FACTORS THAT INFLUENCE OUTCOME OF TRAUMATIC BRAININJURY PATIENTS AT KENYATTA NATIONAL HOSPITAL

AUTHOR:

JOAN M. SHISOKA

H 56/68924/2011

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Award of Master of Science Degree in Medical Surgical Nursing of the University of Nairobi.

November 2013

CERTIFICATE OF APPROVAL

We, the undersigned certify that this research has been submitted for the degree of Master of Science in Nursing (Medical- Surgical) of the University of Nairobi with our approval as supervisors.

Mrs. Lilian A. Omondi

MScN, BScN,

Lecturer, School of Nursing Sciences

University of Nairobi.

Signature……..Date…….

Mr. Samuel T. Kimani

MSc., BScN,

Lecturer, School of Nursing Sciences

University of Nairobi.

Signature……..Date……..

DECLARATION

I, Joan M. Shisoka, hereby declare that this thesis is my original work and has not been submitted in any other institution for the purpose of obtaining a degree or any other academic award.

Signed……

Date…….

DEDICATION

I dedicate this work to my family.

To my spouse Joseph, your support, understanding and encouragement are enduring.

To my twins; son Jeffery and daughter Janice you are the best.

ACKNOWLEDGEMENT

I wish to extend my sincere gratitude to my family. My spouse and children for the encouragement and understanding of the many days I did not have time for them.

Thanks to Kenyatta National Hospital management, for release to study and the opportunity to carry out the study at the institution.

My sincere gratitude to Leonard Cheserem the statistitian and Catherine Muhanji who provided the secretariat services.

Thanks to my colleagues at the University of Nairobi for their input, valuable critique and encouragement.

God bless you all.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A&E - Accident and Emergency

CCU - Critical Care Unit

CT - Computerized Tomography

GCS - Glasgow coma scale

GOS - Glasgow outcome scale

KNH - Kenyatta National Hospital

KNH/UON ECR – Kenyatta National Hospital/ University of Nairobi Ethics Review Committee

RTA - Road Traffic Accident

SPSS - Statistical Package of Social Scientists

TBI - Traumatic Brain Injury

UoN - University of Nairobi

WHO - World Health Organization

OPERATIONAL DEFINITIONS

Cranium: Referring to the skull

Glasgow coma scale: A clinical assessment tool to determine level of consciousness by assessment of eye opening, speech and motor function.

Intubation: Insertion of a tube in the trachea through the nose or mouth to sustain respiration impeded by traumatic brain injury

Morbidity: The state of being in a vegetative or nonfunctional state

Mortality: Death

Neuro: Connotes that which pertains to the nervous system as used in the context of the study. A specialty in medicine and surgery that pertains to treatment of the brain and the spinal cord

Outcome: Indication of return of cognitive, psychological and psychosocial function by use of Glasgow outcome scale tool.

Traumatic brain Injury: Is an insult to the brain following an external mechanical force leading to permanent or temporary impairment of cognitive, physical and psychosocial function with an associated diminished or altered state of consciousness.

Traumatic brain injury patient: A person who has undergone an external mechanical force leading to permanent or temporary impairment of cognitive, physical and psychosocial function with an associated diminished or altered state of consciousness.

ABSTRACT

Background: Traumatic brain injury (TBI) is among the leading causes of admissions in hospitals globally. It is associated with significant morbidity and mortality.TBI is a neurosurgical emergency and timely intervention is critical to favorable outcome. Patients admitted at Critical Care Unit with TBI patients which accounts for 62% and an average of six admissions in 24 hours at Accident &Emergency department.

Objectives: To determine the patients' factors, clinical care and systems factors affecting outcome of traumatic brain injury patients at Kenyatta National Hospital.

Methods: A descriptive cross-sectional design was used for this study. Purposive sampling method was adopted and a check list was used for data collection. Sample size was 91TBI subjects .Data was analyzed using Statistical Package on Social Science (SPSS) software.

Results: The patient factors and institutional protocols influenced outcome of traumatic brain injury patients' management. Patient factors were;> 40 years had poor outcome (p=0.042), casual laborers were at risk of TBI (p=0.043), Polytrauma had significance to poor outcome (p=0.042) and time lapse from trauma to hospitalization (p=0.051).The clinical care factors influenced good outcome which included; diagnosis and medication (p=0.001), Nursing care (p=0.055) and clinical setting A&E (p=0.051), CCU (p=0.032).Protocols factors, patients admitted to surgical wards had poor outcome (p=0.051).

Conclusion: Prevention of TBI is the standard, where it fails early hospitalization and intensive care is paramount for good outcome.

Recommendation: Neuro intensive care unit, Neuro emergency ward set up and training of Neuro teams for critical care and management of traumatic brain injury patients at KNH.

CHAPTER ONE

1.1. Background Information

Traumatic Brain Injury (TBI) remains the leading cause of death and disability in young adults. The Brain Trauma Foundation estimates that 1.6 million head injuries occur annually in the United States. Out of these, approximately 50,000 die and 70,000 to 90,000 are left with permanent neurological disabilities. (Cheung, 2007).

Head injuries also result in a staggering financial burden, which has been estimated at $75 billion annually in the United States. In Canada, the costs are similarly high: 18,000 Canadians are admitted to hospital with traumatic brain injury, resulting in an extrapolated societal cost that exceeds $1 billion (Roukoz, 2006).

Kenyatta National Hospital (KNH) a referral teaching hospital receives patients with TBI directly from the scene of accidents and referrals from other hospitals both private and public. Two thirds of patients admitted at Critical Care Unit (CCU) are TBI patients which accounts to 62% and an average of 6 admissions in 24 hours at the Accident & Emergency (A&E) department. (KNH CCU, A&E admission record, 2012).

The clinical spectrum and major causes of TBI are diverse and varied. In this set up pediatrics, 50% fall from heights, 42% Road Traffic Accident (RTA). In the adult population, 55% RTA, 30% assault, 7% falls from heights. Mortality rate is at 52.6% and 13% morbidity (Opondo, 2005).

Compared to the developed world, approximately 35% falls from heights, 24%Road Traffic Accidents (RTA) in pediatrics. In adults 39% firearm related, 34% (RTA) and 10% falls from heights (Hommer, 2006).

Clinical presentation of the patients and timely management by the clinical team are critical factors in determining outcome. Several studies have been done to find out how the above factors influence outcome and there has been varied findings depending on the set up where the studies were carried out (Mwangombe, 2001).

1.2. Problem Statement

Kenyatta National Hospital houses most of highly specialized professionals in all disciplines. The hospital is also well advanced in technology, equipment and supplies compared with other public facilities. Patients diagnosed or referred with Traumatic brain injury are expected to have good outcome. To the contrary there is high morbidity and mortality rate. Many of these patients end up in a vegetative state or death (Wafula, 2010).

A lot of hospital resources through bed occupancy in the wards and CCU go into management of patients with traumatic brain injury. The effects present a major socio economic, emotional and health problems in relation to long stay in hospital, permanent neurological disability, long term rehabilitation facilities, complications associated with long hospital stay, straining the available resources, loss of earning power and death.

The delays of turnaround time of up to 3 hours of waiting can be minimized or preventable. Hundreds of people live with long term disabilities from head injury and this can be minimized if

these patients are managed promptly. Most of these patients do not have good outcome due to patient factors, clinical team factors, systems and logistical factors.

The investigator sought to determine patient factors in correlation with the clinical care interventions and how they influence patient outcome.

1.3 Study Questions

The study was seeking to answer the following questions:

1. What were the patient related factors that lead to poor outcome of TBI patients?
2. What were the clinical team related factors that lead to poor outcome of patients with traumatic brain injury?
3. What were the systems and logistical factors that lead to poor outcome of TBI patients?

1.4 Objectives

1.4.1 Broad objective

To determine patients' factors, clinical care and systems factors and their influence on outcome of Traumatic brain injury patients at Kenyatta National Hospital.

1.4.2. Specific objectives

1. To determine the patients characteristics and Glasgow coma scale assessment on admission
2. To determine Medical, Surgical and Nursing care interventions executed within the first 72 hours of care
3. To evaluate patient care outcome by correlating the care intervention and the Glasgow outcome scale within 72 hours of admission

1.5 Hypothesis

The outcome of Traumatic Brain Injury is influenced by patient characteristics, Glasgow coma scale on admission and prompt clinical interventions.

1.6 Expected Outcome

Proper triaging of patients for a focused approach to management of TBI patients. Change of policy and protocol by reviving the Neuro Intensive Treatment Area (NITA) and setting up of a Neuro emergency ward.

1.7 Justification

A lot of hospital resources through bed occupancy in A&E, CCU and the wards go into management of patients with traumatic brain injury. There is need in triaging of patients who will either have long term disability or subsequently die for appropriate counseling of close relatives. This study will help identify patients at risk for a more focused approach to manage as well as set up a platform for further studies.

Change of policy and protocol. This is by reviving the Neuro Intensive Treatment Area (NITA) on the fourth floor of the KNH tower block and setting up a special emergency neurosurgical ward. The number of patients admitted is high and they will be managed by a neuro specialized clinical team. Studies have shown that when these patients are managed in a neuro specialized clinical setting, the outcome is satisfactory.

The study results will show clinical evidence which would be timely in clinical practice and policy change.

1.8 Theoretical Framework

In the study Self Care Deficit theory by Dorothea Orem was used. This theory assumes that individuals take care of themselves when they are able, but when they are not able the nurse provides the assistance needed. Traumatic brain injury patients need total care since they are totally dependent.

Orem says that nursing maybe needed when need to incorporate newly prescribed complex self care measures into their self care systems, the performance of which requires specialized knowledge and skill to be acquired through training and experience.

The clinical team to manage traumatic brain injury patients should be a specialized team in this area. Good outcome of patients is highly dependent on the knowledge and skills of the clinical team. This includes neurosurgeons; trauma and neuro nurses, efficient laboratory and radiological personnel .A highly experienced team combined with effective and efficient systems of working work towards positive results. Experience and commitment confounds to quality of care hence positive outcome of these patients.

Orem identifies five methods of helping that can be used:

a) Acting for or doing for another

b) Guiding and directing

c) Providing physical or psychological support

d) Providing and maintaining an environment that supports personal development

e) Teaching

The theory identifies three nursing systems:

Wholly compensatory system; this is represented by a situation in which the individual is unable to engage in those self care actions hence depends on others for their continued existence and wellbeing. A patient's self-care agency is so limited that she depends on others for well-being. This requires total nurse care as the client is unable to do for self.

Partially compensatory system; this is represented by a situation where both the nurse and the patient perform health care measures where the patient or the nurse may have a major role to play in the performance of care measures. The patient can meet some self-care requisites but needs a nurse to help meet others. This involves both the nurse and the client sharing in the self care requirements.

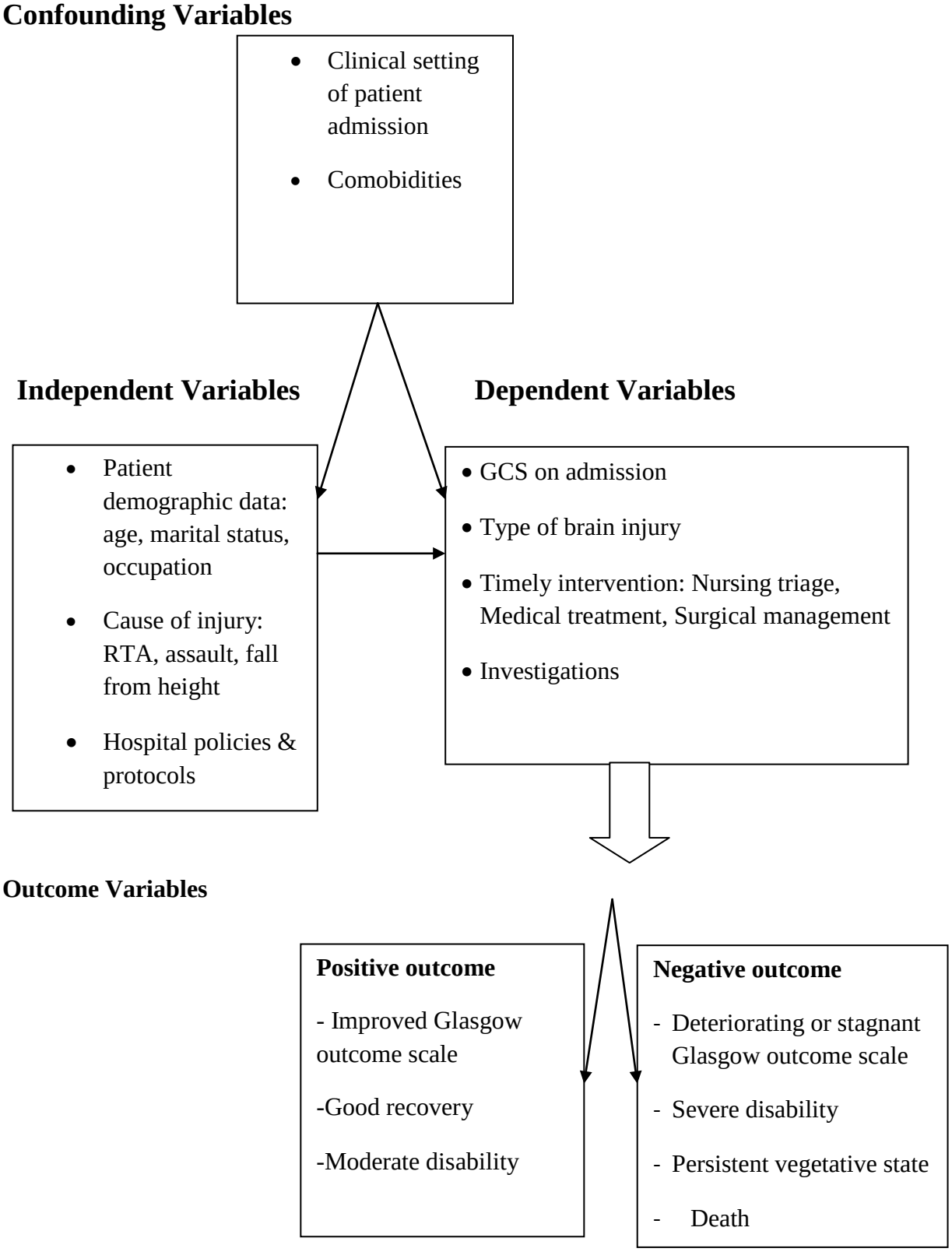
Supportive educative system; in this system the person is able to perform or can and should learn to perform required measures of self care but cannot do so without assistance. The patient does all the care and the role of the nurse is to support him as a self care agent in terms of knowledge and skills. The patient can meet self-care requisites but needs help in decision-

making, behavior control, or knowledge acquisition. Support elicits the help of the nurse solely as a consultant, teacher or resource person. Client is responsible for their own self care.

In the initial stages TBI patients are fully dependant and therefore the clinical team acts for and does for the patients. This is by providing physical and psychological support. Later on in the process of recovery the patient may slowly start becoming independent through assistance by the health care providers. The patient may require rehabilitation to complete the process of full independence through supportive educative system.

This would be achieved through health promotion and health maintenance where both the Nurse and patient promote the individual's responsibility for self care.

1.8.1 Conceptual framework



CHAPTER TWO: LITERATURE REVIEW

2.1Introduction

2.1.1History of traumatic brain injury outcome

Earliest reported series on traumatic brain injuries and management on record appeared in 1700BC when 4 depressed skull fractures were treated by Egyptians. They left the wounds unbandaged after draining the intracranial cavity and anointing the scalp wounds with grease. There was 100% mortality (Leverrsen, et al1998). In Kenya the practice of traditional craniotomy by the “ababari emetwe” (craniotomists) of the Kisii tribe of Kenya has probably been on for centuries. The outcome has always been poor (Ondede, 2008).

2.1.2 Traumatic brain injury

Traumatic brain injury (TBI) is the result of an external mechanical force applied to the cranium and the intracranial contents, leading to temporary or permanent impairments, functional disability, or psychosocial maladjustment. TBI can manifest clinically from concussion to coma and death. Injuries are divided into 2 subcategories: (a) primary injury, which occurs at the moment of trauma, and (b) secondary injury, which occurs immediately after trauma and produces effects that may continue for a long time. (Fausi, et al, 2008).

Traumatic brain injury (TBI) is a nondegenerative, noncongenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness.(Fausi, et al, 2008).

Many TBI patients have polytrauma, injuries to other parts of the body in addition to the head and brain. Trauma victims often develop hyper metabolism or an increased metabolic rate, causing muscle wasting and the starvation of other tissues. Complications related to pulmonary dysfunction can include neurogenic pulmonary edema (excess fluid in lung tissue), aspiration pneumonia (pneumonia caused by foreign matter in the lungs), and fat and blood clots in the blood vessels of the lungs (Bazzarian,et al 2009).

Blunt trauma to the chest can also cause cardiovascular problems, including damage to blood vessels and internal bleeding, and problems with heart rate and blood flow. Blunt trauma to the abdomen can cause damage to or dysfunction of the stomach, large or small intestines, and pancreas. A serious and common complication of TBI is erosive gastritis, or inflammation and degeneration of stomach tissue. This syndrome can cause bacterial growth in the stomach, increasing the risk of aspiration pneumonia. (Hukkenlhoven,et al 2005).

2.2Primary Brain Injury

Primary brain injury is determined by the degree of neuronal damage or death at the time of impact. This is a major determinant of outcome from traumatic brain injury and, with exception of surgically evacuable mass lesions, is normally irreversible. (Opondo, 2005).

2.3 Secondary Brain Injury

Secondary brain insults are characterized by a reduction in cerebral substrate utilization, particularly oxygen. Secondary insults may occur during transport to hospital, initial resuscitation or in Critical Care Unit (CCU). (Opondo, 2005).

Secondary brain injury occurs at a cellular level and is a result of inflammatory responses characterized by free radical and excitatory neurotransmitters production. It can also be initiated by cerebral edema or alterations in cerebral metabolic rate.(Lee, et al 1996).

Management of traumatic brain injured patients is characterized by attempts to avoid secondary brain injury.

2.4 Pathophysiology of Brain Injury

The severity of primary brain injury is determined by the degree of neuronal damage or death at the time of impact. This is a major determinant of outcome from traumatic brain injury with the exception of evacuable mass lesions, is normally irreversible.

The symptoms, pathophysiology and outcome of head injury in pediatric age group are different from that seen in the adult population. This is because of the thin elastic skull which is capable of greater deformity before fracturing, a larger head in proportion to body surface area hence a larger proportion of total blood volume in the head. The brain of a child has a water content of 88% compared to that of the adult which is 77%. This makes the pediatric brain softer hence more susceptible to acceleration-deceleration injury. Infants have open sutures and fontanels while the subarachnoid spaces and brain extracellular spaces are larger. This allows for quicker edema formation but at the same time allows for tolerance to increased cranial pressures. In general children have quicker functional and anatomic recovery compared to adults (Fausi, et al, 2008).

2.5 General outcome of Traumatic Brain Injury patients in varied settings

Children are known to have a lower mortality and better quality of recovery than adults after brain injury. Despite severe injury and prolonged coma majority of children do well. (Bullock, 2009). A study done on severely brain injured patients showed that the outcome of patients below the age of 13 had better outcome than patients above 13 years (Mwangombe, 2001). In another study on pattern and early outcome of pediatric cranioinjury, initial GCS at 24 hours strongly correlated to outcome. RTA victims and surgery were related to poor outcome (Mwangi, 2005).

Older age, low Glasgow coma score, absent pupil reactivity, and the presence of major extra cranial injury predict poor prognosis. All of these variables have been previously identified as prognostic factors for poor outcome in traumatic brain injury (Altman, 2001). Increasing age was associated with worse outcomes but this association was apparent only after age 40. A similar threshold has been reported. Plausible explanations for this include extra cranial comorbidities, changes in brain plasticity, or differences in clinical management associated with increasing age (Bruns,et al 2003).

A study done on factors that influence early outcome of TBI in different age groups at KNH. In the study the overall outcome was poor. That is the subjects either died or remained in persistent vegetative state were at 80.6% compared to 19.4% who had good outcome. Poor outcome was also seen in the extremities of age (Wafula, 2010).

Smoller and colleagues who studied factors affecting short term outcomes of head trauma patients found out that the motor component was the most important predictor of short term outcome. They further found out that the predictability of outcome on adult patients cannot be

applied to the pediatric age group. This is because pediatric patients with similar GCS were found to have a better outcome than the adult population (Smoller, et al 1990).

Ondede did a study on role of mean arterial pressure in monitoring mean arterial pressure in severe head injury patients. He concluded that not all patients at KNH requiring intubation and ventilation receive it. All the patients in his study qualified for it but only 62.1% benefited. This had an effect on the outcome of these patients.

Further found out that 77% of patients were managed conservatively that needed surgery. Also late arrivals to hospital more than 72 hours after injury were referrals from other hospitals (Ondede, 2008).

A study done in Brazil on timing of procedures on head injury patients showed that the faster the patients are attended to the better the outcome of the patients. This is also dependant on GCS score (Leverssen, et al 1998).

Head injury remains the leading cause of death and severe disability in young adults, and it is also the most important single injury contributing to traumatic mortality and morbidity. In a large study of patients who suffered trauma, it was found that the presence of head injury resulted in a 1.5-times increase in death when compared with the presence of extra cranial injuries but no head trauma (Opondo, 2005).

Multiple independent risk factors predicting the outcome of patients with severe head injuries has been identified, the most widely accepted ones being age, GCS score, pupil reactivity, CT scanning findings, and associated extra cranial injuries. In particular, a GCS score of3 at presentation has been associated with a significantly poor outcome. Due to the high mortality

rate, even approaching 100% when the score is associated with bilateral fixed and dilated pupils in some series, questions have been raised as to whether these patients should be treated aggressively, and whether they have any chance of a meaningful recovery (Signorini, et al 1999).

Consequently, an accurate early prediction of survival and functional outcome appears to be of paramount importance. This allows for informed counseling of relatives and helps the treating physician in deciding the aggressiveness of treatment. In this series, in the treatment of patients with blunt head trauma presenting with a GCS score of 3. The primary objective was to determine the overall mortality and 6-month functional outcome. The secondary objective was to identify risk factors allowing prediction of mortality and morbidity in this patient population (Roukoz, et al 2006).

In general patients with isolated head trauma do well than those with multiple injuries. Infants with brain lesions generally fare worse than older children. The intact survivors do well but often have minor physical and neural and behavioral deficits which require skilled evaluation and therapy. It is clear that prevention of injury is the surest way of reducing the problems associated with head trauma. In the event that this fails, then careful care provides at the earliest contact of each patient is the best chance for good recovery (Wafula, 2010).

2.6 Factors associated with poor outcome of Traumatic Brain Injury patients

2.6.1. Hypotension

This is defined as mean arterial pressure of less than 70mmHg. A multicentre study using data from traumatic coma data bank found that blood pressure of less than 80mmHg was one of the factors associated with poor patient outcome (Mass, et al 2005).

2.6.2. Hypothermia

Hypothermia continues to be a controversial area in management of head injured patients. In a study conducted by Bawrodale, 1997 showed that 16% patients with TBI cooled to 32 degrees centigrade within 6 hours of injury had a good outcome compared to those maintained at 37 degrees centigrade (Opondo, 2005).

2.6.3. Electrolyte changes

Disturbed ionic and neurotransmitter homeostasis are now recognized as the most important mechanisms contributing to development of secondary brain swelling after TBI. Glutamate may be responsible for the prolonged increase in extracellular potassium by opening agonist operated potassium permeable ion channels. It has been demonstrated by using patch clamp techniques that the cyclic AMP channels become markedly more permeable to ions after TBI and that this is mediated by prolonged agonist (glutamate) to receptor binding (Reinert et al, 2000).

Reinert and colleagues found increased potassium in 20% of their patients with TBI. This strongly correlates poor outcome. They postulated this to be related to potassium induced astrocyte swelling.

2.6.4. Multiple injuries

Over 50% of severe TBI patients have concomitant potentially life threatening injuries. The association particularly with thoracic or abdominal injuries worsens prognosis of the patients as secondary insults are higher in this patients. Sarrafzadeh and colleagues, reported in their

study that outcome is worse in patients with extra cranial injuries as well besides the TBI (Sarrafzadeh et al, 2001).

2.6.5. Effect of gender

Gender has an independent predictor of survival of TBI following documentation in few studies. Jess and colleagues (2000) found females were 1.75 times more likely than males to die of brain injury and 1.57 times more likely to experience poor outcomes (severe disability or persistent vegetative states) than males.

The controls they used were age, admission GCS, blunt or penetrating injury and multiple trauma in their study (Jennet, et al 2006).

2.7 Neurological Assessment –Glasgow Coma Scale

The Glasgow coma scale (GCS) is important in management of traumatic brain injury and is the most widely accepted and understood scale.

Glasgow coma Scale (GCS) was first introduced in the 1970s to provide a simple and reliable method of recording the level of consciousness of patients and monitoring change. In essence the GCS was developed to standardize the reporting of neurological findings and to provide an objective measure of the level of function of comatose patients (Wardlaw, et al 2002).

It was originally developed as a series of descriptions of eye opening, motor and verbal responses and the addition of values or scores for each aspect of the GCS was done later.

The GCS is one of the most commonly used tools by trauma care providers as it enables the gradation of head injury severity using simple observations rather than invasive or specialist

techniques. Whilst first developed to describe the level of consciousness six hours post head injury to monitor and prognosticate, the GCS is now used for purposes beyond the original intentions of the score. The GCS is commonly used to predict patient outcome following trauma.

2.8 Admission GCS as predictor of Outcome in Traumatic Brain Injury

A number of studies have been published describing the validity of the admission GCS as a predictor of survival post trauma.

Diringer and Edwards evaluated the relationship between the GCS on arrival at the emergency room and functional scale from death to independence in a population of 84 patients with traumatic brain injury. The total GCS score successfully classified the functional outcome of patients in 51% of cases, whilst the GCS eye and motor responses correctly classified 55% of patients (Perel, et al 2007).

Despite the poor reliability of the verbal response of the GCS, removal of this aspect did not significantly improve the performance of the GCS as a predictive tool. The total GCS score predicted 71% of patients who returned to independence.

These findings suggest that the GCS is a relatively poor predictor of functional outcome in neurological impaired patients. Whether the motor response or the eye responses in isolation were superior predictors of functional outcome in the subpopulation of traumatic head injured patients was not assessed.

2.9 Limitations of Glasgow Coma Scale

The value of the GCS as a trauma score and a triage tool is reliant on the ease and reliability of applying the score in a variety of different situations and patient types. In addition the reliability

GCS scoring forms the cornerstone of its use as a research tool. In their original introduction of the GCS, Teasdale and Jennet reported a high degree of consistency in eliciting responses by different observers and suggested that the risk of ambiguous reporting was small. Since then a number of authors have investigated the reliability of the GCS.

Teasdale et al assessed the reliability of GCS scoring in a small population of traumatic head injured patients. Nurses, neurosurgeons and surgical trainees scored patients. Disagreement of rates was low regardless of the qualifications of the tester and the component of the score, though the motor response was scored most consistently. Unfortunately, the study was small and the experience of the testers was not described (Hulley & Cummings1998).

An issue regarding the reliability of the GCS, and one not addressed by the studies described in the previous section, is the presence of complication that can hamper the collection of valid GCS scores. Although the criteria for GCS scoring are well defined, accuracy of responses can be affected by complications such as sedation, intoxication, and facial injury and end tracheal intubations.

There are numerous confounding factors that can be hindered by the presence of hearing loss, psychiatric disorders, dementia, developmental delay and injuries to the mouth and throat. The motor response is also vulnerable to complicating factors such as spinal cord injuries or peripheral nerve injury where the ability to move is affected in absence of head injury.

2.10. Management of Traumatic Brain Injury

2.10.1 Primary Survey

Quick history from the relations, police, ambulance crew on the cause of injury

Meanwhile check airway, intubate, rigid cervical support and alignment with the rest of the spine

Breathing pattern and adequacy is assessed

Circulation and areas of hemorrhage noted

Disability is noted on the AVPU scale (**Alert**, responding to **Voice**, responding to **Pain** only, **Unresponsive**)

Pupils quickly checked for dilatation and response to light

Expose patient for adequate examination and protect from hypothermia

All these should be accomplished in the first three minutes of admission.

2.10.2 Resuscitation

Primary survey and resuscitation should go on simultaneously

Airway should be cleared, if unconscious should be intubated

Breathing pattern and adequacy assessed by use of ambubag, oropharyngeal airway or end tracheal tube.

Circulatory support and control of hemorrhage by giving intravenous fluids setup in large veins and blood taken for biochemical and hematological tests and grouping and cross matching.

Insertion of nasogastric tube and urinary catheter except if contraindicated.

Assessment is made of the response to resuscitative measures using pulse, blood pressure, capillary refill and urine output.

2.10.3 Secondary Survey

Neurological assessment made using Glasgow coma scale (GCS) and external signs of injury to the head. It is based on eye opening, verbal response and motor response. The score range between 3 and 15. GCS should be recorded before and after resuscitation.

Detailed history taken and systemic examination from head to toe to exclude associated injuries.

Investigations to include skull x-ray, computerized tomography of brain and magnetic resonance imaging

2.10.4 Treatment Modalities

Oxygenation should be adequate to prevent hypoxia. Nurse patient in a 30 degrees head up to improve cerebral venous return.

Treatment of intracranial pressure by use of mannitol an osmotic diuretic before definitive treatment.

Antibiotics and tetanus toxoid especially where there are open wounds and gross contamination

Anticonvulsants should be given routinely to prevent post traumatic epilepsy, acute seizures or patients with previous history of epilepsy.

Analgesics which are non opiate should be given to patients as pain causes intracranial pressure.

Intensive care management should be given to patients with GCS less than 8. The focus is to prevent secondary injury and maintenance of cerebral oxygenation.

Surgery is recommended for a rapidly deteriorating patient due to extra dural hematoma.

Physiotherapy should be involved early for chest, limbs and subsequent rehabilitation services.

2.11. Summary of Literature Review

Traumatic Brain Injury is a worldwide problem. It predominates in younger age groups, causing long-term disability for survivors. There is a lack of brain specific treatments that significantly improve outcome. Early management goals are to achieve basic physiological targets, and to avoid hypoxemia, hypo- and hypercarbia, hypotension and hypo- and hyperglycemia. Treatment should be started as soon as possible by skilled staff and continued through the emergency department and critical care, as required. A multi-disciplinary team approach is essential. There are national and international guidelines, describing similar, although not identical goals, and are to be considered current best practice. It is recommended that the guideline considered most appropriate to one's current practice is followed.

The Glasgow coma scale (GCS) is important in management of traumatic brain injury and is the most widely accepted and understood scale. The Glasgow Coma Scale (GCS) is one of the most commonly used tools by trauma care providers as it enables the gradation of head injury severity using simple observations rather than invasive or specialist technique.

CHAPTER THREE: METHODOLOGY

3.1. Research design

A descriptive cross-sectional design was adopted for this study. Quantitative approach to data collection, analysis and presentation was adopted. Data was collected using checklists and patient data sheets. This was presented in tables and graphs and was analyzed using inferential statistics. Discussion was done in prose and conclusions and recommendations drawn from the discussion.

3.2. Research setting

The study was carried out at the Accident and Emergency department (A&E), Critical care unit (CCU) and surgical wards of Kenyatta National Hospital. The A&E department admits all kinds of trauma and emergency patients. It has several clerking rooms, trauma theatre, emergency ward, acute room, radiological services as well as pharmacy services. Has a population of 100 nurses and medical officers. CCU is on the first floor of the tower block with a bed capacity of 21. Has a population of 120 nurses. The surgical wards are on the fifth floor of the tower block. KNH is situated in the Kenyan capital city Nairobi and is the largest teaching and referral hospital and training institution for medical and nursing students of all levels in east and central Africa. It is along hospital road, Dagoretti division, Nairobi County.

3.3 Study population

All patients admitted to Kenyatta National Hospital with traumatic brain injury.

3.4Inclusion criteria

- Patients who presented with traumatic head injury within 72 hours of injury are critical for good outcome to be realized.
- Patients between ages 18-65 years old.
- Patients whose guardians gave informed consent to participate in the study.

3.5Exclusion criteria

- Patients who presented with traumatic head injury more than 72 hours
- Mild brain injury and admitted due to causes other than trauma are excluded to eliminate confounders to TBI.
- Patients admitted to hospital whose identity is not known e.g. a patient picked in an unconscious state and brought to hospital by good Samaritans or a policeman. This will poise the challenges of
    i. Uncertainty about the cause of trauma which may not be known to the rescuers.
    ii. Difficulty in determining the duration of trauma as per the inclusion criteria.
- Patients whose guardians refuse to consent to the study
- Patients above 65 years and less than 18 years
- Patients who had previous neurological problems

3.6 Sampling method

A purposive sampling was used in the study to recruit the sample. This is a non probability sampling method in which the researcher selects the participants based on personal judgment about who will be most representative or informative in the study (Polit and Beck 2006).

All patients admitted at KNH with TBI who will fulfill the laid out criteria of the study will be recruited.

3.7 Sample determination

The study sample size will be determined using Fischer's formula Mugenda and Mugenda, (2003) since the target population is 120 patients (average monthly admissions) thus less than 10,000

$n=z^2\ q/d^2$

Where,

n=the desired sample size (if the target population is greater than 10,000)

z=the standard normal distribution at 95% confidence level (=1.96)

P=the expected population correlation coefficient (population effect size)

50% (large effect size) was used to determine the sample size(state why 50% was used)

q=1-p

d=level of precision (set at +or -5% or 0.05)

Substituting these figures in the above formula:

$N= \frac{(1.96)^2(0.5)\ (0.5)}{(0.05)^2}$

Since the target population is less that 10,000, the sample size is adjusted using the following formula:

nf=n/1+ (n/N)

Where nf=the desired sample size when population is less than 10,000

n=the desired sample size when population is more than 10,000

N=the estimate of population size which is 120 per month.

Hence nf=384/1+384/120

1+3.2

=4.2

=384/4.2

=91.4

3.8 Study Tools

A data collection chart was used to obtain patients' data from clinical assessment of the neurological status and documented information in the file.

3.9. Data Collection

Data was collected from clinical observation of traumatic brain injury patients and their treatment record files.

This was done by the principle investigator and two assistants. The assistants are Bachelor of Science Nurses, with a diploma in Accident and Emergency Nursing and diploma in Critical

Care Nursing consecutively. Their roles include purposive sampling of the TBI patients who fall in the inclusion criteria, clinical observations of the patients and filling up the data collection charts following their assessments as well as the treatment record files as trained by the principle investigator.

3.10. Pretesting of Study Tool

Pretesting of the data checklist was done in A&E department on 10 patients. This assisted the researcher to review the questions. This included the observational checklist, data collection techniques and research ethics.

3.11. Variables

3.11.1 Independent Variables

- Patient demographic data; Age, marital status, occupation and gender
- Cause of injury; RTA, fall from height, assault, falling objects
- Hospital protocols and systems

3.11.2 Dependent Variables

- Glasgow coma scale which will determine the patients' neurological status on admission and will be used to evaluate the care intervention.
- Type of brain injury will influence care intervention outcomes because the greater the injury the poorer the expected outcome despite the interventions rendered.

3.11.3. Confounding Variables

- Clinical setting of patient admission
- Cormobidities

Timely interventions by the care providers i.e. Medical, Nursing, Surgical teams to remedy the situation. The earlier the intervention, the better the prognosis.

Clinical setting in terms of prompt of neurological review and transfer to the most suitable clinical setting e.g. critical care unit among others will influence patient outcomes.

3.12. Data Cleaning and entry

Data was scrutinized at the point of collection for accuracy and completion and entered into a spread sheet using Microsoft excel computer software ready for data analysis.

3.13. Data Analysis

Data was analyzed using Statistical Package on Social Science (SPSS) software. Quantitative data was analyzed. Inferential statistics such as Chi-square and p values was used to show the relationship between variables.

3.14. Data Presentation

The analyzed data was presented in the form of tables and graphs.

3.15Ethical consideration

During the study, rights of participants were respected.

Before conducting the study, the research proposal was sent to Kenyatta National Hospital, University of Nairobi Research Ethics Committee for approval.

Permission to carry out the study in KNH was sought from the Kenyatta National Hospital administration.

Informed consent was sort from the guardians before conducting the study.

Coding of the data collection charts was done for anonymity and confidentiality of data.

The study results were presented to the institution management and recommendations given.

The raw data was kept in a safe under key and lock and can be accessible to the authorized persons only. The documents will remain under safe custody for ten years before destruction according to research documents ethics.

3.16. Study Limitations

Time factor was a major limitation. The study was conducted in line with other courses. There was necessity of balancing time to meet the deadlines of both the study and other academic requirements.

3.17. Dissemination of Results

The report was disseminated to the Chief Executive Officer, Kenyatta National Hospital, the Director College of Health Sciences, Ministry of Medical Services and all relevant stakeholders.

The report is ready for publication in the Nurses journals.

CHAPTER 4: RESULTS

4.1 Introduction

This study was conducted in Accident and Emergency department, Critical Care Unit and Surgical wards at Kenyatta National Hospital. This was done in the month of May and June 2013 where a total number of 91 patients with Traumatic Brain Injury were evaluated using a data sheet modified from Hulley & Cummings 1998.

The main objective of the study was; To determine patients' factors, clinical care and systems factors and the influence on outcome of Traumatic brain injury patients at Kenyatta National Hospital.

4.2 Biographic characteristics

4.2.1 Age

The respondents were aged between 18 and 65 years. Majority of the respondents were aged between 21-30 years 52.7% (n=48) followed by 31-40 years 17.6% (n=16) and 41-50 years 13.2% (n=12). The age groups of 51-65years and the less than 20 years tied at 6.6% (n=6) respectively. Those above 60 were the least with 3.3% (n=3).

4.2.2 Gender

Majority of the traumatic brain injury patients evaluated in this study were male at 89% (n=81) and the female were 11% (n=10).

4.2.3 Marital status

The marital status of most of the respondents was single at 51% (n=45), married at 39% (n=35) and slightly more than 10% were previously married.

4.2.4 Education level

The study findings showed that the educational level of most of the TBI patients interviewed had attained tertiary level of education 74.1% (n=66) and secondary level21.3% (n=19) with slightly less than 5% had primary education level.

4.2.5 Occupation

The occupation of the traumatic brain injury patients was varied. The unemployed were many at 31.8% (n=28), followed by29.2% (n=26) being casual laborers (Jua Kali and industries) which was slightly more than professionals at 25.8% (n=23). The self employed were the least with 13.5% (n=12) as shown in table 1.

Figure 1: shows the distribution of Age in years

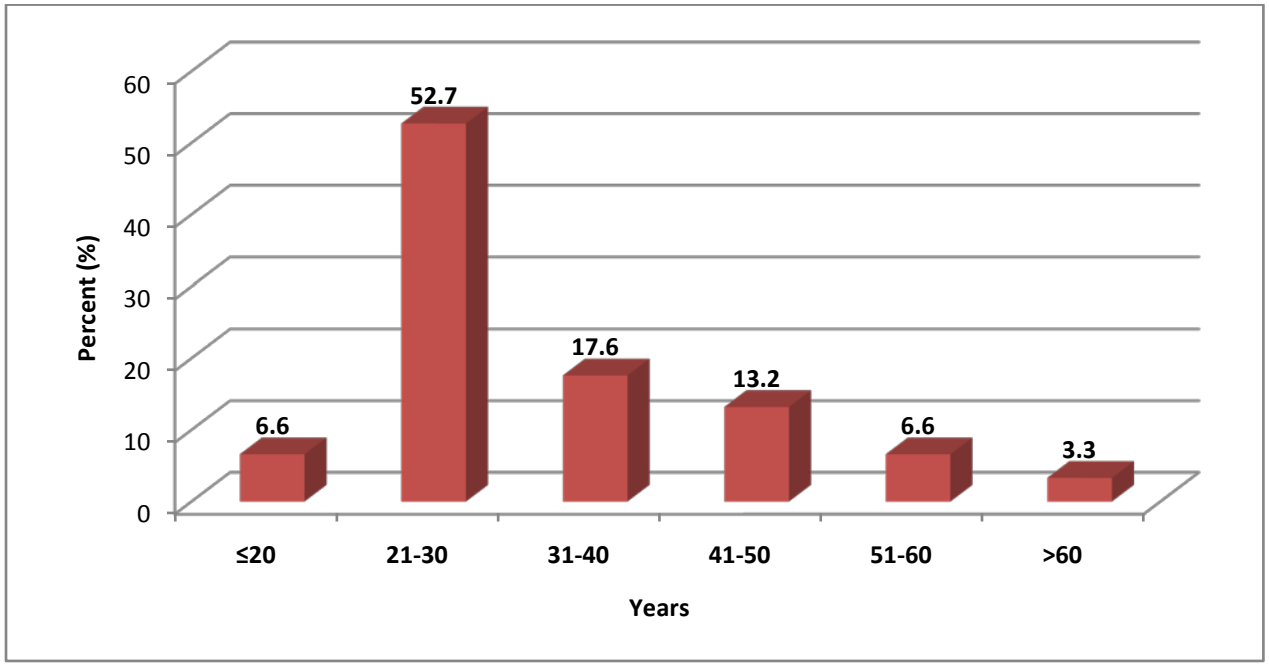


Figure 2: Marital status

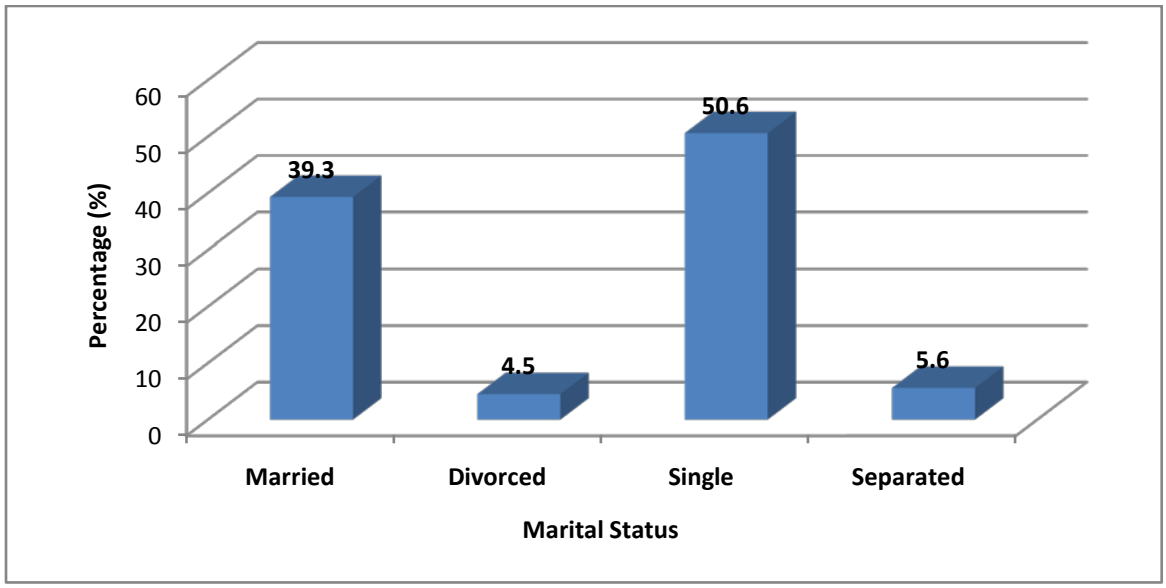


Table 1: Socio- demographic characteristics

Characteristics	Frequency(n)	Percentage %
Gender		
Female	10	11
Male	81	89
Educational level		
Primary	4	4.5
Secondary	19	21.3
College/polytechnic	36	40.4
University	32	33.7
Occupation		
Professional	24	25.8
Casual laborer (industries)	13	14.6
Unemployed	29	31.5
Casual laborer (Jua Kali)	13	14.6
Self employed	12	13.5

4.3 Time lapse between Trauma and Hospitalization

Many of the respondents of TBI patients arrived at A&E department between 3-4 hours 36.3% followed closely by 1-2 hours at 35.2%. It was noted that only about 15.4% arrived at A&E within an hour (< 1 hour) and 13.2% arrived after 4 hours.

Figure3: Time Lapse

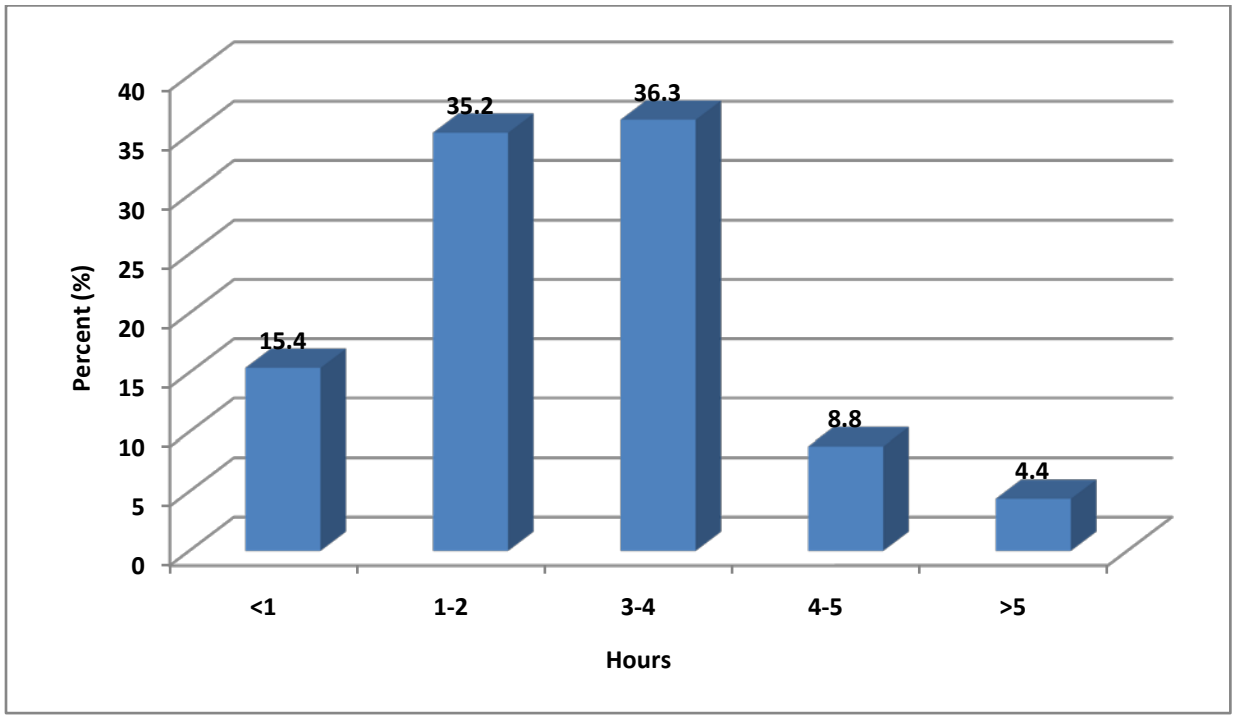


Table 2: Patient characteristics and Glasgow coma scale assessment on admission

Patient characteristics	Glasgow coma scale score at admission		χ^2	P-value	OR
	Severe head injury n(%)	Moderate head injury n(%)			
Age					
18-30 years	48(88.9)	6(11.1)	2.4	0.324	1
31-40 years	12(75)	4(25)		0.174	0.375
41-70 years	19(90.5)	2(9.5)		**0.042***	1.187
Gender					
Female	9(90)	1(10)	0.1		1
Male	70(86.4)	11(13.6)		0.753	0.707
Marital status					
Married	32(88.6)	4(11..4)	3.38	0.22	1
Single	41(88.9)	5(11.1)		0.103	0.25
Previously married (separated, divorced)	6(66.7)	3(3.33)		0.964	0.969
Educational level					
Secondary or less	22(91.3)	2(8.7)	0.718	0.705	1
College/polytechnic	32(86.1)	5(13.9)		0.551	0.59
University	25(83.3)	5(16.7)		0.403	0.476
Occupation					
Casual laborer	17(70.2)	9(29.8)	5.49	**0.043***	1
Unemployed	26(89.3)	3(10.7)		0.355	3
Professional	17(73.9)	6(26.1)		0.163	0.34
Self employed	11(88.3)	2(16.7)		0.605	0.6

*= Significant P Value

Table 2 above shows the results of association between patient characteristics and Glasgow coma score. The patient characteristics were associated with Glasgow coma score on admission. The results depicts that majority of the patients had severe head injury (n=79). Based on age,

majoritywho were aged between18-30 and above 40 years with 88.9% and 90.5% respectively had severe head injury. There was a significant relationship between age above 40 years, low GCS and severity of brain injury (P= 0.042). There was no significant relationship of severity of brain injury in relation to gender, marital status and level of education. However occupation yielded a significant association of severe brain injury with casual laborers having the lowest GCS (P=0.042). The patient characteristics were significant to assessment of traumatic brain injury on admission.

4.4 Causes of Injury

Table 3 gives the distribution of causes of injury of the respondents. Many of the respondents were reported to be due to motor vehicle accident 42.9% (n=39) followed by assault 36.3% (n=33) and then falling from height 15.4% (n=14). Other causes included fall of object which was 4.4% (n=4) and unknown cause of injury was 1.1% (n=1).

4.5 Associated Injuries

The most common associated injury were maxillofacial at 41.3 % (n=50) followed by limbs which was 38% (n=46), chest trauma 7.4% (n=9), frictional burns 6.6% (n=8), abdominal trauma 5% (n=6) and spinal trauma at 1.7% (n=2).

4.6 Associated features.

It was noted that hemorrhage around the eyes (raccoon eyes) was positive at 71.4% (n=65) for majority of the patients. No CSF Rhinorrhea and ottorrhoea at 75% (n=72) and the level of consciousness at injury according to eye witness was unknown 76.7% (n=69).

Table 3: Causes ofinjuries, associated injury and the neurological outcome

Injuries	**Frequency**	**Percentage %**
Cause of injury		
Assault	33	36.3
Fall from height	14	15.4
Fall of object	4	4.4
Motor vehicle accident	39	42.9
Unknown	1	1.1
Associated injury		
Frictional burns	8	6.6
Spinal	2	1.7
Limbs	46	38.0
Abdominal trauma	6	5.0
Chest trauma	9	7.4
Maxillofacial	50	41.3
CSF leakage		
No CSF rhinorrhea	72	75.0
CSF rhinorrhea	13	13.5
CSF ottorrhoea	11	11.5
Neurological status at injury (eye witness)		
Conscious	22	23.3
Unknown	69	76.7
Battles sign (raccoon eyes)		
Positive	65	71.4
Negative	26	28.6

Figure 4: The causes of injury

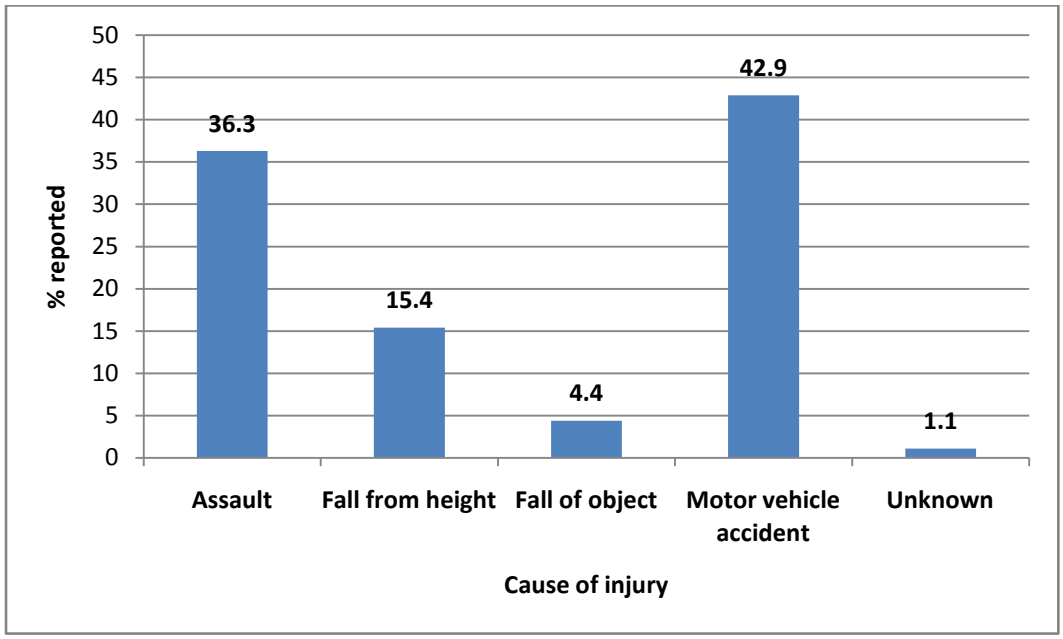


Figure 5: Associated injury

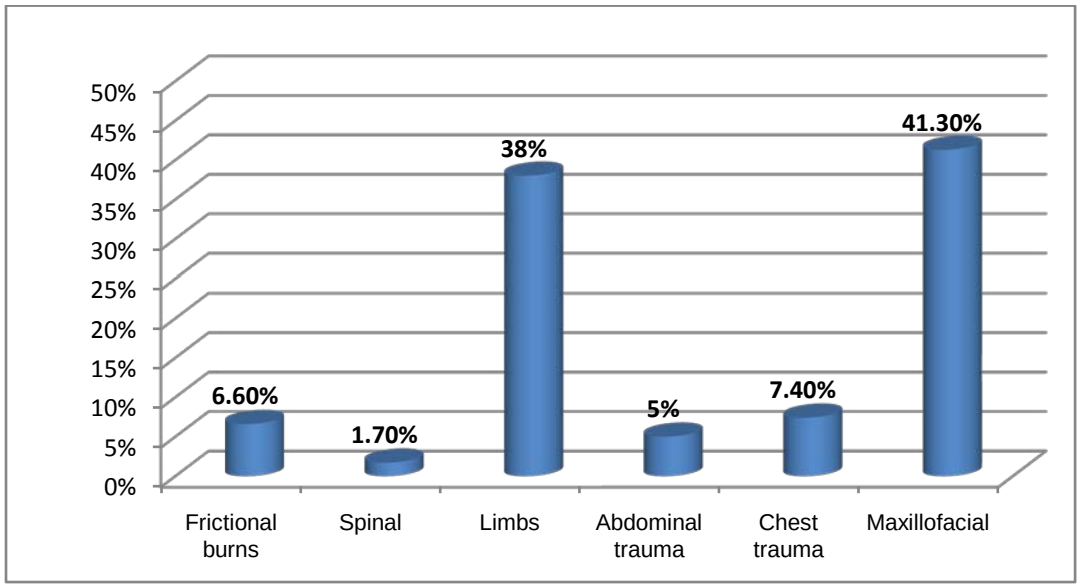


Table 4: Injuries and GCS at admission

Variables	GCS at admission				χ^2	P-value
	Severe TBI (<7)		Moderate TBI (8>)			
	n	%	n	%		
Mechanisms of injury						
Assault	29	87.9	4	12.1	2.01	0.73
Fall from height	13	92.9	1	7.1		
Fall of object	4	100	0	0		
Motor vehicle accident	32	82.1	7	17.9		
Unknown	1	100	0	0		
Associated injury						
Frictional Burns	7	87.5	1	12.5	0.189	**0.042***
Spinal	2	100	0	0		
Limbs	40	87	6	13		
Abdominal trauma	6	100	0	0		
chest trauma	8	88.9	1	11.1		
Maxillofacial	45	90	5	10		
Neurological status at Injury						
Conscious	18	85.7	3	21	0.022	0.880
Unknown	60	87	9	13		
Cerebral spinal leakage						
No CSF leakage	63	87.5	9	12.5	1.09	0.632
CSF Rhinorrhea	12	92.3	1	7.7		
CSF Ottorrhoea	9	81.8	2	18.2		

* = Significant P value

Table 4 illustrates the relationship of multiple injuries on GCS at admission. Majority of patients who had polytrauma had severe TBI at admission as shown by use of GCS. (P 0.042)

4.7 Care interventions

Table 5: Care interventions executed within the first 72 hours

Medical intervention given	N(%)	χ^2	P-value
Medication			
Analgesics; Antimenengitics; Dexamethasone; Mannitol	82(89.7)	1.606	**0.001***
Analgesics; Antimenengitics; Dexamethasone	4(4.6)		
Analgesics; Antimenengitics	2(2.3)		
Analgesics	1(1.1)		
Analgesics; Dexamethasone; Mannitol	1(1.1)		
Antimenengitics	1(1.1)		
Nursing			
Continuous monitoring; Head injury chart; Intubation; Neck collar; Patient parameters; Urinary catheter	2(2.2)	8.02	**0.055***
Continuous monitoring; Head injury char; Intubation; Patient parameters; Urinary catheter	84(92.2)		
Continuous monitoring; Head injury chart; Patient parameters; Urinary catheter	1(1.1)		
Head injury char; Intubation	1(1.1)		
Head injury chart; Intubation; Patient parameters; Urinary catheter	2(2.2)		
Head injury chart; Intubation; Urinary catheter	1(1.1)		
Surgical			
Craniotomy	38(65.5)	0.705	0.703
Elevation of skull fracture	3(5.2)		
Surgical toilet	17(29.3)		

*= Significant P value

Table 5 gives a descriptive analysis of the medical attention to TBI patients at accident and emergency department on arrival. The majority 89.7% (P=0.001) of the trauma patients received Analgesics; Antimenengitics; Dexamethasone and Mannitol. The nursing care intervention at 92.2% (P=0.055) comprised of Continuous monitoring; Head injury chart; Intubation; Patient parameters; Urinary catheterization with exception of restrains.

In surgical intervention, Craniotomy was done to most trauma patients 38(65.5%) and 17(29.3%) surgical toileting was done. However this was only done to patients who would benefit from surgery.

The above analysis indicates that staff intervention is significant and therefore the outcome of TBI patients is dependant patient factors and the systems.

4.8 Outcome

The results are based on defining Glasgow Outcome Scale as follows; 1, 2 and 3 as poor outcome, and Glasgow Outcome Scale 4 and 5 as good outcome.

Glasgow Outcome Scale evaluation at 72 hours was performed and the results presented as shown in figure 5 below. The TBI patients mortality was at 33% (n=33), Persistent vegetative state(acute) 28.6%(n=26), acute severe disability 19.8% (n=18), moderate disability 17.6% (n=16) and good recovery was 1.1% (n=1). These results were evaluated after 72 hours of hospitalization.

However after a longer period of hospitalization of 10 days and longer there was improved outcome as shown in table 7.

Figure 6: GOS outcome (acute) after 72 hours

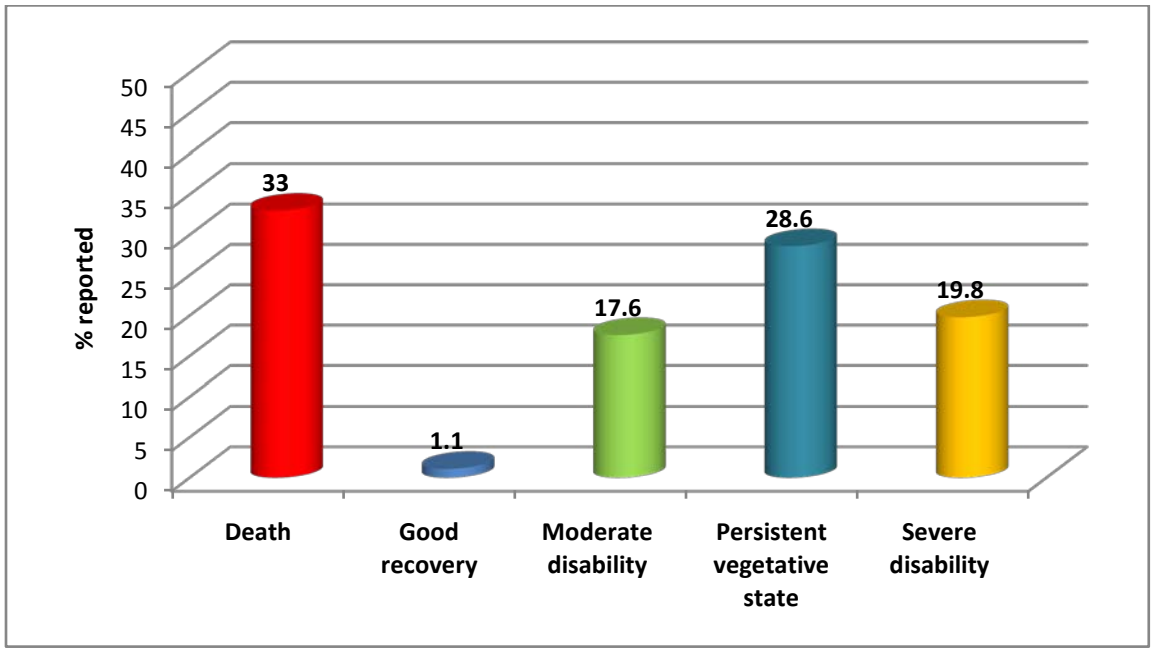


Table 6: GOS evaluation after 72 hours

Variable	**GOS evaluation at 72 hours**		χ^2	**P-value**
	Poor outcome	**Good outcome**		
Severe TBI	70(88.6%)	9(11.4%)	20.95	**0.0001**
Moderate TBI	4(33.3%)	8(66.7%)		

Table 6 above, there was a difference in proportion of patients with severe TBI (n=70; 88.6%) compared to moderate TBI (n=4; 33.3%).The results indicate poor outcome for the severe TBI 11.4% (n=9) and good outcome for the moderate TBI 66.7% (n=8)(P=0.0001).

Table 7: Analysis for Glasgow Outcome Scale

Independent variables	B	OR	95% C.I. for OR		P
			Lower	Upper	
Age>41 years	-.002	.998	.948	1.051	**0.053***
Battles sign					
Negative	-.061	.941	.229	3.856	0.950
Neurological status at injury					
Conscious	-1.244	.288	.071	1.166	0.932
Clinical setting					
A&E department		1			**0.051***
Critical care unit	-1.442	.236	.058	.966	**0.032***
Surgical ward	-.513	.599	.035	10.182	0.845
Length of hospital stay					
1-3 days		1			0.723
4-6 days	1.626	5.086	.847	30.545	0.221
7-10 days	2.348	10.467	.957	114.500	**0.055***
>10 days	1.261	3.529	.409	30.429	**0.050***
Turnaround time on patient reception					
1-2 hours		1			**0.051***
2-3 hours	.170	1.185	.224	6.273	1.000
3-4 hours	.088	1.092	.144	8.268	0.842
4-5 hours	-20.228	.000	.000	.	0.932
Constant	-1.279	.278			1.000

OR= Odds Ratio; **B**= Regression coefficient; **P** is the p-value***** significance

In table 7 above, the outcome results reflects that age is correlated with GOS outcome in that when age increases 40 years and above the outcome becomes poor and it was significant to contributing GOS (P=0.05).

It was noted that some of the independent/predictors of GCS were not significantly associated with GOS. When a patient is admitted to the surgical ward there is a high chance of poor outcome than admission at the A&E department and CCU which was significant (P=0.051), (P=0.032) respectively.

The length of stay was significant in predicting the GOS. Staying in hospital for more than 10 days was 3.5 times likely to have better outcome and was marginally significant (P=0.05). If a patient stays in the hospital between 7 to 10 days, they are more likely of having better outcome than staying between 1 and 3 days (P=0.05) as indicated.

Patients who reported to hospital in less than an hour after injury had good outcome, significance of (P= 0.051).

In summary the results indicate good outcome as 18.7% (n=17) at 72 hours. However at the end of the 8 weeks of data collection most of the patients reported to be in acute persistent vegetative state and acutely disabled improved quite significantly and had good outcome. This is depicted from the results in table 7 above where longer hospitalization resulted to good outcome.

CHAPTER 5
DISCUSSION, CONCLUTION AND RECOMMENDATIONS

5.1 Discussion

A total number of 91 Traumatic Brain Injury Patients were researched on. The outcome was measured after 72 hours using Glasgow Outcome Scale. The TBI patients ranged from age 18 to 65 years old. Majority of the patients were young adults with a median of 29years. The incidence was seen to decrease with age from 40 years and above, an observation that was noted in two other studies by Mwangombe 2001 and Wafula 2010. They found that majority of patients injured were young adults and the numbers were less at fifty and above years.

Traumatic brain injuries are high among young individuals. In this study the age group 21-30 years was dominant. Traumatic brain injuries represent the leading cases of morbidity and death among a predominantly young and productive population.

Majority of the respondents comprised of the male gender. The low percentage of female can be explained by the fact that women are few in the construction industry and they engage less in fights and brawls. This compares with a study done by Opondo 2006 who found that majority of the respondents were male.

A high number of the respondents were single. The singles can be explained by the fact that majority of these subjects were predominantly young.

The education level of most of the TBI patients evaluated were of tertiary level followed by secondary and very few were of primary education level.

The occupation of the respondents varied. Many were unemployed followed by casual laborers (Jua Kali and industries) who were slightly more than the professionals. The self employed were the least. The many respondents being unemployed can be explained since they are likely to engage in unlawful activities which results to brawls and assaults. The casual laborers have a high level of exposure to occupational hazards.

Majority of the patients had severe traumatic brain injury. According to age, majority who were aged 21-30 and above 40 years had severe brain injury. In this study it has been noted absence of survivors among the elderly. The conclusion is that combination of age and admission GCS <6 predict poor outcome and can be used to counsel the patients relatives.

There was no difference in females and males who had severe head injury. The same pattern was seen in marital status, educational level and occupation. The patient characteristics were not significant to assessment of traumatic brain injury at admission.

A high number of respondents were reported to have incurred injuries due to motor vehicle accident followed by assault and then falling from height. This reflects the frequency of motor vehicle accidents caused mainly by public transport and the motor bikes, despite the introduction of new traffic rules in Kenya. Unlawful activities lead to assaults and lack of proper occupational gear in building and construction industry.

Maxillofacial and fractured limbs were the commonest associated injuries to the traumatic brain injury respondents. This can be explained by the close proximity of the maxillofacial and the brain. The limbs were traumatized in the course of defense during assault, RTA and falls from height.

Polytrauma has been associated positively with severe TBI at admission and also poor outcome as depicted by use of Glasgow Coma Scale. Polytrauma will cause the patient to have other pathophysiologic reactions following trauma. This includes neurogenic shock due to pain from injuries, hypovolemia due to massive hemorrhage, inflammatory reactions and histamine production. Bazzarian et al, 2009 also found out that Polytrauma complicated outcome of traumatic brain injury patients who would otherwise have good outcome.

The number of patients seen at Accident and Emergency department within an hour were minimal. In the 1970s and early 1980s Mwangombe, 1999 found that most TBI patients to have been seen within an hour of trauma. In this study patients who were seen in the first hour of trauma had good outcome. This can be explained by timely diagnosis and management of the patients to prevent secondary brain injury through edema and hypoxia which compromises good outcome of the patients.

In a study done by Signorini et al 1999, they found out that TBI patients who presented to hospital within the first hour of trauma had high chances of better outcome. This was due to prevention of secondary insults to the brain tissues

Majority of the TBI patients arrived at A&E department between 1 and 4 hours. A minimal number arrived after four hours of trauma. This reflects on the present poor state of emergency rescue services in the country.

Medical attention and medication given to TBI patients at accident and emergency on arrival was timely and the nursing care intervention was prompt. Both interventions had a significant positive effect on the TBI patients' outcome. Surgical intervention was only done to patients who would benefit from surgery. This indicates that the clinical teams' interventions having been significant therefore the patients' poor outcome is dependent on the patient factors and the

protocols and systems. Positive outcomes of critical care management and proper timely medication were reported in a study by Smoller et al, 1990.

The Glasgow Outcome Scale score indicated that majority of the TBI patients were reported to have poor outcome with mortality of a third of the subjects. These patients had severe TBI with GCS of less than six, arrived to hospital more than two hours after injury and majority who died were above 40 years. Acute Persistent vegetative state and conscious but acutely disabled were defined after a 72 hours evaluation though still hospitalized and undergoing treatment.

In 72 hours of evaluation poor outcome had majority which included the mortalities and good outcome were less. The poor outcome in this study can be explained by high frequency of Polytrauma, late presentation to hospital and age above 40 years. Univariate analysis found predictors of mortality in this study to be Glasgow coma scale score less than 6.

It was noted that some of the independent predictors of GCS were significantly associated with GOS. When a patient is admitted to the surgical ward there is a high chance of poor outcome than those admitted at the Accident and Emergency department and Critical Care Unit which was significant. Ideally these patients should not be managed in the wards during the critical moments. Usually they are admitted to the wards subject to availability of space in A&E and CCU. This is due to the critical care management, availability of machines for continuous monitoring and evaluation and well trained teams to manage these patients.

The length of stay was significant in predicting the Glasgow Outcome Scale. Staying in hospital for more than 10 days was likely to have better outcome and was marginally significant.TBI patients require intensive care, intubation and may also require surgery. All these interventions require time to investigate, perform, recovery period and evaluation.

In summary it has been shown that patient' factors which include age, injury cause, Polytrauma, time lapse from trauma to hospitalization and the GCS on admission would influence outcome of the TBI patients. Prediction of good outcome of patients with traumatic brain injury is intensive care of these patients which is only available at the accident and emergency department and the critical care unit. This includes proper medication, critical care nursing and timely surgery for those who would benefit. Measurement of other categories to include length of stay in the department for proper monitoring and evaluation before discharge is important for good outcome.

5.2 Conclusion

Ninety one patients with Traumatic brain injury who fulfilled the criteria of the study were reviewed during the study period at the A&E, CCU and surgical wards at Kenyatta National Hospital. The study took a period of eight weeks.

Majority of these patients were male, single ,age of 21-30 years and had tertiary level of education. Many were unemployed while others worked as casual laborers.

The Glasgow coma scale was used and was found to significantly correlate to outcome of patients. This is a practical, convenient and economic test for patients. It can be used by most medical staff due to its simplicity. Its proper use should be encouraged. The Glasgow Outcome Scale score was used to evaluate the patients' outcome.

Intensive care of these patients was a major requirement which strongly correlated to good outcome of these patients. However other factors also contribute to good outcome to include timely diagnosis and interventions to prevent secondary brain injury.

The poor outcome in this study can be explained by high frequency of multiple injuries and late presentation to hospital and in patients above 40 years where there were no survivors. Univariate analysis found predictors of mortality in this study to be Glasgow coma scale score less than 6.

However from this study which took a period of eight weeks most patients who were categorized to have poor outcome in 72 hours later had good outcome after a longer period of hospitalization. These were patients in the category of acute persistent vegetative state and acute severe disability which were categorized as poor outcome.

The magnitude of poor outcome seen in this study, it is clear that prevention is the best way of reducing the physical, psychological and economic burden associated with Traumatic brain injury. In the event that prevention fails, proper management of patients' pre hospital and during hospitalization contributes to good outcome.

5.3 Recommendations

Prevention of Traumatic brain injuries is paramount and cannot be underestimated. Road safety should continuously be emphasized to drivers, passengers and pedestrians. Road traffic accidents recorded the highest cause of traumatic brain injuries in this study.

Overall insecurity in the country should be addressed to prevent assaults and mob justice. Responsible drinking should be emphasized to prevent brawls and assault. Building and construction safety measures should be enforced to include proper gear to prevent falls from heights and falling objects injuries.

Traumatic brain injury is a frequent cause of admissions to the hospital and they require intensive medical and nursing care and therefore a neuro-intensive care unit is mandatory. This

should be exclusive to neuro-patients since they occupy 62% of the intensive care unit. A traumatic neuro ward is also a requirement so that patients from the intensive care unit can be treated in the neuro ward other than the general surgical wards. This will facilitate exclusive care which would improve outcome.

Training of neuro teams which would include; neuro surgeons, neuro nurses and all other associate staff. This is to facilitate professional and quality care to improve outcome of these patients.

A study on prevention and management of secondary brain insults should be carried out in the same setting since in this study the high mortality was attributed to secondary brain insults.

REFFERENCE

Altman, D. G. (2001). Systematic reviews in health care: Systematic reviews of evaluations of prognostic variables. British Medical Journal. 323:224-8.

Bazarian, JJ, Cernak I, Noble-Haeusslein L, Potolicchio S, Temkin N. 2009. Long-term neurologic outcomes after traumatic brain injury. Journal of Head Trauma Rehabilitation 24:439-451.

Bruns J Jr, Hauser WA. (2003). The epidemiology of traumatic brain injury: a review. Journal of Neurosurgery; 44-10:2-10.

Bullock M.R. (2009). Prevention of death in head injury in Natal. *South African Medical Journal*. *73:523-527*

Cheung S.Y (2007). Outcome of traumatic head injury in Hong Kong. *International journal of care of the injured.38;76-80*

Fausi A.S, Longo D.L, Hauser S.L. (2008). Harrisons Principals of Internal Medicine.17th edition. The McGraw-Hill Companies. USA.

Homer C. T (2006). Do Trauma Patients with a Glasgow Coma Scale Score of 3and Bilateral Fixed and Dilated Pupils Have Any Chance of Survival? *Journal of Trauma.*; 60:274 –278.

Hukkelhoven CW,Steyerberg EW, Habbema JD. (2005). Predicting outcome after traumatic brain injury: development and validation of a prognostic score based on admission characteristics. Journal of Neurotrauma 22:1025-39.

Hulley S.B and Cummings S.R.(1998). Designing Clinical Research. Williams & Williams, Missouri.

Jennett B, Bond M. (2006). Assessment of outcome after severe brain damage. Lancet 1975; 480-4. World Bank. World development indicators . Washington, DC.

Lee KL, PryorDB, Harrell FE Jr. (1996) Predicting outcome in head injury patients. Statistical models versus expert clinicians. American Journal of Neurosurgery.80:553-60.

Leverssen T.G, Klauber M.R, and Marshal L.F.(1988). Outcome of head injury related to patients age. *Journal of Neurosurgery 68:409-416*

Lubanga R. (1992). Head injury in African Children at Kenyatta National Hospital. *MMED Thesis, University of Nairobi.*

Maas A I, Marmarou A, Murray G D, Teasdale S G, (2007). Prognosis and clinical trial design in traumatic brain injury: the IMPACT study. Journal of Neurotrauma 24:232-8.

Maas AI, Hukkelhoven CW,Marshall LF.(2005). Prediction of outcome in traumatic brain injury with computed topographic characteristics: a comparison between the computed topographic classification and combinations of computed topographic predictors. Journal of Neurosurgery 57:1173-82.

Mugenda O and Mugenda A. (2003). Research Methods Qualitative and Quantitative Approaches. Acts press Nairobi, Kenya.

Mwangi j. (2005) .The pattern and early outcome of pediatric craniovertebral injuries managed at Kenyatta National hospital. *MMED Thesis, University of Nairobi.*

Mwangombe N.J, Kiboi J. (2001). Factors influencing the outcome of severe head injury patients at Kenyatta National Hospital. *East Africa Medical Journal. 78(5):238-241*

Ondede K. (2008). Role of the mean arterial pressure in monitoring severe head injury patients at a tertiary hospital. *MMED Thesis, University of Nairobi.*

Opondo E. (2005). Factors influencing outcome of severe head injury at Kenyatta National Hospital. *MMED Thesis, University of Nairobi*.

Perel P, Wasserberg J, Ravi RR. (2007). Prognosis following head injury: a survey of doctors from developing and developed countries. British Medical Journal 13:464-5.

Reinert C.K, Hukkelhoven C.W,Marshall L.F. 2000). Prediction of outcome in head injury patients. *Journal of Neuro Trauma. 16:152-158.*

Roukoz B. Chamoun, Claudia S. Robertson, and Shankar P. Gopinath. Outcome of traumatic head injury patients. *Journal of Trauma. 2006: 278-281*.

Sarrafzadeh A. M,Marshall L.F, Kumar S. T. 2001.Outcome of traumatic head injury patients. *Journal of Trauma. : 218-221.*

Signorini D F,Andrews P J, Jones P A. (1999). Predicting survival using simple clinical variables: a case study in traumatic brain injury. *Journal of Neurosurgery 66:20-5.*

Smoller S.W, Kamran T, Kenneth S. (1990). Factors affecting short term outcome of head trauma patients. *Journal of Neurosurgery 1: 154-166*

Wafula G.T. (2010) Factors that influence early outcome in severe traumatic brain injury in different age groups at Kenyatta National Hospital. *MMED Thesis, University of Nairobi.*

Wardlaw J.M, Easton VJ, Statham P. (2002). Which CT features help predict outcome after head injury? Journal of Neurosurgery 72:188-92.

APPENDIX I: CONSENT FORM

NEXT OF KIN

I, JOAN M. SHISOKA, a post graduate student at the University of Nairobi. I am doing a study on **Factors that Influence Outcome on Traumatic Brain Injury Patients at Kenyatta National Hospital.** These factors are important in head injury patients as they play a big role in the recovery of patients. I will not influence the management of the patient but will monitor the time taken from one procedure of management to the next and the progress of the patient.

I will ask you questions and also examine the patient. I will subsequently follow up the patient through the hospital process up to 72 hours and record my findings. All information will be treated with strict confidentiality.

The results of this study will be useful in care of patients in the future. Participation is completely voluntary and you are free to withdraw your patient from the study at any point and that would not affect treatment in any way.

I …….have been explained to the purpose and conditions of my patients' involvement in the study. I agree to the above and give consent on his/her behalf to be included in the study.

Name of guardian……. …..
Sign/thumb……

Date……..

Witness……...
Sign/thumb……

Date……

INVESTIGATOR

JOAN SHISOKA

Signature……

APPENDIX II: KISWAHILI CONSENT VERSION

FOMU YA KUKUBALI KUSHIRIKISHA MGONJWA KATIKA UTAFITI

Mimi, JOAN SHISOKA mwanafunzi katika chuo kikuu cha Nairobi. Ninafanya utafiti katika Hospitali kuu ya Kenyatta unaochunguza matokeo baada ya masaa sabini na mbili ya wagonjwa walioumia vichwa.

Nitakuhoji kuhusu kuumia kichwa kwa mgonjwa na nitaandika yale utakayosema kwa shughuli za huu utafiti. Pia mgonjwa atapimwa kimwili kwa minajili ya utafiti huu.

Uelewe kwamba hakuna malipo ya kushiriki na habari yote utakayopeana itawekwa siri. Unaweza kujiondoa wakati wowote katika utafiti huu, na hali hiyo haitaathiri matibabu ya mgonjwa kwa vyovyote vile.

Jina lako na wala la mgonjwa halita andikwa pahali popote katika makaratasi ya utafiti ila nambari ya utafiti tu.

Mimi……. (majina kamili kwa herufi kubwa) nimeelewa maelezo yote ambayo nimepewa. Nimekubali kushirikisha mke/mume/ndugu/jamaa yangu katika huu utafiti kama mgonjwa kwa hiari yangu.

JINA LA MSHIRIKI/MLINZI…….

Sahihi/kidole gumba……Tarehe ……

SHAHIDI…….

Sahihi/kidole gumba……Tarehe ……

MTAFITI

JOAN SHISOKA

Sahihi……

APPENDIX III: DATA COLLECTION TOOL

Data sheet design from Hulley S.B and Cummings S.R.1998. Designing Clinical Research. Williams & Williams, Missouri.

Instructions

- Do not write any names.
- Tick where appropriate in the spaces provided

Data Sheet:

Study code number …….....

Date of admission ……

Time of admission ……

1. Gender

Male…..... Female……

2. Age in years ……..

3. Marital status

Married……. Divorced…….

Single…… Separated……

4. Education level

Primary…… College/ Polytechnic……

Secondary…….. University……

5. Occupation

Professional……. Casual laborer (Industries)……

Unemployed……. Casual laborer (Jua kali)…….

Self employed (specify)…….

6. Time lapse between trauma and arrival at A&E department

< 1 hour ……1 – 2 hours …….

3 – 4 hours……4 – 5 hours…….

>5 hours……

7. Mechanism of injury

Motor vehicle accident …… Fall from height……..

Assault….....Fall of object……..

Fire arm/ missile……..Unknown….....

8. Associated injury

Maxillofacial ….....Chest trauma ……..

Abdominal trauma …….Limbs ……..

Spinal ……Frictional burns…….

9. Neurological status at injury (eye witness)

Conscious……Unconscious…….

Unknown…….

10. Cerebral spinal fluid leakage

CSF rhinorrhoea ……CSF ottorrhoea ……

No CSF leakage……..

11. Battles sign (hemorrhage around the eyes- raccoon eyes)

Positive…….Negative……

12. Glasgow coma scale score at admission

Eye opening …….

Motor response……

Verbal response……

Total score ……..

13. Medical attention given

a) **Medication** Mannitol…. Dexamethasone….Antimenengitics…...Analgesics……

b) **Nursing** Intubation…….Neck collar……..

Restrains…….Patient parameters……

Head injury chart……. Urinary catheter……

Continuous monitoring……..

c) **Surgical** Craniotomy ……..

Surgical toilet ……

Elevation of skull fracture ……..

14. Turn around time on patient reception at A&E department to the admitting clinical setting.

1 – 2 hours ……2 – 3 hours ……

3 – 4 hours …….4 – 5 hours …….

>5 hours ……

15. Clinical setting where patient admitted

A&E department ……..Critical care unit ……..

Surgical ward ……...Orthopedic ward ……

16. A&E/ CCU/Ward Hospital stay (Admission to discharge)

1 - 3 days ……... 4 – 6 days ……...

7– 10 days……. >10 days ……

17. Glasgow Outcome scale (GOS) at discharge

……a) Death

…….b) Persistent vegetative state

…….c) Severe disability (conscious but disabled)

…….d) Moderate disability (disabled but independent)

- Dysphasia
- Hemiparesis
- Ataxia
- Memory deficits
- Personality changes
- Intellectual deficits

……..e) Good recovery

This is resumption to normal life even though there may be minor neuropsychological deficits.

APPENDIX IV: KNH/UON-ERC APPROVAL LETTER

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

KNH/UON-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke
Link:www.uonbi.ac.ke/activities/KNHUoN

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

Ref: KNH-ERC/A/186

1st July, 2013

Joan M. Shisoka
School of Nursing Sciences
College of Health Sciences
University of Nairobi.

Dear Joan

RESEARCH PROPOSAL: FACTORS THAT INFLUENCE OUTCOME OF TRAUMATIC BRAIN INJURY PATIENTS AT KENYATTA NATIONAL HOSPITAL (P93/3/2013)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 1st July, 2013 to 30th June, 2014.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

KENYATTA NATIONAL HOSPITAL
APPROVED
01 JUL 2013
ETHICS & RESEARCH COMMITTEE

For more details consult the KNH/UoN ERC website **www.uonbi.ac.ke/activities/KNHUoN.**

Yours sincerely

PROF. M. L. CHINDIA
SECRETARY, KNH/UON-ERC

c.c. Prof. A.N. Guantai, Chairperson, KNH/UoN-ERC
Deputy Director CS, KNH
AD, Health Information, KNH
Principal, College of Health Sciences, UoN
Dean, School of Medicine, UoN
Supervisors: Mrs. Lilian Omondi, Mr. Samuel T. Kimani

APPENDIX V: KNH A&E DEPARTMENT APPROVAL LETTER

Joan M. Shisoka

School of Nursing Sciences

College of Health Sciences

University of Nairobi.

12th August 2013.

The Assistant Director

Accident & Emergency Department

Kenyatta National Hospital.

Approved and recommended 12/8/13

Casualty Department Kenyatta National Hospital

Dear Sir/Madam,

RE: PERMISSION TO CONDUCT A STUDY ON "FACTORS THAT DETERMINE OUTCOME ON TRAUMATIC BRAIN INJURY PATIENTS AT KENYATTA NATIONAL HOSPITAL".

I am a postgraduate student pursuing Master of Science in Nursing (Medical- Surgical) at University of Nairobi.

I am kindly requesting for permission to carry out a research on the above study. Your kind consideration will be highly appreciated and it will go a long way in facilitating completion of my study. The research findings will be utilized both locally and nationally in improving health care service utilization.

Yours Faithfully,

JOAN M. SHISOKA

shisokaj@yahoo.co.uk