO POLICY	NO INDI-CATION
sical neuvers for trol of norrhage	0	0	0	0	0	0
:king and uring for ıtrol of norrhage	0	0	0	0	0	0
terial ırniquet	3	3	3	0	0	0
lvic wrapping	2	2	1	0	0	0
traosseous cess	3	4	3	0	0	0
enous cutdown	2	2	2	0	0	0
entral venous	3	3	3	0	0	0

s						
pheral utaneous IV s	0	0	0	0	0	0
ogen ned blood sfusion	0	0	0	0	0	0
rpretation	2	2	2	0	0	0
rnal brillation	4	4	3	0	0	0
lle mpression of ion umothorax	1	0	0	0	0	0
ninistration of nedications t require ance nitoring	4	4	3	0	0	0
ninistration of tonic IV fluids	0	0	0	0	0	0
rdioversion	4	4	3	0	0	0
icardiocentesis	4	4	3	0	0	0
ministration of antibiotics d/or timalarials	0	0	0	0	0	0
TAL	32	32	26	0	0	0

All the four facilities could perform only 6 out of 10 procedures related to altered mental status. The procedures that could not be done by all facilities were CT scan, lumbar puncture, protection from secondary injury and administration of locally appropriate antidote for toxic cause, (Table 10)

4.4.1 Unconscious patient's procedure

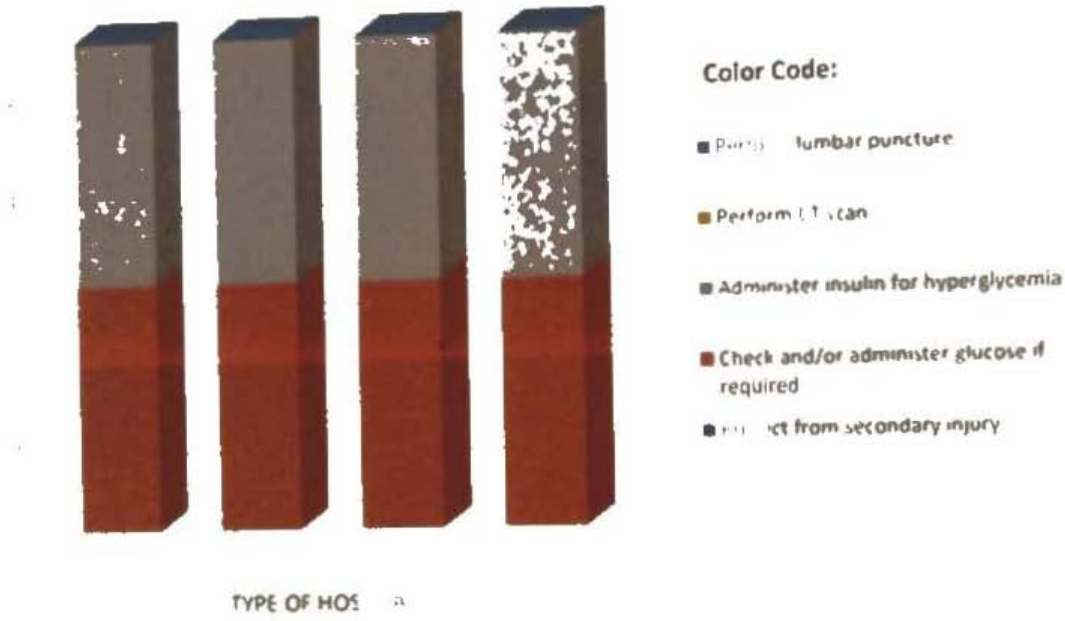


Figure 5: Frequency of procedures associated with unconscious patient performed by each facility

All facilities were not able to manage procedures associated with the unconscious patient, except for checking for and administering glucose if required and administering insulin for hyperglycemia which all of them were capable of doing. Interestingly the only

teaching hospital in the region was not always capable of performing CT scans of the head due to supplies and frequent breakdowns (Figure 5).

Head CT scan was not performed at all facilities mainly due to lack of supplies, training and infrastructure. Whiles the lack of both supplies and health care worker training were reasons for not performing head CT scans at all levels, at district, regional and mission hospitals the issue of lack of human resources was linked by the respondents to the non-availability of infrastructure that demands that facilities should be stocked with requisite human resources.

4 5 1 Seizures procedure by Facility type

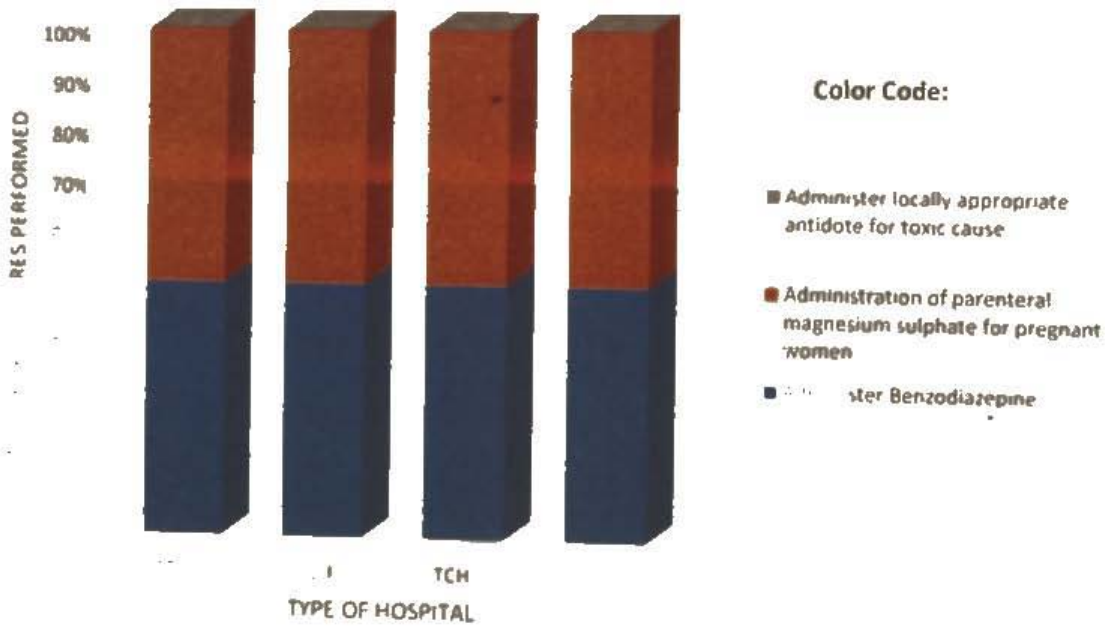


Figure 6: Frequency of procedures associated with seizures performed by each facility

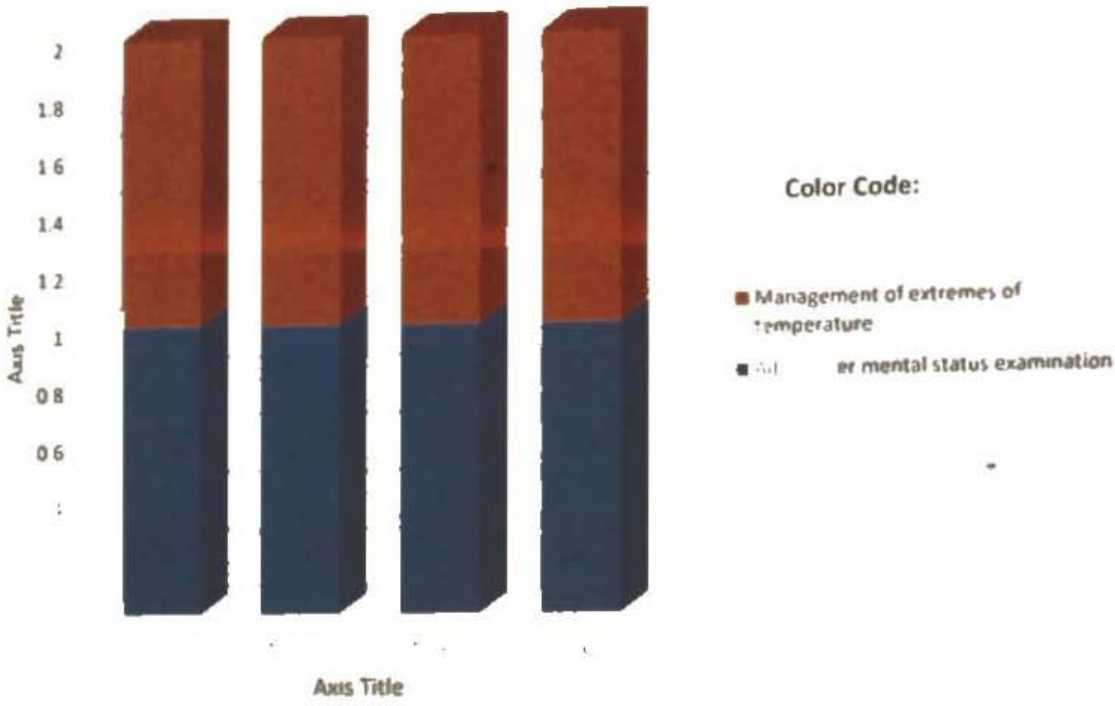


Figure 7: Frequency of procedures associated with other performed by each facility

All the facilities were able to administer benzodiazepines (Figure 6) and manage extremes of temperature (Figure 7). Again, all facilities reported being able to administer parenteral magnesium sulphate for pregnant patients and mental state examinations, however none was able to administer locally-appropriate antidotes for toxic causes.

Table 11: Frequency of reason for not performing procedures related to altered mental status

Signal functions	No training	No supplies	No human resources	No infrastructure	No policy	No indication
Protect from secondary injury	2	4	3	0	0	0
Perform CT scan	3	4	3	3	0	0
Perform Lumbar Puncture	2	4	2	0	0	0
Administer Locally Appropriate Antidote for Toxic Causes	0	4	0	0	0	0
Administer Benzodiazepine	0	0	0	0	0	0
Check and/or administer glucose if required	0	0	0	0	0	0
Administer insulin for hyperglycemia	0	0	0	0	0	0

Administration of parenteral magnesium sulphate for pregnant women	0	0	0	0	0	0
Management of Extremes of Temperature	0	0	0	0	0	0
Administer mental status examination	0	0	0	0	0	0
TOTAL	7	16	7	3	0	

The most frequent reasons for not performing procedures related to altered mental status were lack of supplies (n=16), the lack of training (n=7 and no human resources (n=7) (Table 7). For procedures such as CT scans, which require dedicated space for equipment and specialized staff, the most common reasons were no infrastructure, lack of human resource to carry out the procedure and absence of CT scan machines.

4.6 Severe Pain procedure

The severe pain theme has a total of 8 procedure broken down into three subsections (general severe pain, n=1, abdominal pain, n=5, and chest pain, n=2). The procedures

required to be performed here included administration of opiate based analgesia, urine dipstick and complex ones like ultrasound and chest x-ray.

Table 10: Number of severe pain procedures by facility type

	Hospitals			
	TTH	TWH	TCH	SDA
Number of Severe pain procedures	7	5	5	4

Teaching hospitals were able to perform almost all procedures, (n=7). Though the SDA hospital is at the same level as a district hospital it performed less procedures, n=4 out of 8 with the district hospital being able to do 5 out of 8.

Table 12: Reasons for not performing procedures related to severe pain

Signal functions	No training	No supplies	No human Resources	No Infra-structure	No Policy	No Indication
Placement of Foley catheter for urinary outlet obstruction	3	3	3	0	0	0
Therapeutic paracentesis	3	3	3	0	0	0
Administration	0	1	0	0	0	0

appropriate wound care, basic immobilization for fracture and complex ones like thoracotomy and escharotomy.

Table 12: Number of trauma procedures by facility type

	Hospitals			
	TTH	TWH	TCH	SDA
Number of Trauma procedures	9	6	5	5

Teaching hospitals were able to perform the most procedures, (n=9 out of 15). Both SDA hospital and Tamale Central hospitals which are all at the level of a district hospital were able to perform 5 out of 15 procedures.

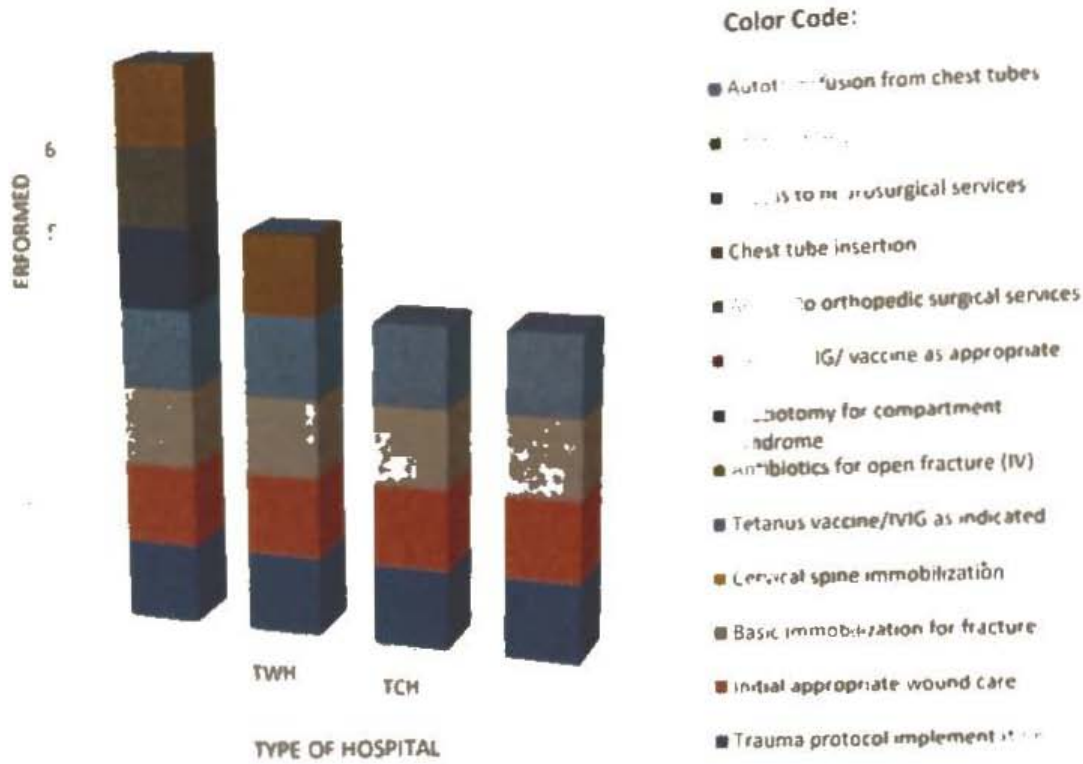


Figure 8: Frequency of procedures associated with general trauma performed by each facility

While all facilities were able to provide appropriate initial wound care, had trauma protocols, give tetanus IVIG/vaccine as indicated, basic fracture immobilization, none could provide cervical spine immobilization or antibiotics for open fracture, rabies IVIG/vaccine as indicated, perform thoracotomy or autotransfusion from chest tubes. Again, none could provide access to neurosurgical services all the time (Figure 8) Only two out of four facilities (TTH and TWH) could perform chest tube insertion with only the tertiary facility (one out of four) being able to perform fasciotomy for compartment

syndrome, escharotomy or give access to orthopedic surgical services all the time.

(Figure 8).

Table 13: Reason for not performing procedures related to Trauma

Signal functions	No training	No supplies	No human resources	No infra-structure	No policy	No indication
Cervical spine immobilization	3	4	3	0	0	0
Antibiotics for open fracture (IV)	0	4	0	0	0	0
Fasciotomy for compartment syndrome	3	0	3	0	0	0
Rabies IVIG/ vaccine as appropriate	0	4	0	0	0	0
Access to orthopedic surgical services	3	3	3	0	0	0
Chest tube insertion	2	2	2	0	0	0
Access to neurosurgical services	3	2	4	0	0	0
Thoracotomy	2	4	2	0	0	0
Autotransfusion from chest tubes	2	4	2	0	0	0

Escharotomy	2	3	2	0	0	0
Trauma protocol implementation	0	0	0	0	0	0
Initial appropriate wound care	0	0	0	0	0	0
Basic immobilization for fracture	0	0	0	0	0	0
Tetanus vaccine and IVIG as indicated	0	0	0	0	0	0
Cooling care	0	0	0	0	0	0
TOTAL	20	30	21	0	0	0

The most frequent reason for not performing trauma-related procedures was non-availability of supplies(n=30), human resources (n=21) and training (n=20) (Table 9).

4.8 Maternal Health procedures in emergency

Table 13: Number of facilities able to perform Maternal health procedures

Procedures	Number of facilities
Administer uterotonic drugs	4
Perform assisted vaginal delivery	4
Perform newborn resuscitation	4
Access to surgical services	4

All four hospitals were able to perform all procedures related to maternal health e.g. administer uterotonic drugs (i.e. parenteral oxytocin), perform assisted vaginal delivery and had access to surgical services (e.g. caesarean section) and perform newborn resuscitation (Table 13).

Objective three: Assess the quality of emergency care in government hospitals in Tamale

4.9 Results of quality indicators

Table 14: Report of Mortality in Tamale teaching, Tamale West, Tamale Central and SDA Hospitals

Tamale Teaching Hospital				
Indicator	**2015**	**2016**	**2017**	**2018**
Mortality from trauma(outcome)	**37/1207 (3%)**	**34/1333 (2.6%)**	**86/1181 (7.7%)**	**55/705 (7.8%)**
Tamale West Hospital				
Indicator	**2015**	**2016**	**2017**	**2018**
Mortality from trauma(outcome)	**3/779 (0.3%)**	**4/754 (0.5%)**	**16/814 (2%)**	**5/789 (6%)**
Tamale Central Hospital				
Indicator	**2015**	**2016**	**2017**	**2018**
Mortality from trauma(outcome)	**17/1197 (1%)**	**14/1333 (1%)**	**16/1181 (1%)**	**27/1207 (2%)**

CHAPTER FIVE

DISCUSSION

This study had the following objectives to

1. Determine capacity of facilities to perform signal functions at government hospitals in Tamale
2. Examine factors or reasons affecting capacity to perform signal functions at government hospitals in Tamale
3. Assess the quality of emergency care in government hospitals in Tamale

Key findings for objective one was as follows:

At all levels of care (i.e. Tertiary, regional and district), all signal functions which should be performed by well-functioning emergency departments could not be performed. The ability to perform signal functions is an indication the existence of a functional system; mitigating the need to assess each individual component of a critical intervention, signal functions represent a culmination of knowledge, interventions, and supplies. (E. J. Calvello et al., 2015). The inability to execute these procedures suggests a deficiency in knowledge, interventions and supplies (process, structure and outcome)

The key findings for objective two are that follows:

- The potential reasons serving as barriers to the ability to perform signal functions grouped into health worker training, human resources, supplies/equipment and medicines, policy, infrastructure and no indication revealed that the commonest reason for inability to perform signal functions(procedures) was the lack of

supplies/equipment and medicines followed by a lack of training then human resources, infrastructure and finally no indication.

The quality indicator for the mortality outcome for all four facilities show a progressive worsening over the past four years.

Competence of these facilities is much lower than expected in light of the Accident and Emergency policy introduced in 2011. Simple procedures such as ability to prevent secondary injury in unconscious patients, lumbar puncture, administering toxic antidotes for local causes like snake bites cannot be performed by all facilities due to reasons like non-availability of supplies, medicines and equipment. There also are complex procedures like performing CT scans, Endotracheal intubation, invasive and non-invasive ventilation, ECG and cardiovascular defibrillation that require highly technical personnel with specialized training and equipment which could not be performed at all levels. These highly technical procedures were available largely at the teaching hospital across all themes; where training was not as big a challenge compared to regional and district level. Training challenges at regional and district levels may be attributed to lack of priority management of these facilities placed on training as observed in the findings of this study; whereby they all didn't have a clear-cut plan detailing how training of staff earmarked for emergency service provision was to be trained though policy existed All facilities had clearly displayed policies and guidelines which aided in standardizing procedures and decision making, especially in facilities where training and senior expertise is limited and are therefore key to sustainability and coordination of emergency care. Though ideally the level of the facility dictates whether a procedure could be

performed or not, there were cases where facilities are not able to meet the expectation of being able to perform not because of the level of the facility but because of non-availability of equipment these facilities. For the teaching hospital factors were supplies, medications and equipment availability whiles for regional and district hospitals it was more of lack of training and human resource. Similar findings have been observed by De Wulf et al (De Wulf et al, 2015) who also found that higher- level health facilities like central (Tertiary hospital in this case) hospitals were able to perform more procedures due to larger numbers of trained personnel, adequate supplies, better infrastructure and better equipment than lower-level facilities such as clinics or district hospitals. Kim P., (2017) in a nationwide study conducted in Cameroon found "Supplies, equipment, and medication" and "Health care worker training" were the two most cited barriers to delivery.

Shock related procedures such as arterial tourniquet and central venous access are performed more at tertiary hospitals than regional and district or quasi government hospitals mainly because of lack of expertise, training and supplies not being available at regional and districts hospitals. Mental status related procedures on the other hand like CT scan could not be done at all levels mainly due lack of certain supplies that is needed to keep CT machine constantly functional. These procedures may not have been available at lower level facilities because of their high cost but also limited or lack of advocation to incorporate these onto inventory list of supplies for procurement. Tertiary hospitals are larger with more specialized trained staff in emergency care who may have more advocating will and power to put certain resources on essential lists due to demand of the procedure as opposed to lower level facilities who do not have the specialist to carry out

the procedure and therefore may not advocate the need for these equipment and supplies. In all facilities, human resources availability and expertise to perform scan existed. These findings also reflect systemic challenges such as procurement and uneven distribution of supplies necessary for emergency care at different facility levels that impact on providing and improving emergency care, (Osei KM., 2015). Similarly, for trauma related procedure such as access to neurological services, was mainly available at tertiary hospitals owing to the need for a specialist to carry out this procedure; most of which are clustered at tertiary level. An implementation of trauma protocols has been associated with significant improvements in patient care process measures during the initial resuscitation of severely injured Lashoher, A., 2016).

5.1 Reasons for not performing emergency care procedures

The study showed that there were differing reasons for a facility's inability to perform procedures. In certain cases, these reasons were multiple. For example, the inability of the teaching hospital to be able to perform procedure like auto-transfusion from chest tubes under the trauma theme was due not only to the non-availability of supplies like tubes and chest tube bottles but also due to the fact that at certain times there were no persons available who had the requisite skills to perform this procedure. Again, the mission hospitals for example inability to perform placement of a Foley catheter for urinary obstruction under the severe pain theme all the time because at various times there may be not supply of silicon catheters or that introducers may be broken or loss but also may be due to the lack of a urologist to do this procedure or that the cadre of health

professionals at the facility currently have had no such training to allow them to perform procedure in the absence of a urologist. Coyle and Harrison, (2015) These following an assessment carried out in Sierra Leone reported a lack of formal training as a common reason for not being able to perform procedures. Similarly, Chancy Chavula (2017), collaborated this finding with findings from a study in public hospitals in Zambia where he found that the lack of training was the number one reason (48.4% weight out of the 100% weight assigned the six reasons)

Access to procedures related to emergency care is frequently required at the district level, as these facilities are usually the first point of contact for trauma or emergency cases, (De Wulf et al, 2015). Whiles obvious gaps exist in the provision of essential drugs, supplies and equipment, infrastructure, training requirements and human resource needs even at the tertiary levels of care, this study observed also similar gaps at the district level facility as well are being observed and the need to build capacity

5.1.1 Supplies/Equipment and medicines

Supplies, equipment and medicines forms an integral pillar of the health system. The non-availability of these at all levels of emergency care delivery was the most profound reason for not performing signal functions. Essential medications like adrenaline, salbutamol, lasix, intravenous antibiotics and oxygen are some of the commonest medications that are missing a lot of times from these facilities. The perennial shortage of anti-snake venom and anti-rabies vaccines does not allow patients to access emergency

care during certain times of the year. All facilities lacked essential equipment like all sizes of laryngoscopes and blades, Ambu bags, needle thoracotomy sets, intraosseous tool set and, in some cases, kits are missing essential components or are broken. This create the opportunity for improvisation but that notwithstanding does not allow for standard quality emergency care provision.

An assessment conducted by Choo et al, (2010) found that the most common reason for referring patients from district to regional facilities for procedures relating to obstructed airway and fracture was the lack of trained staff. This is not the case in this study which showed that the non- availability of supplies, medicines and equipment was the number one reason for the non-performance of procedures. The disparity in this finding could be due to sample size of this study which looked only at 4 facilities while Choo's study looked at 17. Other studies assessing emergency care services also found limited supplies as a reason for not being able to perform emergency care procedures (Osei KM et al; De Wulf et al, 2015; Choo et al, 2010). However, a study conducted in Sierra Leone on the assessment of emergency care services found that the majority of facilities had all the necessary equipment (82%) and drugs (76%) available for emergency care related procedures, (Coyle and Harison,2015). Additionally, training staff or making less-expensive and sustainable alternatives available can help in overcoming this challenge of limited supplies. In many situations at the tertiary level for studies have used ordinary bedsheets to do pelvic binding instead of pelvic binders, research provides evidence of similar effects of stabilizing unstable pelvis with either use, (Prasarn ML et al, 2013).

The lack of supplies was more common a problem at tertiary facilities than regional or district facilities. This trend is similar to that showed by, (Chancy Chavula, 2017) who assessed the emergency care capacities of a total of 23 facilities: seven districts, 12 general and four central hospitals in Zambia using the ECAT. This study found that lack of supplies was also a more common problem at central facilities (tertiary) than at district and general level(regional) . This was attributed to the fact that more complex and specialized procedures were being performed at central level(tertiary) and, thus, more supplies were required, (Faul M et al, 2015). Also, at tertiary facilities there are higher patient numbers, making it difficult for them to match the supply and demand needs. The usual urban location of most tertiary hospitals which is mostly violence prone account for the large numbers of violence related injuries they see and 40% of the injuries presenting to these facilities are repeat victims of violence as reported in Faul et al., (2015). Poor infrastructure limits an already challenged capacity to provide emergency care in district facilities, leading to increased referrals to higher-level facilities This however did not seem to be a common reason amongst in this study. Both large numbers of referrals and unnecessary referrals take up scarce resources, (Thakur et al, 2010). Thakur et al, (2010) looked at referral of patients with orthopedic injuries in Rhode Island, finding that almost 52% of referrals from district to central level centres were unnecessary, and that there was negligible clinical benefit from the transfers. Its stands to reason that if the capacity of regional and district hospital capacities is enhanced by adequate human resource supply, infrastructure, training and reliable supplies, medicines and equipment, a lot of referral will be cut to the tertiary facilities. This finding highlights the limited capacity of

the district level of the healthcare system to provide emergency care. This demonstrates the mismatch between supply and demand at tertiary hospitals.

5.1.2 Human Resource and Training

Human resources were reported as a major reason for not performing emergency procedures. This challenge seems overall to be prevalent more in lower facilities than at the tertiary level. Several factors contribute to human resource challenges in regional and district hospitals, primarily because staffing allocations are not correlated with the volume or acuity needs of the department and there are no accepted staffing standards in the region, (Faul M et al, 2015). Again, whiles on the whole there is not much incentives for people to want to work in great distances, the teaching hospitals provide some prospects of teaching with the Universities. This makes it relatively easier for skilled personnel to accept positions at the teaching hospital than at the lower than tertiary health facilities. The diversity and complexity of cases seen at the teaching hospitals also affords the opportunity for learning and collaborations at these levels which serves as an incentive for acceptance of job offers at teaching hospitals. A lack of training counts as the second most common reason for non-performance of procedures according to this current study. This is in variance with other studies were the lack of training is a common reason for not being able to perform procedures is in line with similar assessments performed in Africa, (Choo et al, 2010). Training that is tailored to the needs and requirements of individual facilities can have a positive impact where access to formal

training institutions is limited, though, for example, telemedicine, mobile and other information technologies (Jamison DT, 2006).

5.1.3 Infrastructure

Infrastructure was found to be a limiting factor for procedures related to emergency care, particularly for procedures such as CT scanning that require dedication of larger spaces. . In this study it was ranked as the fourth out of six commonest reasons for non-performance of procedures. availability of infrastructure was a common challenge at regional and district hospitals, and limited their ability to perform procedures. Although there are criteria for resource allocation, such as those from the American College of Surgeons, (Faul et al,2015), which come from high income settings and their applicability to low income countries is not established. Emergency units in low income settings are typically designed without data to determine required capacity and inform resource allocation Faul et al, (2015) found that infrastructure allocation was very poorly correlated with the actual needs of emergency units. This often results in poorly designed, under-sized, and under-resourced "casualty departments" that struggle with high patient volume and high acuity presentations. Hence, indicating that there is need to establish criteria for resource allocation and architecture based on local emergency service provision data. Leslie HH. et, al., (2017) however found that correlation between infrastructure and evidence-based care was low (median 0.20, range from −0.03 for family planning in Senegal to 0.40 for ANC in Tanzania in a health system capacity assessment involving eight countries between 2007 and 2015, (Haiti, Kenya, Malawi,

Namibia, Rwanda, Senegal, Tanzania, and Uganda). They however did not detect a minimum level of infrastructure that was reliably associated with higher quality of care delivered in any service.

5.1.4 Maternal Health

Procedures pertaining to maternal health was covered in all facilities and services for maternal health were available irrespective of the level of health facility. This may be attributed to the prioritization of maternal health under both the Millennium and Sustainable Development Goals and, thus, most facilities provide it. Similar findings were noted by Levine et al. (2008) when they assessed availability and accessibility of emergency obstetric care in the central province of Zambia. Their study found that the majority of the health centres had the medications (penicillin, oxytocin, ampicillin) necessary for obstetric care, the staff were comfortable performing basic procedures such as basic vaginal deliveries, IV medications and treating infections but few facilities had the necessary equipment to perform the removal of retained products of conception or assisted vaginal delivery.

5.2 Quality indicator: Mortality from trauma

Capacity is evidenced by processes and structures as well as outputs. The health systems' goal outcomes include the following: improve health; be responsive to the legitimate non-

health expectations of the population e.g. prompt treatment, treatment with dignity; and ensure fairness in financial contributions. The level of goal attainment e.g. life expectancy, maternal mortality, infant mortality; as well as the distribution of the goal within the population (equity) are important, (Agyepong et al., 2015). The outcome indicator used for this study (percentage of mortality from trauma) saw a progressive worsening over the last four years. Though the total number of trauma cases progressively remained the same, the total number of deaths occurring from trauma increased progressively. As suggested by the Donabedian, (2003) model of quality good structure should promote good process and good process should in turn promote good outcome (unidirectional pathway), and hence the progressive worsening of the outcome indicator in light of an inability to perform signal functions adequately at all facility levels will be consistent.

This study looked at individual procedures that are performed within different themes of emergency care (respiratory failure, shock, severe pain, altered mental status, trauma and maternal health). It showed a decrease capacity, at all four facilities, to perform signal functions and to provide the quality of emergency care needed at all emergency units. It brought to light the potential gaps and challenges for which procedures related to emergency care could not be performed, being chiefly lack of supplies, equipment and medicines, lack of human resources and the lack of training of health care workers. It therefore provides an insight into the three areas of concentration of attention to such as supplies, equipment and medicines; human resources and training. It also provides insights into which specific procedures which require strengthening to ensure enhanced and improved provision of emergency care.

5.3 Limitations

Only four government hospitals in Tamale were included in this study due to the short time available and also distances between hospitals. This did not allow for much comparison between health facilities. It was not possible to find the same cadre of staff at each facility for interviewing, which would have strengthened the findings more in terms of comparability. The time limitation prevented a direct observation of all procedures stipulated as signal functions for emergency medicine. Though a for profit-private hospital was included in this study, and any system-wide factors contributing to challenges could be determined, the sample size does not allow for generalization of result and future research is needed in that regards. The response may be biased as this study only assessed self-reported ability to perform these procedures. However, using purposive sampling to carefully select interviewees will help minimized this bias.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

Overall, most facilities self-reported being able to perform less than three quarters of the 72 emergency care procedures. The highest number being 49 performed by teaching hospitals and lowest being 31 for mission hospital). Some procedures e.g. arterial tourniquet, escharotomy, pericardiocentesis, pelvic binding, administration of IV antibiotics and administration of tetanus vaccine/ IVIG are not performed, mainly due to lack of training, supplies, poor infrastructure and in very few case policies. Capacity of facilities to perform these signal functions was most limited at district and regional level, and this affected their ability to perform emergency care procedures. It is envisaged that although it may be costly and increase budgetary allocations, building capacity at lower level facilities can improve emergency care across all levels of health facilities, as it will reduce the burden at tertiary level and improve patient outcomes since these are first-line access points for patients. The capacity of all facilities to perform emergency procedures in maternal care is very strong. This points out that where policy meets other necessary factors such as supplies, equipment, human resources, training etc. It ensures success of care delivery.

The findings of this study suggest that emergency care provision within Tamale has been influenced by policy with respect to maternal health. However, with respect to the accident and emergency policy, despite the fact that people are aware of its existence (was a low scoring reason for non-performance), the other necessary factors (supplies, training, human resources and infrastructure) are not adequate hence affecting the four-

REFERENCES

Accorsi, S., Kedir, N., Farese, P., Dhaba, S., Racalbuto, V., Seifu, A., & Manenti, F. (2009). Poverty, inequality and health: the challenge of the double burden of disease in a non-profit hospital in rural Ethiopia. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, *103*(5), 461–468. https://doi.org/10.1016/j.trstmh.2008.11.027

Agyei-Mensah, S., & De-Graft Aikins, A. (2010). Epidemiological transition and the double burden of disease in Accra, Ghana. *Journal of Urban Health*, *87*(5), 879–897. https://doi.org/10.1007/s11524-010-9492-y

Agyepong, I. A., Anniah, K., Aikins, M., Akweongo, P., & Esena, R. (2015). HEALTH POLICY , HEALTH SYSTEMS RESEARCH AND ANALYSIS CAPACITY ASSESSMENT OF THE SCHOOL OF PUBLIC HEALTH , UNIVERSITY OF GHANA. *49*(3).

Anderson, P. D., Suter, R. E., Mulligan, T., Bodiwala, G., Razzak, J. A., & Mock, C. (2012). World Health Assembly Resolution 60.22 and its importance as a health care policy tool for improving emergency care access and availability globally. *Annals of Emergency Medicine*, *60*(1), 35–44. https://doi.org/10.1016/j.annemergmed.2011.10.018

Arnold, J. L., & Holliman, C. J. (2005). Lessons Learned From International Emergency Medicine Development, *23*, 133–147. https://doi.org/10.1016/j.emc.2004.10.001

Aufderheide, T. P., Nolan, J. P., Jacobs, I. G., Belle, V., Bobrow, B. J., Marshall, J., … Taira, B. R. (2013). Global Health and Emergency Care : A Resuscitation Research Agenda — Part I. https://doi.org/10.1111/acem.12270

Bae, C. (2016). *FACILITY-BASED CAPACITY ASSESSMENT OF EMERGENCY CARE SERVICES IN PUBLIC HOSPITALS IN ZAMBIA*. University of Cape Town.

Bae, C., Pigoga, J. L., Cox, M., Hollong, B., Kalanzi, J., Abbas, G., … Hynes, E. J. C. (2018). Evaluating emergency care capacity in Africa : an iterative , multicountry refinement of the Emergency Care Assessment Tool. https://doi.org/10.1136/bmjgh-2018-001138

Broccoli, M. C., Moresky, R., Dixon, J., Muiva, I., Taubman, C . Wallis, L. A., … Scientific, A. (2018). Defining quality indicators for emergency care delivery : findings of an expert consensus process by emergency care practitioners in Africa, 1–8. https://doi.org/10.1136/bmjgh-2017-000479

Calvello, E. J. B., Broccoli, M., Risko, N., Theodosis, C., Totten, V. Y., Radeos, M. S., … Wallis, L. (2013). Emergency Care and Health Systems: Consensus-based Recommendations and Future Research Priorities. *Academic Emergency Medicine*, *20*(12), 1278–1288. https://doi.org/10.1111/acem.12266

44 , No 3 , Part 2 Health Services Research : A Series of Papers Commissioned by the Health Services Res, *44*(3).

Gawande, A. (2003). Dispatch from India, 2383–2386

GHS. (2010). Ghana-National-Health-Accounts-2005-2010.pdf.

GHS, H., UNFPA, U., & Amdd, W. H. O. (2011). National Assessment for Emergency Obstetric and Newborn Care Ghana August 2011 Ministry of Health WHO Table of Contents, (August).

Hammer, J. (2014). Annual Review of Economics:, *1*, 1–41. https://doi.org/10.1146/annurev-economics-080213

Hsia, R., Razzak, J., Tsai, A. C , & Hirshon, J. M. (2010). Placing emergency care on the global agenda. *Annals of Emergency Medicine*, *56*(2), 142–149. https://doi.org/10.1016/j.annemergmed.2010.01.013

Hsia, R. Y., & Carr, B. G. (2011). Measuring emergency care systems: The path forward. *Annals of Emergency Medicine*, *58*(3), 267–269. https://doi.org/10.1016/j.annemergmed.2011.03.048

Indictors, Q., Facility, F. O. R., & Care, B. (n.d.). Quality indictors for facility based care.

Jamison, D. T., Alwan, A., Mock, C. N., Nugent, R., Watkins, D., Adeyi, O., … Zhao, K. (2017). Jamison DT, Breman JG, Measham AR, et al. Disease Control Priorities in Developing Countries [Internet]. Disease Control Priorities in Developing Countries. The International Bank for Reconstruction and Development / The World Bank; 2006 [cited 2016 Nov 26]. Available from:

Universal health coverage and intersectoral action for health: key messages from Disease Control Priorities , 3rd edition. *The Lancet*, *6736*(17), 1–13. https://doi.org/10.1016/S0140-6736(17)32906-9

Kobusingye. (2013). *Emergency and Trauma Care*.

Lashoher, A., Schneider, E. B., Juillard, C., Stevens, K., Colantuoni, E., Berry, W. R., Mock, C. (2016). *Implementation of the World Health Organization Trauma Care Checklist Program in 11 Centers Across Multiple Economic Strata: Effect on Care Process Measures. World Journal of Surgery*, *41(4)*, *954–962*.doi:10.1007/s00268-016-3759-8

Langli, H., Mduma, E., Svensen, E., & Perlman, J. M. (2012). Early initiation of basic resuscitation interventions including face mask ventilation may reduce birth asphyxia related mortality in low-income countries \ prospective descriptive observational study &, *83*, 869–873 https://doi.org/10.1016/j.resuscitation.2011.12.011

Levine, A. C., Marsh, R. H., Nelson, S. W., Tyer-viola, L., & Burke, T. F. (2008). Measuring access to emergency obstetric care in rural Zambia, 113–119. https://doi.org/10.1007/s12245-008-0032-4

Limited, K. B. (2017). Arabian Journal of Business and Impact of Motivation on Employee Performances : A Case Study of, 7(1), 1–8. https://doi.org/10.4172/2223-5833.1000293

Leslie HH, Sun Z, Kruk ME (2017) Association between infrastructure and observed quality of care in 4 healthcare services: A cross- sectional study of 4,300 facilities in 8 countries. PLoS Med 14(12): e1002464. https://doi.org/ 10.1371/journal.pmed 1002464

Mckinstry, B (1994). Do patients care about the age of their general practitioner ? A questionnaire survey in five practices, (August), 349–351.

Mosadeghrad, A. (2012). A Conceptual Framework for Quality of Care. *Materia Socio Medica*, *24*(4), 251. https://doi.org/10.5455/msm.2012.24.251-261

Mosadeghrad, A. M. (2013). Healthcare service quality: Towards a broad definition. *International Journal of Health Care Quality Assurance*, *26*(3), 203–219. https://doi.org/10.1108/09526861311311409

Mosadeghrad, A. M. (2014). *Factors Influencing Healthcare Service Quality*. *International Journal of Health Policy and Management* (Vol. 3). https://doi.org/10.15171/ijhpm.2014.65

Mowafi, H., Dworkis, D., Bisanzo, M., Hansoti, B., Seidenberg, P., Obermeyer, Z., … Reynolds, T. A. (2013). Making recording and analysis of chief complaint a priority for global emergency care research in low-income countries. *Academic Emergency Medicine*, *20*(12), 1241–1245. https://doi.org/10.1111/acem.12262

Osei-ampofo, M., Oduro, G., Oteng, R., Zakariah, A., Jacquet, G., & Donkor, P. (2013). The evolution and current state of emergency care in Ghana ' volution et le statut actuel des soins d ' urgence au Ghana L ' e. *African Journal of Emergency Medicine*, *3*(2), 52–58. https://doi.org/10.1016/j.afjem.2012.11.006

Osei KM, Hamilton B, Freeman FB, et al. Essentials for emergency care: Lessons from an inventory assessment of an emergency centre in Sub-Saharan Africa. African J Emerg Med [Internet]. 2015 Dec [cited 2019 July 10];4(4):174–7. Available from: http://linkinghub.elsevier.com/retrieve/pii/S2211419X14000664

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (2016). Model Service Its Quality and Implications for Future, *49*(4), 41–50. https://doi.org/10.1509/jmkg.74.2.133

Peters, Thomas J. and Waterman Jr, R. H. (1977). *In Search of Excellence: Lesson from America's Best-Run Companies. NASSP Bulletin* (1st ed.). New York: Harper & Row. https://doi.org/10.1177/019263657706140612

Pines, J. M., Hilton, J. A., Weber, E. J., Alkemade, A. J., Al Shabanah, H., Anderson, P. D., ... Prasarn ML, Conrad B, Small J, Horodyski M, Rechtine GR. Comparison of circumferential pelvic sheeting versus the T-POD on unstable pelvic injuries: A cadaveric study of stability. Injury [Internet]. 2013 Dec [cited 2016 Oct 27];44(12):1756–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23810452

Schull, M. J. (2011). International perspectives on emergency department crowding. *Academic Emergency Medicine*, *18*(12), 1358–1370. https://doi.org/10.1111/j.1553-2712.2011.01235.x

Razzak, J., & Kellermann, A. (2002). Emergency medical care in developing countries: is it worthwhile? *Bulletin of the World Health Organization*, *80*(1), 90. https://doi.org/10.1590/S0042-96862002001100011

Reynolds, T. A., Calvello, E. J. B., Broccoli, M. C., Sawe, H. R., Mould-Millman, N. K., Teklu, S., & Wallis, L. A. (2014). AFEM consensus conference 2013 summary: Emergency care in Africa - Where are we now? *African Journal of Emergency Medicine*, *4*(3), 158–163. https://doi.org/10.1016/j.afjem.2014.07.004

Risko, N., Calvello, E. J., De Ramirez, S. S., Narayan, M., & Hirshon, J. M. (2011). Including emergency and acute care as a global health priority. *International Journal of Emergency Medicine*, *4*(1), 1–2. https://doi.org/10.1186/1865-1380-4-75

Rogers, W. J., Canto, J. G., Lambrew, C. T., Tiefenbrunn, A. J., Kinkaid, B., Shoultz, D. A., ... Every, N. (2000). Temporal Trends in the Treatment of Over 1 . 5 Million Patients With Myocardial Infarction in the U . S . from 1990 Through 1999, *36*(7). https://doi.org/10.1016/S0735-1097(00)00906-7

Schuster, M. A. (1998). How Good Is the Quality of Health Care in the United States?, *76*(4). Shevin T. Jacob, MD, MPH; Patrick Banura, MBChB, MPH; Jared M. Baeten, MD, P., Christopher C. Moore, MD; David Meya, MMed; Lydia Nakiyingi, MMed; Rebecca Burke, M., Cheryl Lynn Horton, MD; Boaz Iga, MS, MT (ASCP); Anna Wald, MD, MPH; Steven J. Reynolds, MD, M., M. yanja-, H., Kizza, & MMed, MS, W. Michael

Scheld, M. (2010). *Development of a Consensus on Evidence-Based Quality of Care Indicators for Canadian Emergency Departments ICES Investigative Report March 2010 Development of a Consensus on Evidence-Based Quality of Care Indicators for Canadian Emergency Departments*.

Survey, H. (2014). *Ghana*.

Terlizzi, E. P., Cohen, R. A., Ph, D., & Martinez, M. E. (2019). National Health Interview Survey Early Release Program Health Insurance Coverage : Early Release of Estimates From the National Health Interview Survey , (September 2018), 1997–2018.

Thakur NA , Plante MJ , Kayiaros S, Reiner SE EM. Inappropriate transfer of patients with orthopaedic injuries to a Level I trauma center: a prospective study. J Orthop Trauma. 2010;24(6):336–9.

UNDP. (2015). Sustainble Development Goals.
Voluntary, N., & Standards, C. (2010). *National Voluntary Consensus Standards for Medication Management*. Retrieved from http://www.qualityforum.org/Publications/2010/05/National_Voluntary_Consensus_Standards_for_Medication_Management.aspx

Walline, J. H., Yu, X., & Jr, C. A. C. (2013) International Emergency Medicine EMERGENCY DEPARTMENT CHARACTERISTICS AND CAPABILITIES, *44*(6), 1174–1179. https://doi.org/10.1016/j.jemermed.2012.07.083

WHO. (2009). PRIORITY INTERVENTIONS HIV / AIDS prevention , treatment and care in the health sector, (April).

World Health Organization: World Health Report 2000. Health Systems: Improving Performance. Geneva. 2000, [http://www.who.int.proxy.lib.uwo.ca:2048/whr/2000/en/whr00_ch4_en.pdf

World Health Organization: World Health Report 2003: Shaping the Future. Geneva. 2003, [http://www.who.int.proxy.lib.uwo.ca:2048/whr/2003/en/Chapter7-en.pdf]

APPENDENCES

Appendix I

Information Sheet

PARTICIPANTS' STATEMENT

I acknowledge that I have read or have had the p[illegible]rpose and contents of the Participants' Information Sheet read and satisfactorily expla[illegible]d to me in a language I understand (ENGLISH). I fully understand the contents an[illegible]ny potential implications as well as my right to change my mind (ie withdraw from the researc[illegible]even after I have signed this form.

I voluntarily agree to be part of this research.

Name or Initials of Participant..... ..... ID Code .....

Participants' Signature .....OR Thumb Prin[illegible] ..... OR Mark (Please specify).....

Date:.....

INVESTIGATOR STATEMENT AND SIGNATURE

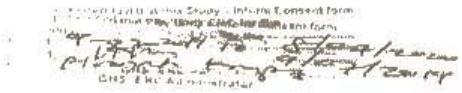
Brief statement or declaration that investigator has given enough information to participants to make informed decisions.

Example: I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's name..... .....

Signature ....

Date..... .....



Who to Contact for Further Clarification/Questions: If you have any challenges or questions, please contact any of the following

Kwasi Owusu Offei

Prinicipal inestigator

School of Public Health, University of Ghana, Legon

Phone number: +233509149156

Email: discreet.offei@gmail.com

Dr Patience Akweongo

Supervisor

School of Public Health, University of Ghana, Legon

Phone number: +233243138376

Email: akweongo@gmail.com

For further clarifications on ethical issues, please contact Ms. Hannah Frimpong, administrator of Ghana Health Service-Ethical Review Committee on phone number +233507041223

Thank you

Informed Consent form ... GHS-ERC Administrator

low funding sources, leaves little doubt as to the reasons for poor health indices thus making it the weak link in the overall health system. Most facilities in Tamale are expected to be in the very early stages of implementation of the emergency policy and to have low capacity for emergency service delivery with a lack of strategic leadership, poor management and funding as postulated etiologies.

v. Nature of research:

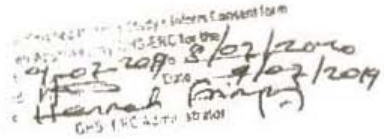
This study proposes to assess the current emergency care capacities of government facilities in Tamale using Emergency Care Assessment Tool (ECAT) and to assess the quality of care provided at these facilities.

This study will collect data using the ECAT form on the current capacity of the emergency department from the doctors/ nurses in charge of the emergency department. Interviewees will be expected to answer questions on what procedures can or cannot be performed at facilities at least 90% of the time. An inability to not be able to perform any procedure is not a reflection of the respondent. Reason will be assigned to why procedures cannot be performed in the categories of no supplies, no training, no human resources, no infrastructure, no policy and no indications. A comment section will be provided for to add any additional comments

Participants involvement:

- Duration /what is involved: Participants will be expected to answer a yes or no to the 72 procedures listed in the questionnaire and assign reasons for the inability to perform them. This is a self-reported assessment and not a reflection on the individual participant. The filling of this questionnaire is expected to take a maximum time of one hour.

Potential Risks: There are no anticipated potential risks involved with being part of this study.



PARTICIPANTS INFORMATION SHEET FOR DOCTORS/NURSES IN-CHARGE AT EMERGENCY DEPARTMENT OF TAMALE WEST HOSPITAL

Title of Study: Influence of Emergency Policy on Facility Capacity and Quality of Care At Government Hospitals in Tamale

Introduction: I am Kwasi Owusu Offei. A student of the School of Public Health, University of Ghana pursuing my Masters in Public Health degree.,P.O.Box, OF 251, Ofankor. Tel: 0509149156, Email: discreet.offei@gmail.com.

Background and Purpose of research:

Health emergencies occur everywhere, and each day they consume resources regardless of whether there are systems capable of achieving good outcomes or not. In a low resource country like Ghana policy and guidelines will play a very integral role in ensuring quality and efficiency of emergency services at all tiers of service. In 2011, the Accident and emergency policy was introduced to help strengthen the capacities of facilities in emergency care management. The most popular means of transport is by motorcycles and their accidents are major causes of out-patient attendance and admissions. Northern region accounts for the most (20%) motorcycle fatalities in Ghana, (Afukaar et a. (2009). The region is characterized by a huge land mass and population with poor communication and road network, lack of relevant data collection tools and low funding sources, leaves little doubt as to the reasons for poor health indices thus making it the weak link in the overall health system. Most facilities in Tamale are expected to be in the very early stages of implementation of the emergency policy and to have low capacity for

Funding information: This study is self-funded by

Sharing of participants Information/Data:

The data is solely for the principal investigator(me). I i part of academic work in partial fulfilment for the completion of degree.

Provision of Information and Consent for particip nts

A copy of the participant information sheet and con e i form will be given to you to keep after it has been signed by both respondent and researcher. thu ib printed. (E.g. A copy of the Information sheet and Consent form will be given to you after it ha been signed or thumb-printed to keep.

[1] Updated Version 4 dated February 5, 2019 - Property of GI -ERC Secretariat only

This is to Certified that this Study & Inform Consent form has been Approved By CHS ERC for the
Period 01-07-2019 to
Signed Date
Name
CHS ERC Administrator

Benefits:

You may or may not directly benefit at the moment, ho ever your participation will help throw light on the current capacity of your facility and help ass gn reasons to the deficiencies. This will help policy makers to align needed resources in a much more educated way to help strengthen the capacity of hospitals to manage emergencies which inva ably is of benefit to all stakeholders.

Costs: The cost of this study is fully borne by the rese rcher.

There is no financial gain and its solely for academic pu oses. Indicate whether there will be any costs incurred, e.g. transportation and who will be payi g for that cost.

Compensation:

No other compensation will be offered for participation in this study other than the pen that will be given to each respondent for answering questionnaire. However, your participation will be deeply appreciated.

Confidentiality:

Questionnaire has been designed to ensure anonymity to respondent. Data collected from study will be kept under lock and saved on a hard drive with a password lock which is accessible only to researcher and supervisor.

Voluntary participation/withdrawal: Your participa ion in study must be voluntary and hence all rights to redraw at any point in time is solely reserved by you without a need to explain why.

Outcome and Feedback: I will ensure the safe protection of both hard and soft data. Information collected will sit with me fir a maximum of five years after which soft data will be deleted and hard copies.

Feedback to participant:

Findings of this study will be disseminated to all hospit l to ensure that steps are taken to address the strengthening of the emergency care capacity of fac ities

GHS-ERC stamp: Approved ... 9/02/2019 ... 9/02/2019

endix 1: The Emergency Care Assessment Tool for advanced level facilities, covering the entire breadth of signal functions

Emergency Care Assessment Tool for Advanced Facilities*

ility name: _ Facility location: _ Date: _

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery: Policies**	Human resources: HCW*** training	Supplies/ equipment/ medication	Infrastructure	No indication ****	Other barrier/comments
SENTINEL CONDITION: RESPIRATORY FAILURE							
tructed airway							
rm manual euvres to open the y[1]	☐ Yes ☐ No						
ve obstruction of y[2]	☐ Yes ☐ No						
if suction	☐ Yes ☐ No						
	Yes						
y/cricothyrotomy	☐ No						
spiratory distress							
rm rescue thing	☐ Yes ☐ No						
y three-way ing	☐ Yes ☐ No						
t oral airway	☐ Yes ☐ No						

dvanced facilities are those with staff members who have robust knowledge and skills as well as the resources to provide comprehensive emergency services to address sentinel nditions. These are "referral-level" facilities, which include tertiary referral hospitals and other academic/university facilities.

The policy barrier refers to a lack of policies and processes that facilitate optimal patient care (e.g. no triage system, lack of timely patient movement to definitive care).

*HCW: Healthcare worker

**No indication means that the signal function cannot be performed at least 90% of the time; however, the respondent cannot identify why.

ncludes head tilt, chin lift, jaw thrust

includes abdominal thrusts if conscious, CPR if unconscious, chest thrusts and back blows for infant

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
m bag valve mask tion	☐ Yes ☐ No							
supraglottic device	☐ Yes ☐ No							
ister critical peutics for reactive y disease	☐ Yes ☐ No							
ister oxygen	☐ Yes ☐ No							
rm endotracheal ation	☐ Yes ☐ No							
rm non-invasive anical ventilation	☐ Yes ☐ No							
rm invasive anical ventilation	☐ Yes ☐ No							

SENTINEL CONDITION: SHOCK

emorrhagic shock								
rm physical peuvres for control emorrhage[4]	☐ Yes ☐ No							
y arterial tourniquet	☐ Yes ☐ No							
y pelvic binder	☐ Yes ☐ No							
y packing and ring for control of norrhage	☐ Yes ☐ No							

E.g. any bronchodilators, adrenaline, steroids
Direct pressure, pressure bandage, pressure points

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
m peripheral taneous enous access	☐ Yes ☐ No							
n intraosseous s	☐ Yes ☐ No							
rm venous wn	☐ Yes ☐ No							
nister pathogen ned blood fusion	☐ Yes ☐ No							
rm central venous s	☐ Yes ☐ No							
her shock								
rm ECG pretation	☐ Yes ☐ No							
rm external illation/ oversion	☐ Yes ☐ No							
orm needle mpression of on pneumothorax	☐ Yes ☐ No							
inister adrenaline anaphylactic shock)	☐ Yes *- If yes, circle: IM IV* ☐ No							
inister IV lications that require ance monitoring[3]	☐ Yes *- If yes, circle: IM IV* ☐ No							

E.g. vasopressors, thrombolytics

unction	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery: Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
n diocentesis	☐ Yes ☐ No							
ere sepsis or septic shock								
ister isotonic IV	☐ Yes ☐ No							
ister IV antibiotics	☐ Yes *If yes, circle:* *PO IM IV* ☐ No							
ister IV alarials	☐ Yes *If yes, circle:* *PO IM IV* ☐ No							
SENTINEL CONDITION: ALTERED MENTAL STATUS								
onscious patient								
ct from secondary s	☐ Yes ☐ No							
t and/or administer se if required	☐ Yes ☐ No							
nister insulin for rglycaemia	☐ Yes ☐ No							
rm head CT	☐ Yes ☐ No							
rm lumbar ture	☐ Yes ☐ No							

Specifically, is there adequate personnel/infrastructure to monitor blood pressure and avoid hypotension, avoid hyperthermia and cooling if necessary, avoidance of hypoxia, NGT reduce aspiration risk)

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
ure								
ister diazepine	☐ Yes *If yes, circle:* *PO IM* *IV Rectal* ☐ No							
nister parenteral esium sulphate egnant patient	☐ Yes ☐ No							
nister locally opriate antidote xic cause	☐ Yes ☐ No							
her								
nister mental s examination	☐ Yes ☐ No							
ge extremes of erature	☐ Yes ☐ No							

E.g. antivenom

SENTINEL CONDITION: SEVERE PAIN

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
eral severe pain								
nister opiate-analgesia	☐ Yes ☐ No							
dominal pain								
rm urine dipstick	☐ Yes ☐ No							
rm HCG testing	☐ Yes ☐ No							
nister oral tion	☐ Yes ☐ No							
Foley catheter rinary outlet uction	☐ Yes ☐ No							
rm therapeutic centesis	☐ Yes ☐ No							
rm point-of-care sound	☐ Yes ☐ No							
est pain								
nister aspirin if ikely	☐ Yes ☐ No							
in chest x-ray	☐ Yes ☐ No							

SENTINEL CONDITION: TRAUMA

unction	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Polici es	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
ral trauma								
nent trauma protocol	☐ Yes ☐ No							
m initial appropriate l care[8]	☐ Yes ☐ No							
bilize fracture (basic)	☐ Yes ☐ No							
e fracture	☐ Yes ☐ No							
bilise cervical spine	☐ Yes ☐ No							
nister tetanus vaccine /IG as indicated	☐ Yes ☐ No							
nister antibiotics for fracture	☐ Yes *If yes, circle: PO IM IV* ☐ No							
orm fasciotomy for partment syndrome	☐ Yes ☐ No							
inister rabies IVIG / ination as appropriate	☐ Yes ☐ No							
to provide access to eral definitive surgical ices	☐ Yes ☐ No							
[illegible]	[illegible]	[illegible]						

[8] irrigate with potable water or sterile solution, surgically close clean acute wounds, dress, infection control as needed

	least 90% of the time?	Polici es	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	
provide access to aedic surgical services	☐ Yes ☐ No							
provide access to surgical services	☐ Yes ☐ No							
chest tube	☐ Yes ☐ No							
m thoracotomy	☐ Yes ☐ No							
m autotransfusion chest tube	☐ Yes ☐ No							
ns								
de cooling care	☐ Yes ☐ No							
rm escharotomy	☐ Yes ☐ No							

SENTINEL CONDITION: EMERGENCY OBSTETRICS

tructed labour								
nister uterotonic drugs arenteral oxytocin)	☐ Yes ☐ No							
rm assisted vaginal ery	☐ Yes *If yes, circle: Routine / Vacuum / Forceps* ☐ No							
rm newborn scitation (e.g. with bag mask)	☐ Yes ☐ No							
to provide access to cal services (e.g. arean section)	☐ Yes ☐ No							

endix 2: The Emergency Care Assessment Tool for intermediate facilities, containing a modified list of signal functions.

Emergency Care Assessment Tool for Intermediate Facilities*

ility name: _____ **Facility location:** _____ **Date:** _____

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies**	Human resources	HCW*** training	Supplies/ equipment/ medication	Infrastructure	No indication ****	Other barrier/comments
SENTINEL CONDITION: RESPIRATORY FAILURE								
tructed airway								
rm manual manoeuvres to the airway[9]	☐ Yes ☐ No							
e obstruction of airway[10]	☐ Yes ☐ No							
uction	☐ Yes ☐ No							
spiratory distress								
rm rescue breathing	☐ Yes ☐ No							
three-way dressing	☐ Yes ☐ No							
t oral airway	☐ Yes ☐ No							
rm bag valve mask lation	☐ Yes ☐ No							

ntermediate facilities are those with the ability to provide first response and stabilisation of emergency patients with sufficient resources to attain intravenous access and establish definitive airway, though not necessarily the capacity to provide mechanical ventilation. These are "mid-level" facilities, which include regional and district hospitals.
The policy barrier refers to a lack of policies and processes that facilitate optimal patient care (e.g. no triage system, lack of timely patient movement to definitive care).
*HCW: Healthcare worker
**No indication means that the signal function cannot be performed at least 90% of the time; however, the respondent cannot identify why.
ncludes head tilt, chin lift, jaw thrust
Includes abdominal thrusts if conscious, CPR if unconscious, chest thrusts and back blows for infant

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
supraglottic device	☐ Yes ☐ No							
ister critical therapeutics active airway disease[11]	☐ Yes ☐ No							
ister oxygen	☐ Yes ☐ No							
rm endotracheal ation	☐ Yes ☐ No							

SENTINEL CONDITION: SHOCK

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
m venous cutdown	☐ Yes ☐ No							
er shock								
m ECG interpretation	☐ Yes ☐ No							
m external defibrillation/ version	☐ Yes ☐ No							
m needle decompression sion pneumothorax	☐ Yes ☐ No							
nister adrenaline (for ylactic shock)	☐ Yes *- If yes, circle:* *IM* *IV* ☐ No							
vere sepsis/septic shock								
nisterf isotonic IV fluids	☐ Yes ☐ No							
nisterf IV antibiotics	☐ Yes *If yes, circle:* *PO* *IM* *IV* ☐ No							
inister IV antimalarials	☐ Yes *If yes, circle:* *PO* *IM* *IV* ☐ No							

SENTINEL CONDITION: ALTERED MENTAL STATUS

function	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery: Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
nscious patient								
t from dary injury	☐ Yes ☐ No							
and/or ister glucose if ed	☐ Yes ☐ No							
nister insulin for glycaemia	☐ Yes ☐ No							
zure								
nister odiazepine	☐ Yes *If yes, circle:* *PO IM IV Rectal* ☐ No							
nister ropriate antidote oxic cause[1]	☐ Yes ☐ No							
ther								
nister mental s examination	☐ Yes ☐ No							
age extremes of perature	☐ Yes ☐ No							

[1] Specifically, is there adequate personnel/infrastructure to monitor blood pressure and avoid hypotension, avoid hyperthermia and cooling if necessary, avoidance of hypoxia, NGT to reduce aspiration risk)

[2] E.g. antivenom

SENTINEL CONDITION: SEVERE PAIN

unction	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
ral severe pain								
ster opiate-analgesia	☐ Yes ☐ No							
ominal pain								
m urine dipstick	☐ Yes ☐ No							
m HCG testing	☐ Yes ☐ No							
ister oral ion	☐ Yes ☐ No							
Foley catheter nary outlet ction	☐ Yes ☐ No							
rm therapeutic esthesia	☐ Yes ☐ No							
est pain								
nister aspirin if kely	☐ Yes ☐ No							
n chest x-ray	☐ Yes ☐ No							

SENTINEL CONDITION: TRAUMA

tion	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery: Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
trauma								
t trauma	☐ Yes ☐ No							
nitial te wound	☐ Yes ☐ No							
e fracture	☐ Yes ☐ No							
racture	☐ Yes ☐ No							
se cervical	☐ Yes ☐ No							
er tetanus nd IVIG as l	☐ Yes ☐ No							
er antibiotics fracture s IV)	☐ Yes *If yes, circle:* *PO IM IV* ☐ No							
fasciotomy partment ne	☐ Yes ☐ No							
cooling care	☐ Yes ☐ No							
n escharotomy	☐ Yes ☐ No							

igate with potable water or sterile solution, surgically close clean acute wounds, dress, infection control as needed

SENTINEL CONDITION: EMERGENCY OBSTETRICS

nction	Perform at least 90% of the time?	If no, select all relevant barriers to signal function delivery:						
		Policies	Human resources	HCW training	Supplies/ equipment/ medication	Infrastructure	No indication	Other barrier/comments
ucted labour								
ster uterotonic .e. parenteral n)	☐ Yes ☐ No							
n assisted delivery	☐ Yes *If yes, circle:* *Routine / Vacuum / Forceps* ☐ No							
m newborn itation (e.g. ag and mask)	☐ Yes ☐ No							
o provide access gical services caesarean n)	☐ Yes ☐ No							