



UNIVERSITY OF NAIROBI

**RELATIONSHIP BETWEEN INJURY SEVERITY SCORE & POST-TRAUMATIC
STRESS DISORDER AMONG ORTHOPAEDIC TRAUMA SURGICAL PATIENTS
AT THE KENYATTA NATIONAL HOSPITAL**

By

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award of the degree of Master of Medicine (M. Med) in Orthopaedic Surgery at
the University of Nairobi**

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January 2022

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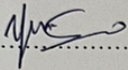
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DEDICATION

To my family and friends for your prayer and support

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LIST OF ABBREVIATIONS

| | |
|------|---|
| AAM | Advancement of Automotive Medicine |
| AIS | Abbreviated Injury Scale |
| DSM | Diagnostic and Statistical Manual of Mental Disorders |
| ICU | Intensive Care Unit |
| IES | Impact of event scale |
| IISC | International Injury Scaling Committee |
| ISS | Injury Severity Score |
| KNH | Kenyatta National Hospital |
| MVA | Motor Vehicle Accident |
| PTSD | Posttraumatic Stress Disorder |
| WWII | World War II |

STUDY DEFINITIONS

Post-traumatic stress disorder (PTSD) is a psychiatric disorder involving extreme distress and disruption of daily living related to exposure to a traumatic event.¹ About 7 to 8% of the U.S. population will experience PTSD during their lives.

Diagnostic Statistical Manual is the manual used by clinicians and researchers to diagnose and classify mental disorders. The American Psychiatric Association (APA) published DSM-5 in 2013, culminating a 14-year revision process.

Trauma is a deeply distressing or disturbing experience. There are three main types of trauma:

- Acute trauma results from a single incident.
- Chronic trauma is repeated and prolonged, such as domestic violence or abuse.
- Complex trauma is exposure to varied and multiple traumatic events, often of an invasive, interpersonal nature

LIST OF TABLES

| | |
|---|-------------------|
| <i>Table 1: Example demonstrates an ISS calculation.....</i> | <i>page 2</i> |
| <i>Table 2: Data Variables.....</i> | <i>page 19</i> |
| Table 3: Socio-demographic characteristics of the study participants..... | page 20 |
| Table 4: Clinical profile of the study participants..... | page 21 |
| Table 5: Crude association between IES-R score potential predictors of Post-Traumatic Stress Disorder..... | page 24-25 |
| Table 6: Adjusted association between IES-R score and ISS score..... | page 27 |

LIST OF FIGURES

| | |
|--|----------------|
| <i>Figure 1: Conceptual Framework.....</i> | <i>page 16</i> |
| <i>Figure 2: Study Flow Diagram.....</i> | <i>page 20</i> |
| Figure 3: Distribution of the ISS scores among patients with orthopedic trauma at the Kenyatta National Hospital..... | page 22 |
| <i>Figure 4: Distribution of the IES-R scores among orthopedic patients at the Kenyatta National Hospital.....</i> | <i>page 23</i> |
| Figure 5: Relationship between ISS scores and IES-R scores among orthopedic patients at the Kenyatta National Hospital..... | page 24 |
| Figure 6: Predicted values of IES-R scores across variables in the adjusted model (Table 4)..... | page 28 |

TABLE OF CONTENTS

| | |
|---|------------------------------|
| DECLARATION..... | Error! Bookmark not defined. |
| CERTIFICATE OF SUPERVISORS | Error! Bookmark not defined. |
| DEPARTMENTAL APPROVAL..... | Error! Bookmark not defined. |
| I would like to express my sincere gratitude to my teachers and supervisors Dr. Kirsteen..... | v |
| Ondiko Awori, Dr. John K Kingori & Dr. Catherine Gitau for their guidance and supervision | v |
| throughout this study..... | v |
| LIST OF ABBREVIATIONS..... | vi |
| STUDY DEFINITIONS | vii |
| LIST OF TABLES | viii |
| LIST OF FIGURES | viii |
| TABLE OF CONTENTS..... | ix |
| ABSTRACT..... | xii |
| CHAPTER ONE INTRODUCTION | 1 |
| 1.1 Background and Epidemiology | 1 |
| 1.2 Assessment of Orthopedic Severity | 1 |
| 1.3 Factors Associated with Post-Traumatic Stress Disorder | 2 |
| 1.4 Diagnostic Criteria for Post-Traumatic Stress Disorder | 3 |
| 1.5 Revised Impact of Event Scale | 3 |
| 1.6 Statement of the Problem | 4 |
| 1.7 Study Justification | 5 |
| 1.8 Study Question | 5 |
| 1.9 Null Hypothesis | 5 |
| 1.10 Study Objectives | 5 |
| 1.10.1 General Objective | 5 |
| 1.11 Conceptual Framework | 6 |
| CHAPTER TWO: LITERATURE REVIEW | 6 |
| 2.1 Introduction..... | 7 |
| 2.3 Injury Severity Score and Post-Traumatic Stress Disorder | 7 |
| 2.4 Predictors of Post-Traumatic Stress Disorder | 8 |
| 2.4.1 Head Injury | 8 |
| 2.4.2 Gender | 8 |
| 2.4.3 Age | 8 |
| 2.4.4 Time from the Trauma | 9 |

| | |
|---|----|
| 2.4.5 Rehabilitation status | 9 |
| CHAPTER THREE: METHODOLOGY | 10 |
| 3.1 Study Design | 10 |
| 3.2 Study Site..... | 10 |
| 3.3 Study Population | 10 |
| 3.3.1 Inclusion Criteria..... | 10 |
| 3.3.2 Exclusion Criteria | 10 |
| 3.4 Sample Size Determination and Formula | 11 |
| 3.5 Sampling Procedure | 11 |
| 3.6 Recruitment and Consenting Procedure | 11 |
| 3.7 Data Variables | 11 |
| 3.8 Study Flow | 13 |
| 3.9 Data Collection Procedures | 13 |
| 3.10 Training Procedures..... | 14 |
| 3.11 Quality Assurance | 14 |
| 3.12 Data Management and Analysis..... | 14 |
| 3.13 Ethical Considerations | 15 |
| Participants’ Autonomy, Beneficence, and non-Malficience | 15 |
| CHAPTER FOUR: RESULTS..... | 16 |
| 4.1 Introduction..... | 16 |
| 4.2 Socio-demographic characteristics..... | 16 |
| 4.3 Clinical profile of patients..... | 17 |
| 4.4 Injury Severity Scale (ISS) score | 18 |
| 4.5 Impact of Event Scale – Revised (IES-R)..... | 18 |
| 4.6 Relationship between ISS scores and IES-R scores | 19 |
| 4.7 Relate overall ISS scores with IES-R score – Crude analysis..... | 20 |
| 4.8 For a given ISS score, determine the effect of age, sex, and time from trauma on IES-R scores | 22 |
| 4.9 Predicted values of IES-R scores across variables in the adjusted model..... | 23 |
| CHAPTER FIVE: DISCUSSION | 25 |
| Study Limitations and How to Overcome..... | 26 |
| Study Results dissemination Plan | 26 |
| Recommendations | 27 |
| Budget and Budget Justification..... | 28 |

| | |
|--|----|
| Study Time Frame | 28 |
| REFERENCES | 29 |
| ANNEXES | 33 |
| Annex A: Consent Form in English..... | 33 |
| Annex B: Ridhaa ya mafunzo sehemu ya kwanza: maelezo | 35 |
| Annex C: Study Questionnaire..... | 37 |
| Annex D: Injury Severity Score Assessment | 38 |
| Annex E: Impact of Event Scale- Revised (IES-R) Assessment | 39 |

ABSTRACT

Background: Major trauma has been defined and assessed using the Injury Severity Score (ISS). A total score of more than 16 has been linked to the development of post-traumatic stress disorder. Trauma is associated with psycho-social effects, especially among younger patients. With the increasingly higher survival rates of multiple trauma patients (85–88%), psychiatric consequences of trauma and subsequent surgical intervention have attracted much interest; studies in developed countries, applying different tools to assess injury severity, have demonstrated a relationship between the development of post-traumatic stress disorder with injury severity score, more so with increasing age, among women, and among patients who stay alone. There is, however, a paucity of data on the screening and integrated care for trauma patients in our setup, more so among orthopedic patients; hence the study to assess the prevalence of symptoms of post-traumatic stress disorder in patients who experienced orthopedic trauma at the Kenyatta National Hospital, Kenya.

Objective: To determine the relationship between injury severity score and post-traumatic stress disorder among orthopedic trauma patients at the Kenyatta National Hospital in Kenya.

Methodology: The study was cross-sectional, where ninety-eight patients from the orthopedic wards at the Kenyatta National Hospital were enrolled in the study. The principal investigator administered the Injury Severity Score tool at the time of admission using the patient records. The revised impact of the event scale tool was used to evaluate post-traumatic stress disorder at discharge. The socio-demographic parameters were collected from the patient's files and a direct interviewee-administered questionnaire. These were recorded in a specially designed data collection tool. Coding and analysis were performed using the Statistical Package for Social Sciences version 24. Univariate analysis for the socio-demographic (age, gender, religion, level of education, employment status, marital status) and surgical variables (type of injury, injury score at admission, number of days in the hospital, cost of surgery, site of the body majorly affected) were done. Bivariate analysis was used for the post-traumatic stress symptoms and the association with socio-demographic and surgical characteristics. A p-value of 0.05 was applied.

Results: Our study showed a weak positive relationship between the ISS score and the IES-R score. The Spearman rank correlation coefficient (ρ) was 0.016.

However, the number of sites injured and the cause of injury were significantly associated with the IES-R score. Patients with more than two sites of injury had a mean IES-R score of 15.59 higher than that of those with one injury site, implying that the more the number of injury sites

a patient has results the higher the patient's IES-R scores predicting the likely development of post-traumatic stress disorder in polytrauma patients.

On average (median), the patients had an ISS score of 9, with the least being 1 (one) and the highest being 35. Regarding the IES-R score, the patients in this study had a median of 33.5, ranging from 0 (zero) to 77.

Conclusion: Posttraumatic stress disorder is not uncommon among patients with orthopedic trauma and is associated with low socioeconomic income, number of sites injured & and cause of injury.

Recommendation: The finding of predictors of PTSD at an early stage after accidents might be helpful in identifying high-risk patients for the development of PTSD especially amongst polytrauma victims for adequate management.

CHAPTER ONE INTRODUCTION

1.1 Background and Epidemiology

Major trauma can be defined using the Injury Severity Score (ISS). A total score of more than 16 is associated with a sizeable psycho-social effect especially among young people [1]. In the recent past, the rate of survival for multiple trauma patients has increased. This has been attributed to the progressive improvement in care (1,2,3,4). Following trauma, a significantly high proportion of patients report a significant reduction in quality of life and with functional limitations (2). This subsequently leads to a significant financial burden due to loss of working hours due to disability, costs of rehabilitation, or mental impairment (2).

As much as the initial rehabilitation mainly focuses on treating physical injuries, the psychological morbidity has continued to gain focus over the past decades, explicitly concerning post-traumatic stress disorder (PTSD) (5). Therefore, higher rates of return to work are achieved with a good functional status following discharge (6).

1.2 Assessment of Orthopedic Severity

The use trauma scores for triaging patients with polytrauma in the emergency rooms (ER) has been used to allow a comparison between trauma patients. The scores are important in the assessment of trauma care and in allocation of resources. The Injury severity characterization is important in managing polytrauma. The Association for the Advancement of Automotive Medicine (AAAM) International Injury Scaling Committee (IISC), in 1969 developed the Abbreviated Injury Scale (AIS) for grading injuries. The AIS therefore formed the basis for the Injury Severity Score (ISS), so far, the most widely used measure of severity of injuries among trauma patients (8).

The Injury Severity Score (ISS) scores patients with multiple trauma. In this system, each of the injuries is assigned an AIS score and allocated one of six body regions as follows: **Head or neck injuries** (injury to the brain or cervical spine, injury to the skull or cervical spine, asphyxia or suffocation); **Facial injuries** (mouth, ears, nose, and facial bones); **Chest injuries** (lesions to internal organs, drowning, and inhalation, the diaphragm, rib cage, and thoracic spine); **Abdominal or pelvic contents injuries** (all lesions to internal organs, lumbar spine and the abdomen or pelvis); **Extremities or pelvic girdle injuries** (sprains, fractures, dislocations, and amputations); **External and other trauma injuries** (lacerations, contusions,

abrasions, and burns, independent of their location on the body surface, except amputation burns assigned to the appropriate body region). Other traumatic events included to this ISS body region are electrical injury, frostbite, hypothermia, and whole-body (explosion-type) injury.

Table 1: Example demonstrating an Injury Severity Score calculation (adopted from Ruchholtz S et al. 2008)

| ISS Body Region* | Injury | AIS Code | Highest AIS | AIS ² |
|--------------------|--|----------|-------------|------------------|
| Head/Neck | Cerebral contusion NFS | 140602.3 | 4 | 16 |
| | Internal carotid artery transection (neck) | 320212.4 | | |
| Face | Closed fractured nose | 251000.1 | 1 | |
| Chest | Rib fractures left side, ribs 3 – 4 | 450202.2 | 2 | |
| Abdomen | Retroperitoneal Haematoma | 543800.2 | 2 | 4 |
| Extremities | Fractured femur (NFS) | 853000.3 | 3 | 9 |
| External | Abrasions (NFS) | 910200.1 | 1 | |

ISS = 29

Using this assessment, each body region with the highest AIS score is taken into consideration. The body region with the most severely injured parts gets its scores squared and added together to get the total ISS score. The total scores are a range between 0 to 75 with a score of 1 representing a minor injury, and 75 a fatal one. The scores are therefore an indication of the severity of the injury and have a linear correlation with mortality, morbidity and length of hospital stay. Limitations to using the ISS include the fact that the severity scores (AIS 1–6) may be subjectively assigned hence making it difficult to generalize. Furthermore, the scoring system does not consider situations where there are multiple injuries within one region of the body.

In this study, the ISS scoring system will be utilized to assess the severity of trauma among patients with polytrauma at the Kenyatta National Hospital, determine the psychological post-traumatic effects of patients with major physical trauma, and the association with PTSD. The decision to use the ISS is based on the fact that it has been widely used and published; it is easy to administer and interpret.

1.3 Factors Associated with Post-Traumatic Stress Disorder

Studies have shown that factors associated with PTSD after major trauma include gender, the cause of the injury, style of coping, age, chronic illnesses, pain, cognitive functioning at discharge and level of employment (9,10). Identifying patients with risk for developing PTSD

is essential for prevention and early treatment (11). Symptoms of PTSD may however develop immediately hence hamper the identification of risk groups (5).

1.4 Diagnostic Criteria for Post-Traumatic Stress Disorder

Several tools have been employed to study PTSD. The Posttraumatic Diagnostic Scale (PDS-5) assessment complements the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) for self-reporting of PTSD. Another tool used to assess subjective distress caused by trauma is the Impact of Event Scale-Revised (IES-R). This tool contains seven additional items that are related hyperarousal symptoms of PTSD, missed out in the original IES.

The DSM-V remains the primary reference in the diagnosis of PTSD. The criteria for diagnosis identifies the triggers to PTSD as a threat to one's life, injury of serious or sexual violation, resulting from: direct experience of trauma; personal witness of the trauma; the trauma occurred to a close family member or friend (either violence or accidental); first-hand repeated or extreme exposure to details of the trauma (pictures, television or movies unless work-related experiences are excluded). The trauma is of such magnitude that it causes clinically significant distress or impairment of the individual's social interactions, ability to work, or other important areas of normal functions.

1.5 Revised Impact of Event Scale

The 22-item tool is a revised form of the IES self-reporting tool (for DSM-IV) that has been used to assesses subjective distress due to trauma. The additional seven items in this tool relate to the symptoms of hyper activity among patients with PTSD. The IES-R tool allows respondents to identify stressful events and indicate the level of distress they were in for the past seven days. The items are then rated on a 5-point scale ranging from 0 ("not at all") to 4 ("extremely") and a total score ranging from 0 to 88.

Using the IES-R scale, sub-scale scores can be calculated for Intrusion, Avoidance, and Hyperarousal sub-scales. From these, means instead of raw sums for each of the sub-scale scores are used to compare with the symptom checklist 90 – revised scores (5). Wohlfarth et al. showed that scores of more than 35 on the total IES-score produced a sensitivity of 89% and a specificity of 94% when the DSM-IV was used as the diagnostic criteria for PTSD (13). In order to maintain a similar sensitivity and specificity in this study, an IES-R-score more 35 will be applied to signify the symptoms of post-traumatic stress indicative of PTSD (5). The Impact of Event Scale, the most widely-used self-report measures patients with trauma.

Therefore, its adoption in this study will provide us with rich access to published papers for comparison.

Table 2: Impact of Event Scale-Revised



The Impact of Event Scale - Revised (IES-R)

Instructions:

Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you DURING THE PAST SEVEN DAYS with respect to (the event). How much were you distressed or bothered by these difficulties?

| | | Not at all | A little bit | Moderately | Quite a bit | Extremely |
|----|--|------------|--------------|------------|-------------|-----------|
| 1 | Any reminder brought back feelings about it | 0 | 1 | 2 | 3 | 4 |
| 2 | I had trouble staying asleep | 0 | 1 | 2 | 3 | 4 |
| 3 | Other things kept making me think about it | 0 | 1 | 2 | 3 | 4 |
| 4 | I felt irritable and angry | 0 | 1 | 2 | 3 | 4 |
| 5 | I avoided letting myself get upset when I thought about it or was reminded of it | 0 | 1 | 2 | 3 | 4 |
| 6 | I thought about it when I didn't mean to | 0 | 1 | 2 | 3 | 4 |
| 7 | I felt as if it hadn't happened or wasn't real | 0 | 1 | 2 | 3 | 4 |
| 8 | I stayed away from reminders about it | 0 | 1 | 2 | 3 | 4 |
| 9 | Pictures about it popped into my mind | 0 | 1 | 2 | 3 | 4 |
| 10 | I was jumpy and easily startled | 0 | 1 | 2 | 3 | 4 |
| 11 | I tried not to think about it | 0 | 1 | 2 | 3 | 4 |
| 12 | I was aware that I still had a lot of feelings about it, but I didn't deal with them | 0 | 1 | 2 | 3 | 4 |
| 13 | My feelings about it were kind of numb | 0 | 1 | 2 | 3 | 4 |
| 14 | I found myself acting or feeling as though I was back at that time | 0 | 1 | 2 | 3 | 4 |
| 15 | I had trouble falling asleep | 0 | 1 | 2 | 3 | 4 |
| 16 | I had waves of strong feelings about it | 0 | 1 | 2 | 3 | 4 |

1.6 Statement of the Problem

Post-traumatic stress disorders among patients with a history of trauma are associated with debilitating psycho-social and economic impairment leading to poor quality of life. PTSD has

also been associated with the development of chronic diseases. To manage these patients holistically, there is a need to determine and characterize patients more prone to developing PTSD. Despite this published relationship in the developed countries, there is a paucity of data in developing countries such as Kenya. This study, therefore, aims to determine the relationship between trauma as assessed by the injury severity score and the risk of developing PTSD using the revised impact of scale score.

1.7 Study Justification

Recent advances in intensive care and trauma surgery have resulted in an increased survival rate for patients with polytrauma, translating to a high number of patients susceptible to PTSD. The diagnosis of PTSD among polytrauma patients can be challenging because of the variable length of time that symptoms develop and the lack of standard tools for timely diagnosis. Since PTSD develops subtly and does not present as an emergency but with deleterious psychological effects, days after the injury, there is a paucity of data in the African setup despite high polytrauma incidences. The study, therefore, aims at providing more information on the development of PTSD among polytrauma patients and the potential impact that this could have on the long-term management of these patients. The findings will inform policy on the comprehensive assessment of patients with polytrauma and inform the need for a more holistic, inter-departmental approach to managing patients with polytrauma. Additionally, the findings will help clinicians help identify early warning indicators for the development of PTSD for timely treatment.

1.8 Study Question

What is the relationship between injury severity score and post-traumatic stress disorder among orthopedic trauma surgical patients at the Kenyatta National Hospital, Kenya?

1.9 Null Hypothesis

There is no relationship between injury severity score and post-traumatic stress disorder among orthopedic trauma surgical patients at the Kenyatta National Hospital.

1.10 Study Objectives

1.10.1 General Objective

To determine the relationship between injury severity score and post-traumatic stress disorder among orthopedic trauma surgical patients at the Kenyatta National Hospital.

1.10.2 Specific Objectives

Among orthopedic trauma surgical patients at the Kenyatta National Hospital:

1. For a given ISS score, determine the effect of age, sex, and time from trauma on IES-R scores
2. Determine the IES-R score at various ISS scores
3. Relate overall ISS scores with IES-R score

1.11 Conceptual Framework

1.11.1 Theoretical

Globally, polytrauma patients are first managed in the accident and emergency unit. Depending on the injury severity, patients either get discharged, undergo surgery, or get admitted for further management. Severity of the injury is dependent on the extent of the trauma, site of the injury, age of the patient, other comorbidities, medications, and time is taken before definitive management is instituted. Assessment of post-traumatic stress disorder entails clinical and mental evaluation of these patients using globally acceptable tools such as the IES-R.

1.11.2 Figurative Presentation

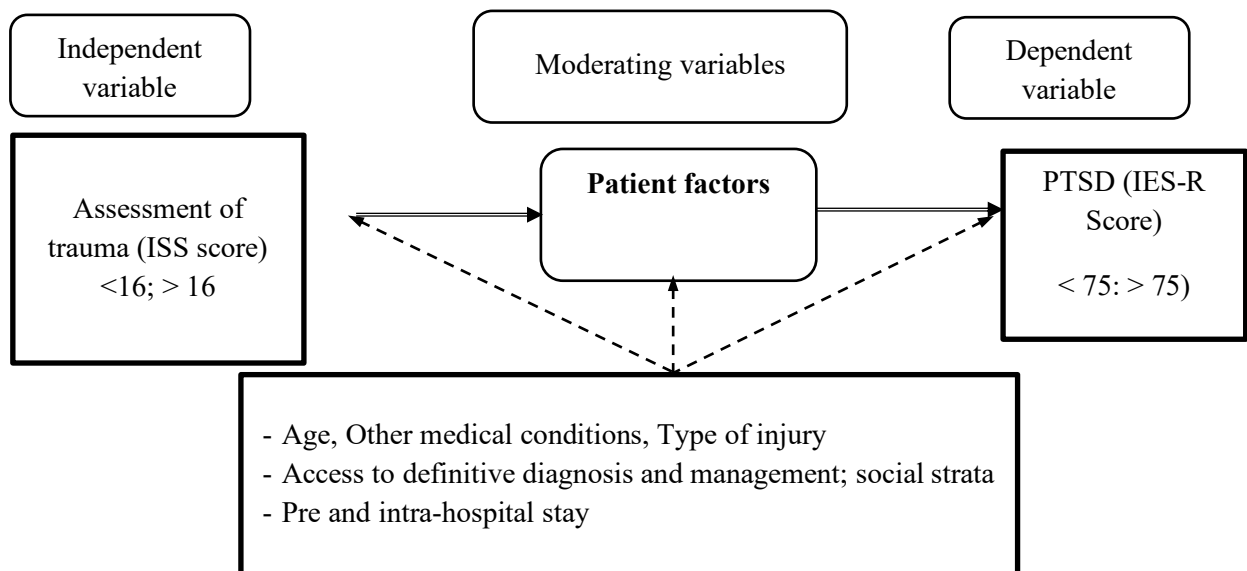


Fig. 1: Conceptual Framework of the Study

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Stress following trauma is a condition characterized by extreme distress and disruption of daily living that happens following exposure to a traumatic event (8). This may result from injury, threatened or actual death of other people. The symptoms include re-experiencing the traumatic event, avoiding similar events and hyperarousal. The symptoms may occur immediately after the event or take some time to manifest (14). The prevalence in the general population, ranges between 2-4% (15,16). Approximately 7 to 8% of the U.S. population experience PTSD during their lifetime. Trauma patients have a higher chance to develop PTSD compared to the rest of the population; rates up to 39% have been reported 1-4 months after the injury (17). For those on follow up for longer than one year, the prevalence varies from 5% among victims of traffic injury to about 32% among those with major trauma (18).

2.2 Pathophysiology of Post Traumatic Disorder

The etiology of PTSD has multiple factors, with a contribution from traumatic, environmental and genetic factors (19). There is documented evidence of clinical and molecular genetic factors associated with PTSD, with gene-environment interactions and temporally dynamic epigenetic mechanisms having been documented as potential correlates of environmental influences (20). Genetics alone is associated with about 30% or more of the variance in PTSD; a study done among identical twins in Vietnam showed that monozygotic twins exposed to combat had an increased risk of developing PTSD, compared to non-identical twins (21).

David Comings, in his study, in the City of Hope, found an association between a reward gene, the dopamine D2-receptor gene (A1 allele form), with military veterans who were diagnosed with PTSD (22). Ernest Noble had in a similar study, demonstrated that individuals with severe alcoholism had a 30-40 percent fewer dopamine D2 receptors in the brain (23). Studies have shown that low dopamine function is associated with a higher chance of developing PTSD (24).

2.3 Injury Severity Score and Post-Traumatic Stress Disorder

A study by Han et al. reported higher injury scores as strong determinants for development of post-injury depression after trauma (8). Those patients with an injury score of more than 16 were twice as likely to develop PTSD compared to those with lower injury scores (8). Similarly,

a study by Frommberger et al. reported higher ISS scores among patients suffering from stress compared to those patients without stress disorders (25).

2.4 Predictors of Post-Traumatic Stress Disorder

2.4.1 Head Injury

Some researchers have reported a protective effect against developing mental disorders among patients with head injury with amnesia (26,27). Other researchers obtained similar results among patients who experienced an extended period of unconsciousness following trauma (28). Zatzick et al., in their study on the effect of severe, moderate, and mild traumatic brain injuries (TBIs) on PTSD found that severe TBIs were associated with lower risks of developing PTSD (29). These findings however contradicted those by Chossegras who positively correlated head injuries and subsequent development of PTSD (30). Other studies have found an association between posttraumatic amnesia and PTSD (31). There was however no documentation on the development of amnesia or the duration of unconsciousness following traumatic brain injury, or the influence that long-term use of sedatives during the stay at the Intensive Care Unit (ICU) has on the development of PTSD (8).

2.4.2 Gender

Following trauma, women have been shown to be more affected by PTSD compared to men (31,32). Notable too is the fact that men are more prone to accidents, combat, assault and war, while women experience more violence associated with assault (33). Researchers have therefore made observations that women have a greater risk to develop PTSD compared to their male counterparts (34). As a result of women being more likely to seek psychological support compared to men, they are likely to have a better chance to recover from PTSD (34). On the contrary, Becket al. did not find any difference in the rate of PTSD between men and women PTSD among patients with Motor Vehicle Accidents (MVA) after six months (5).

2.4.3 Age

As described by Soberg et al., a younger age is associated with higher chances of developing PTSD two years following severe multiple trauma (8). Other authors have had similar results among flood and burn victims (35). In a study by Zhang and Ho the results showed that the older patients were at a higher r age was a risk factor for PTSD among earthquake victims, two months after the event (36). A similar study conducted in Germany showed higher rates of

PTSD among older age groups, most likely as a result of exposure to the effects of World War II (WWII) (36).

2.4.4 Time from the Trauma

Juana et al. using an IES-R cutoff of 35, found that 23% of patients with polytrauma had PTSD one year after trauma; a further 20% had PTSD at two years (5). It has been hypothesized that factors such as the coping strategy and psychosocial resources may affect the long-term response to recovery and protection from developing PTSD [12].

2.4.5 Rehabilitation status

Unsatisfactory rehabilitation has been associated with mental disorders especially when this is associated with constant reminders about the trauma. These reminders have injurious emotional effects that may bar the person from participating in social events (8). A mental disorder can also negatively affect physical functioning, with resultant psychosomatic diseases and subsequent low functional outcomes. Functional rehabilitation and psychosocial support therefore have a significant contribution towards recovering from trauma (36). Based on the literature, there is documented evidence for the association between the severity of injury as assessed by the ISS and the development of PTSD as assessed by the IES-R tool. By conducting this study, it is hoped that the findings will inform the management of patients with polytrauma.

CHAPTER THREE: METHODOLOGY

3.1 Study Design

The study was a cross-sectional study where the injury severity score among orthopedic surgical inpatients as documented at the time of admission was compared with the development of post-traumatic stress disorder as assessed using the Revised Impact of Scale score at discharge.

3.2 Study Site

This study was conducted at the Kenyatta National Hospital (KNH), situated in Nairobi County in Kenya. KNH is the oldest hospital in Kenya, founded in 1901. It serves as a National referral and teaching hospital. It has an average bed capacity of 1800. The KNH is a teaching hospital for the University of Nairobi, Faculty of Medicine, and visiting students from other institutions. The facility has several specialists who offer specialized services across various areas of specialization, including surgery. The orthopedic department is managed by the KNH and UON consultants and the registrars specializing in orthopedic surgery. Patients who require admission in the unit are usually assessed at the accident and emergency unit and operated on from the trauma theater before admission. Post-traumatic stress assessment is not routinely done; patients who exhibit mental health disorders are referred to the psychiatric unit for further evaluation and management. Some of the challenges that affect service delivery include delays in the procurement of orthopaedic implants; these may delay operations.

3.3 Study Population

An average of 2500 patients are admitted to the orthopedic unit per year. Most of the patients have injuries to limbs, necessitating an extended stay within the hospital with an average hospital stay of 38 days.

3.3.1 Inclusion Criteria

- Patients admitted for the management of orthopedic trauma
- Adult patients aged above 18 years of age
- Patients with a GCS of 15 who can give consent, or under their condition, their next of kin will provide support on their behalf.

3.3.2 Exclusion Criteria

1. Patients with a documented history of mental health disorder before the trauma

3.4 Sample Size Determination and Formula

The main outcome of this study is the development of PTSD following orthopedic trauma. Juana et al. using an IES-R cutoff of 35, found that 23% of patients with polytrauma had PTSD one year after trauma; a further 20% had PTSD at two years (5). Applying the same in this study;

We estimate using the sample size formula $n = \frac{2(z_{1-\alpha/2}\sqrt{2\bar{p}(1-\bar{p})} + z_{1-\beta}\sqrt{p_c(1-p_c) + p_a(1-p_a)})^2}{(p_c - p_a)^2}$

[Allan Donner; Stat. Medicine (1984), using statcalc software that we would need to study a total of 140 women to achieve 80% power to detect the stated difference of 20% at a two-sided alpha=0.05 level of significance. Assuming a response rate of 90%, our recalculated sample size will be **98**.

Where $\bar{p} = (p_c + p_a)/2$ ($Z_{0.25}=1.960$, and $Z_{0.8}=0.842$).

1. Reference for software <http://www.stat.ubc.ca/~rollin/stats/ssize/b2.html>
2. Reference for sample size formula Donner, A., *Approaches to sample size estimation in the design of clinical trials--a review*. Stat Med, 1984. **3**(3): p. 199-214.

3.5 Sampling Procedure

The study participants were selected using a non-probabilistic consecutive sampling method where all eligible patients were enrolled in the study. Participants who consented to the research and fitted the criteria for inclusion were recruited until the sample size for the study was reached.

3.6 Recruitment and Consenting Procedure

Upon verbally accepting to participate in the study, all potential study participants underwent consenting (written in English and Kiswahili). This was administered by either the principal investigator or research assistant at the side rooms of the respective rooms. Those who declined to participate in the study were excluded.

3.7 Data Variables

Table 2: Data Variables

| Objective | Variables | Data source |
|-----------|-----------|-------------|
|-----------|-----------|-------------|

| | | |
|--|--|-------------------------------------|
| Burden of post-traumatic stress disorder | Age, Occupation, Marital Status, | Patient file, Questionnaire |
| Exposure variable – Trauma necessitating admission | Grading of the injury severity score | Patient file |
| Outcome Variables – Post traumatic stress disorder | Post-traumatic stress disorder scoring | Patient file Study Questionnaire |

3.8 Study Flow

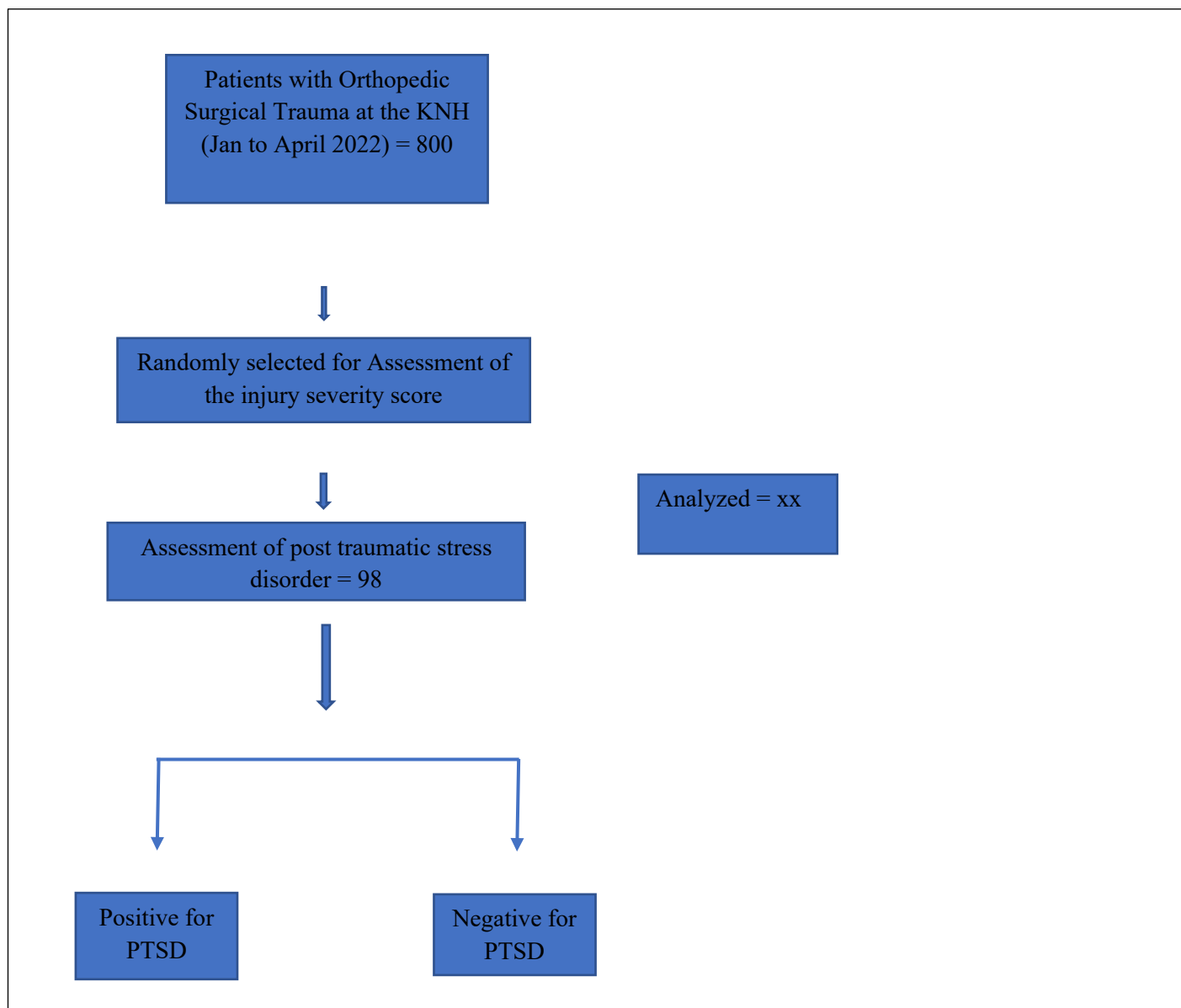


Figure 2: Study Flow Diagram

3.9 Data Collection Procedures

An interviewer-administered questionnaire was administered to all the eligible study participants or their next of kin. Sociodemographic and clinical information, including age, level of education, marital status, religion, other comorbidities, medication, and surgical history, was collected and collaborated with information from the participants' files. The principal investigator (PI) and the research assistants (RA) worked closely with the data management team and abided by the standard operating procedures for data handling and security. The collected data was de-identified by assigning study-specific unique identifiers

to the study participants. In case of missing records, or information, permission was sought to seek clarification from the next of kin as documented in the patients' files. All electronic data was stored in an external hard drive and password protected after encryption. The PI verified the collected data daily before uploading it to the excel sheet for cleaning and coding.

3.10 Training Procedures

Two research assistants were recruited from the nurses with training and experience in data collection. The team underwent a one-day training on data collection, cleaning, and entry into an excel sheet.

3.11 Quality Assurance

The questionnaire was pre-tested and analyzed before a final draft was administered to the study participants/next of kin. The research assistants were trained on appropriate interview techniques and filling the questionnaires. Recording of clinical findings was entered after thorough scrutiny. Unique identifiers were assigned to all the study participants. In case of any double entries are discovered, one of the questionnaires will be withdrawn, discarded, and serialization rectified. Information filled on the questionnaires was checked for any errors and corrected.

3.12 Data Management and Analysis

For assessment purposes, the participants were divided into two: the "healthy" group without signs of mental impairment (i.e., the succession study questionnaires were negative for any of the three entities) and the "impaired" group that would have scored positive after PTSD assessment. The data collected was analyzed using the STATA software version 16. The burden of post-traumatic stress disorder was estimated, taking those with the positive score as the numerator and the total number of enrolled patients as the denominator. Descriptive data will be visualized using means and standard deviations around the mean for numerical variables such as age and injury severity score. Univariate analysis was done for the socio-demographic (age, gender, religion, level of education, employment status, marital status) and surgical variables (type of injury, injury score at admission, number of days in hospital). Bivariate analysis was done for the post-traumatic stress symptoms and the association with socio-demographic and surgical characteristics. Multivariate models were developed using a stepwise approach (both backward elimination and forward selection) and the Akaike information criterion to determine the optimal model in the MASS package. Linear regression models and chi-square test of the association were used to evaluate whether any of the injury severity scores

predicted post-traumatic stress disorder. Pearson's correlation was done to test the strength of the association. Values less than 0.05 were considered statistically significant. Data will be visualized as presented in the dummy tables below:

3.13 Ethical Considerations

Approval of this study was sought from the Kenyatta National Hospital-University of Nairobi Research and Ethics committee. Authorization to conduct the study was also sought from the KNH administration and the surgical ward. Further, consent was sought from the study participants and their next of kin.

Confidentiality

Neither participant's name nor hospital number was recorded on the data tools but were assigned a research tracking number. The principal researcher safely kept an inventory of the participants' tracking systems. Confidentiality of the clinical information of the participants was ensured at all stages of the research. Collected data was always kept safely by the primary researcher and only disposed of after feedback and publication of the study findings.

Participants' Autonomy, Beneficence, and non-Maleficence

Participants/next of kin were allowed to freely withdraw from the study at any stage if they chose to. No extra cost unrelated to the management of the participant was incurred purely for the study. No coercion or persuasion was resorted to in those who declined consent. No material gain was extended to participants. The participants were not subjected to any form of prejudice; neither was there be any data manipulation. Any findings during the study that was deemed necessary in the patient's treatment was passed to the treating surgical team. Patients found to have psychological distress were referred to the psychiatric unit, KNH, for further assessment; this will be at their own cost.

CHAPTER FOUR: RESULTS

4.1 Introduction

This study was conducted in May 2022 at the Kenyatta National Hospital Orthopedics ward. A total of 98 orthopedic trauma patients were recruited in the study. Data was collected regarding the patients' socio-demographic characteristics and clinical profile – main variables being the injury severity scale (ISS) score and the impact of even scale – revised (IES-R) score.

4.2 Socio-demographic characteristics

The median (IQR) age of the patients in this study was 36.5 (27.0-48.0) years, ranging from 19 to 57 years. About half of the patients were male (47%) and a majority were married (60%). Approximately half of them (55%) had a monthly family income of between Ksh. 6,000 – 30,000 while 60% were staying with either a wife/spouse/child (Table 1).

Table 3: Socio-demographic characteristics of the study participants

| Variable | Category/statistic | N=98 n (%) |
|-----------------------------|--------------------|--------------------|
| Age of patient (years) | Median (IQR) | 36.5 (27.0 - 48.0) |
| Sex of patient | Female | 52 (53) |
| | Male | 46 (47) |
| Marital status | Single | 32 (33) |
| | Married | 60 (61) |
| | Separated | 6 (6) |
| Level of education | None | 3 (3) |
| | Primary | 35 (36) |
| | Secondary | 44 (45) |
| | Tertiary | 16 (16) |
| Employment status | Unemployed | 28 (29) |
| | Self Employed | 54 (55) |
| | Employed | 16 (16) |
| Monthly family income (Ksh) | None | 9 (9) |
| | <6000 | 22 (23) |
| | 6001-15000 | 29 (31) |
| | 15001-30000 | 23 (24) |

| | | |
|---------------------|--------------------|---------|
| | >30000 | 12 (13) |
| Person staying with | Alone | 27 (28) |
| | Wife/spouse/friend | 59 (60) |
| | With parents | 12 (12) |

4.3 Clinical profile of patients

On average (median), the patients had an ISS score of 9, with the least being 1 (one) and the highest being 35. Regarding the IES-R score, the patients in this study had a median of 33.5, ranging from 0 (zero) to 77. A majority of the patients had one or two sites of injury (80%) and two-thirds of the injuries (66%) were caused by road traffic accident. Most respondents (80%) had undergone surgery (Table 2).

Table 4: Clinical profile of the study participants

| Variable | Category/statistic | N=98 n(%) |
|---------------------------------------|-----------------------|--------------------|
| Injury Severity Score (ISS) | Median (IQR) | 9.0 (9.0 - 14.0) |
| Impact of Event Scale-Revised (IES-R) | Median (IQR) | 33.5 (20.0 - 47.0) |
| No. of sites injured | One | 43 (44) |
| | Two | 35 (36) |
| | More than two | 20 (20) |
| Cause of injury | Road traffic accident | 65 (66) |
| | Machine injury | 4 (4) |
| | Assault | 9 (9) |
| | Fall | 9 (9) |
| | Others | 11 (11) |
| Time from trauma (months) | Median (IQR) | 12.5 (12.0 - 13.0) |
| Undergone surgery | No | 19 (20) |
| | Yes | 78 (80) |
| Surgery conducted on time | No | 20 (26) |
| | Yes | 58 (74) |

4.4 Injury Severity Scale (ISS) score

The distribution of the ISS score peaked at 9 – 12 class intervals. The mode of the distribution was 9 i.e., a majority of the patients (35/98; 36%) had an ISS score of 9. The median of the distribution was 9 and ranged from 1 to 35 (Figure 1).

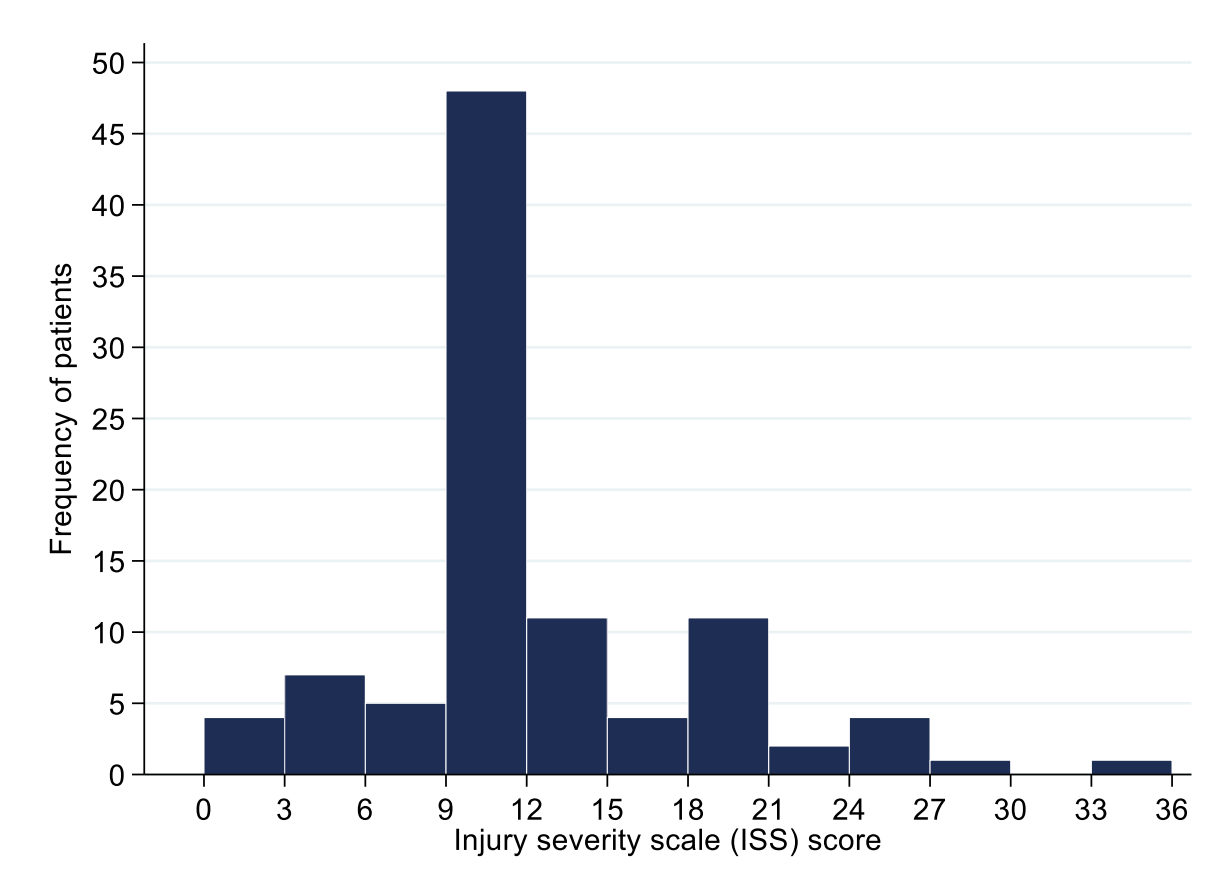


Figure 3: Distribution of the ISS scores among patients with orthopedic trauma at the Kenyatta National Hospital

4.5 Impact of Event Scale – Revised (IES-R)

The IES-R score was largely evenly distributed across the range of its values. The distribution was trimodal i.e., it had three modes – 20-25, 30-35 and 45-50 class intervals. The median of the distribution was 33.5 and the values ranged from 0 to 77 (Figure 2).

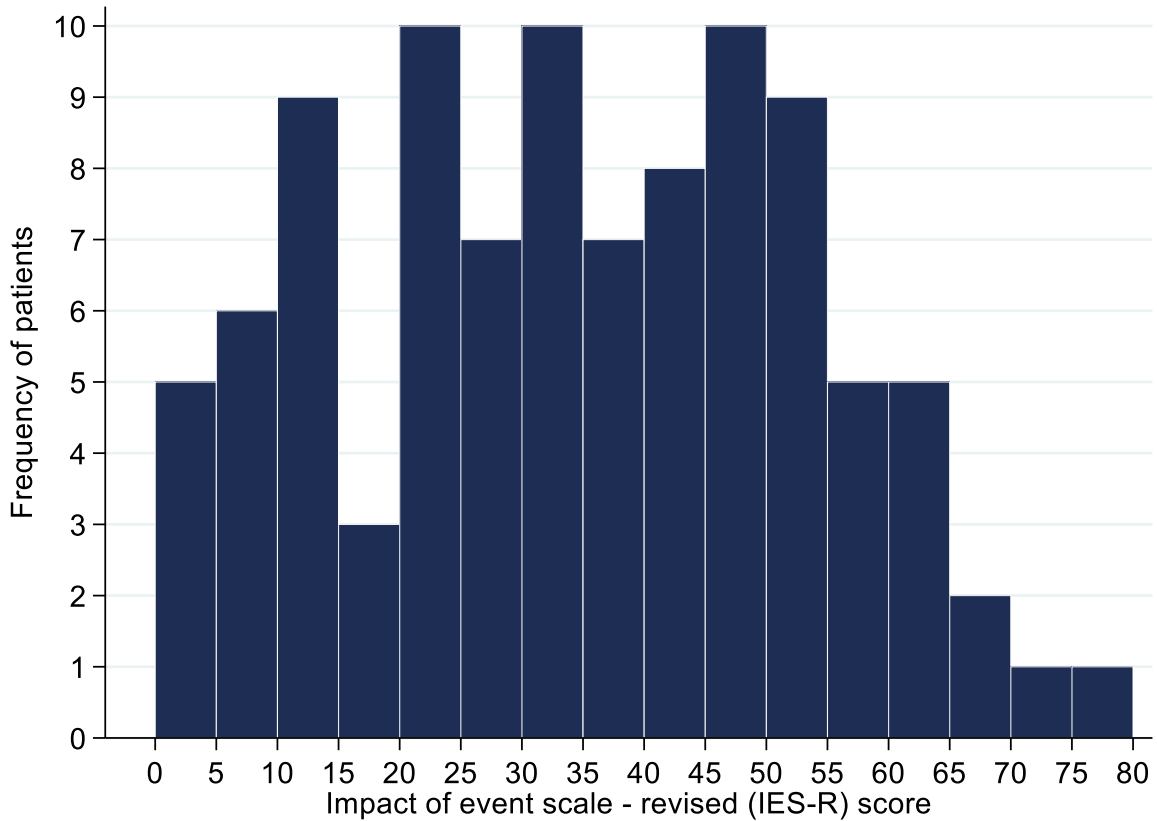


Figure 4: Distribution of the IES-R scores among orthopedic patients at the Kenyatta National Hospital

4.6 Relationship between ISS scores and IES-R scores

There was a weak positive relationship between the ISS score and the IES-R score as shown in Figure 3. The Spearman rank correlation coefficient (ρ) was 0.016. The fitted values line is almost horizontal, denoting a weak relationship.

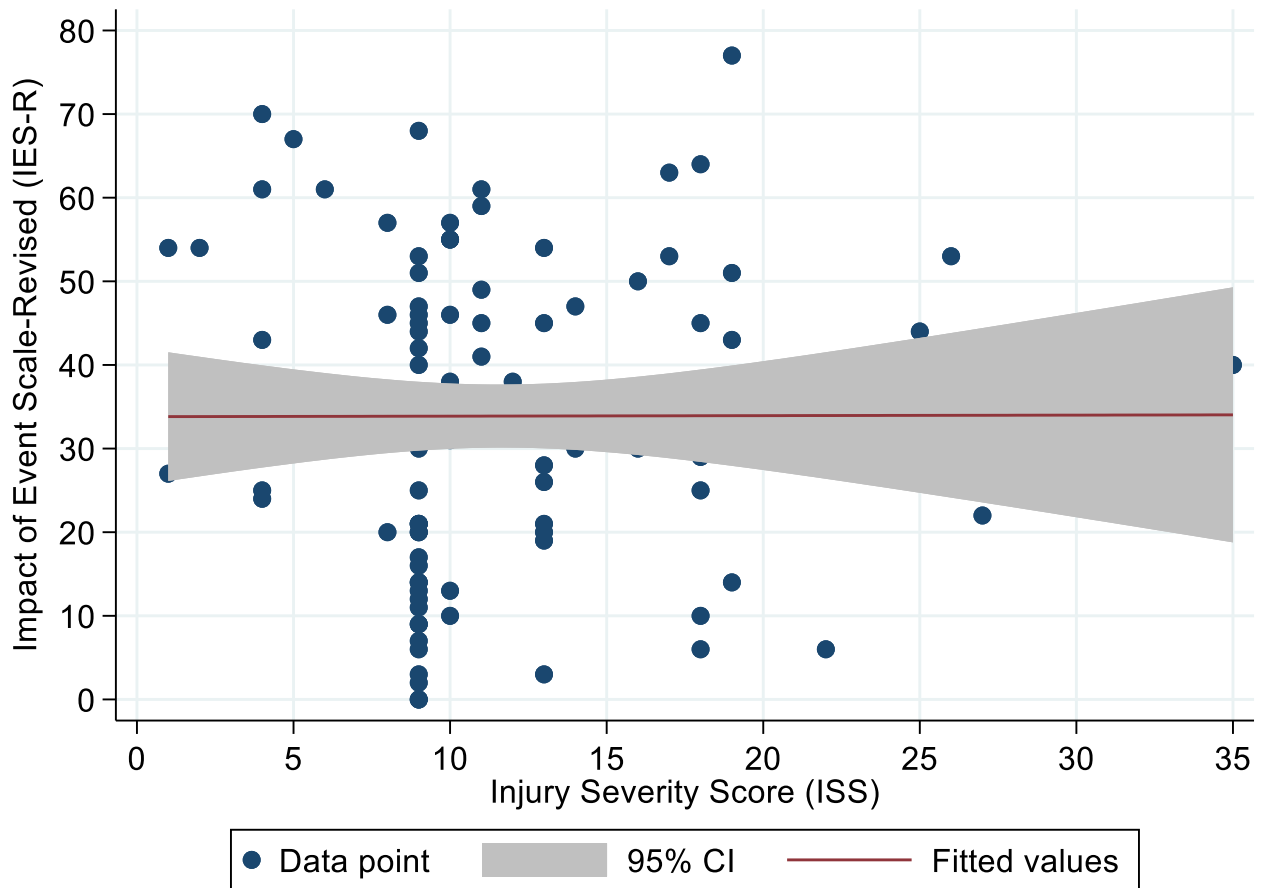


Figure 5: Relationship between ISS scores and IES-R scores among orthopedic patients at the Kenyatta National Hospital

4.7 Relate overall ISS scores with IES-R score – Crude analysis

The effect of each sociodemographic and clinical variable on the IES-R was determined using the simple linear regression with robust standard errors. The monthly family income, number of sites injured, and cause of injury were individually statistically associated with the IES-R score (Table 3). Potential predictors with a p-value ≤ 0.4 (including the main predictor ISS score) were included in the adjusted model (Table 4).

Table 5: Crude association between IES-R score potential predictors of Post-Traumatic Stress Disorder

| Potential predictors | | β - coefficient | 95% CI | p-value |
|--|--------------------|--------------------------|-------------------------|------------------|
| Injury severity scale (ISS) score | | 0.01 | [-0.55, 0.56] | 0.982 |
| Age (years) | | -0.01 | [-0.32, 0.31] | 0.987 |
| Sex | Female | Ref. | | |
| | Male | -2.33 | [-9.98, 5.32] | 0.547 |
| Marital status | Single | Ref. | [0.00, 0.00] | |
| | Married | 0.58 | [-7.81, 8.96] | 0.892 |
| | Separated | 6.71 | [-7.97, 21.39] | 0.367 |
| Education | None | Ref. | | |
| | Primary | -0.16 | [-23.40, 23.08] | 0.989 |
| | Secondary | 2.46 | [-20.91, 25.83] | 0.835 |
| | Tertiary | 15.35 | [-8.60, 39.31] | 0.206 |
| Employment | | Ref. | | |
| Unemployed | | | | |
| | Self-employed | -4.40 | [-13.31, 4.50] | 0.329 |
| | Employed | -5.08 | [-15.48, 5.32] | 0.335 |
| Income (Ksh) | None | Ref. | | |
| | <6000 | -13.45* | [-24.34, -2.57] | 0.016 |
| | 6001-15000 | -9.59 | [-19.28, 0.11] | 0.053 |
| | 15001-30000 | -20.00*** | [-29.70, -10.30] | <0.001 |
| | >30000 | -12.00 | [-24.11, 0.11] | 0.052 |
| Person staying with | | Ref. | | |
| | Alone | Ref. | | |
| | Wife/spouse/friend | -0.04 | [-8.59, 8.50] | 0.992 |
| | With parents | 1.71 | [-12.20, 15.63] | 0.807 |
| No. Of sites injured | | Ref. | | |
| | One | Ref. | | |
| | Two | 11.21** | [2.88, 19.54] | 0.009 |

| | | | | |
|----------------------------------|----------------|------------------|------------------------|--------------|
| | More than two | 14.03** | [5.17, 22.88] | 0.002 |
| Cause of injury | Road traffic | Ref. | | |
| accident | Machine injury | -6.67 | [-21.46, 8.12] | 0.373 |
| | Assault | 11.72* | [0.63, 22.80] | 0.038 |
| | Fall | -15.17*** | [-23.70, -6.64] | 0.001 |
| | Others | 2.74 | [-7.13, 12.61] | 0.583 |
| Time from trauma (months) | | -0.16 | [-0.57, 0.25] | 0.441 |

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; IES-R - Impact of Event Scale-Revised (IES-R); PTSD – Post traumatic stress disorder

4.8 For a given ISS score, determine the effect of age, sex, and time from trauma on IES-R scores

The adjusted effect of the ISS score on the IES-R score was determined using the multiple linear regression with heteroscedasticity-robust standard errors. There was no statistically significant association between the ISS score and the IES-R score (Table 4). However, the number of sites injured and the cause of injury were significantly associated with the IES-R score.

After adjusting for the other predictors in the model, the mean IES-R score of the patients who had two sites of injury was 11.94 higher than the mean of those who had one ($\beta = 11.94$; 95% CI: [2.83, 21.05]). Additionally, after controlling for other factors, patients with more than two sites of injury had a mean IES-R score of 15.59 higher than that of those with one injury site ($\beta = 15.59$; 95% CI: [3.77, 27.40]). This implies that the more the number of injury sites a patient has, the higher the patient's IES-R score predicting likely development of post-traumatic stress disorder.

Controlling for the other factors in the model, the mean IES-R score of patients whose cause of injury was a fall was 10.47 lower than the mean score of patients whose cause was road traffic accident ($\beta = -10.47$; 95% CI: [-19.72, -1.22]). In other words, compared to a road traffic accident, a fall is more likely to be associated with lower IES-R score.

Table 6: Adjusted association between IES-R score and ISS score

| Predictors | β -coefficient | 95% CI | p-value |
|--|----------------------|------------------------|--------------|
| Injury severity scale (ISS) score | -0.38 | [-1.07,0.30] | 0.269 |
| Income (Ksh) | | | |
| None | Ref. | | |
| <6000 | -5.16 | [-18.22,7.91] | 0.434 |
| 6001-15000 | -0.29 | [-12.28,11.71] | 0.962 |
| 15001-30000 | -11.28 | [-22.60,0.04] | 0.051 |
| >30000 | -1.52 | [-16.67,13.64] | 0.842 |
| No. of sites injured | | | |
| One | Ref. | | |
| Two | 11.94* | [2.83,21.05] | 0.011 |
| More than two | 15.59* | [3.77,27.40] | 0.010 |
| Cause of injury | | | |
| Road traffic accident | Ref. | | |
| Machine injury | -0.77 | [-15.44,13.91] | 0.917 |
| Assault | 7.33 | [-7.94,22.61] | 0.342 |
| Fall | -10.47* | [-19.72, -1.22] | 0.027 |
| Others | 3.30 | [-8.53,15.13] | 0.580 |
| Time from trauma (months) | 0.13 | [-0.28,0.54] | 0.518 |

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, IES-R - Impact of Event Scale-Revised (IES-R)

4.9 Predicted values of IES-R scores across variables in the adjusted model

The predicted values of IES-R scores from the adjusted model were plotted against each factor in the model to visualize the patterns (Figure 4). The predicted IES-R score showed a general declining trend as the ISS score increased. There was no obvious pattern across the monthly income groups. The predicted IES-R score increased with increasing number of injury sites. Regarding the time from trauma, there was a gradual increase in the predicted IES-R score with increasing time.

Predicted impact of event scale - revised (IES-R) score

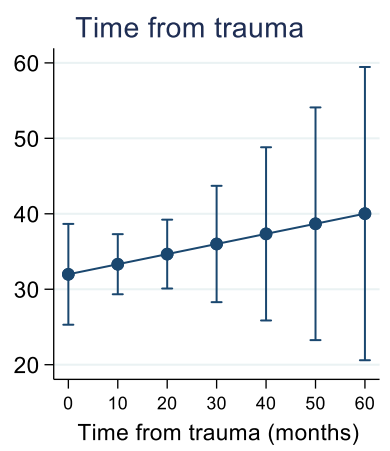
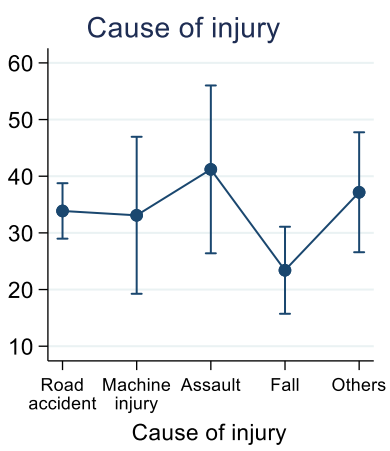
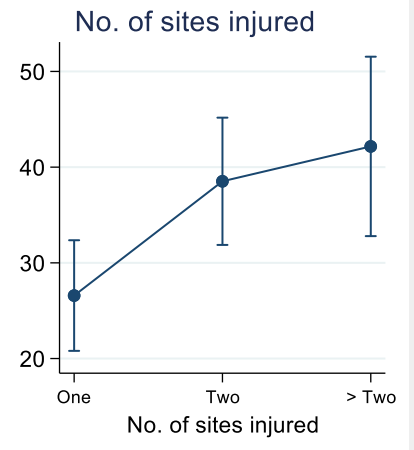
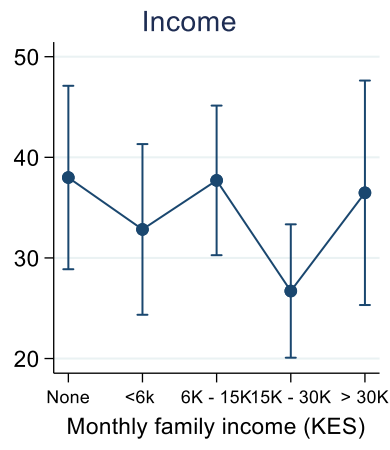
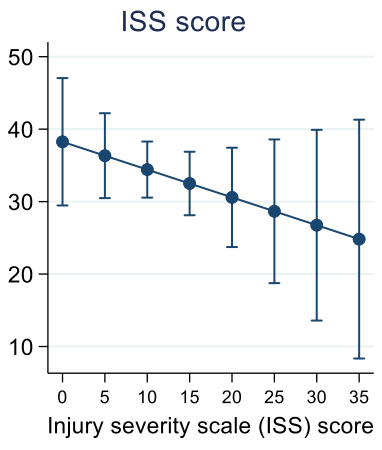


Figure 6: Predicted values of IES-R scores across variables in the adjusted model (Table 4)

CHAPTER FIVE: DISCUSSION

Development of PTSD among orthopedic patients has been shown to be dependent on several factors, both patient (socio-economic) and clinical. Despite the fact that orthopedic trauma generally occurs in male patients, our study had an almost equal proportion of males and females (47% male). Our findings therefore contrast with that of a study by Rajesh Kumar done in a tertiary hospital similar to KNH in India where the male to female ratio was 5:1. The most affected age group in the study by Rajesh Kumar was 25–44 years in males and 45–64 years in females; this is comparable to the findings in our study where the range was 19 to 57 years.

On average (median), the patients had an ISS score of 9, with the least being 1 and the highest being 35. Regarding the IES-R score, the patients in this study had a median of 33.5, ranging from 0 (zero) to 77. A majority of the patients had one or two sites of injury (80%) and two-thirds of the injuries (66%) were caused by road traffic accident. The distribution of the ISS score peaked at 9 – 12 class intervals. The IES-R score was largely evenly distributed across the range of its values. The distribution was trimodal i.e., 20-25, 30-35 and 45-50 class intervals.

Our study showed a weak positive relationship between the ISS score and the IES-R score. The Spearman rank correlation coefficient (ρ) was 0.016. The findings contrast with Han et al. who reported ISS as a strong predictor for the start of the post-injury depression in trauma survivors; patients with an $ISS \geq 16$ demonstrated twice as many depressive symptoms as patients with moderate injuries (8). Additionally, Frommberger et al. reported higher ISS scores in patients with stress than patients without stress disorders (25). The contradictory findings could be attributable to the low sample size in our study.

The effect of each sociodemographic and clinical variable on the IES-R was determined using the simple linear regression with robust standard errors. The monthly family income, number of sites injured, and cause of injury were individually statistically associated with the IES-R score. Age was not found to be a predictor for the development of PTSD. Our findings contrast with those in a study by Erasmus et al, who noted that patients that developed PTSD were significantly younger than patients that did not develop PTSD. This is confirmed in literature, stating that the lowest prevalence of PTSD is found at the age of 71–75 years for both men and woman, when they seem to be more resistant towards developing PTSD [31].

Our findings did not show that having a family support system to be protective against development of PTSD. The findings are similar to the study by Erasmus who, despite having a

lot of social support being associated with a lower chance of developing PTSD in the Univariate analysis, this was not confirmed in the multiple regression analysis. Neither did we find an association between sex and the development of PTSD despite several studies showing that females were more likely to develop PTSD (34).

Additionally, after controlling for other factors, patients with more than two sites of injury had a mean IES-R score of 15.59 higher than that of those with one injury site ($\beta = 15.59$; 95% CI: [3.77, 27.40]). This implies that the more the number of injury sites a patient has, the higher the patient's IES-R score.

Controlling for the other factors in the model, the mean IES-R score of patients whose cause of injury was a fall was 10.47 lower than the mean score of patients whose cause was road traffic accident ($\beta = -10.47$; 95% CI: [-19.72, -1.22]). In other words, compared to a road traffic accident, a fall is more likely to be associated with lower IES-R score.

Regarding the time from trauma, there was a gradual increase in the predicted IES-R score with increasing time. Our findings are similar to a study by Juana et al. where 20% of the trauma patients had an IES-R score of 35 or higher one year after trauma, indicating PTSD. At two years after the trauma, the prevalence rate of probable PTSD was 23% (5). The hypothesis is that there are different mediators of acute and chronic symptoms of PTSD.

Study Limitations and How to Overcome

Older participants may have had problems admitting and expressing their feelings. Additionally, there were fears of diagnosis with a mental disorder with resultant stigmatization with a psychological diagnosis.

There was also a possibility of blurred memories (recall bias).

Another limitation of our study is its successive design. Thus, we could not provide information about the onset of the examined mental disorders. The only information we could provide was about the present status. In addition, some information was missed from the patients' files due to the poor documentation.

Study Results dissemination Plan

The dissertation results shall be disseminated to the Orthopaedic surgery unit in the department of surgery both at the KNH and UON as well as UoN online repository. It will also be presented

in other fora like conferences or seminars and to health care workers for proper insights concerning this topic.

A report of the study findings will be shared with the KNH-UON ERC team.

Following the presentation to the department, a manuscript will be submitted to the orthopedic and psychiatry journals for possible publication.

Recommendations

The finding of predictors of PTSD at an early stage might be helpful in identifying high-risk patients for the development of PTSD after road traffic accidents especially among polytrauma patients.

In the next step a form of brief intervention program, as is suggested for rape victims (Foa et al. 1995), might be applied to those identified as high-risk patients during hospitalization in orthopedic surgical wards in order to shorten the hospital stay or prevent the development of a full PTSD with its deleterious effects.

BUDGET AND BUDGET JUSTIFICATION

| Particulars | Amount (Ksh) | Justification |
|----------------------------|--------------|------------------------------------|
| Research fee for KNH- ERC | 5,000 | Statutory fees paid by students |
| Statistician | 35,000 | For data analysis |
| Research Assistants | 30,000 | For collection of data |
| Stationery | 1,000 | For data collection |
| Printing and binding | 10,000 | For presentation to the University |
| Total | 81,000 | |
| Contingencies 10% of total | 8,100 | |
| Total | 88,100 | |

STUDY TIME FRAME

| Activity | Oct – Dec 2021 | Jan 2022 | Feb 2022 | Mar 2022 | Apr 2022 | May 2022 | Jun 2022 |
|---------------------------------------|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Proposal development | | | | | | | |
| Ethical Approval | | | | | | | |
| Data collection | | | | | | | |
| Data Analysis | | | | | | | |
| Dissertation Writing and presentation | | | | | | | |

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ANNEXES

Annex A: Consent Form in English

Study Title: Association Between Injury Severity Score & Post Traumatic Stress Disorder Among Orthopedic Trauma Surgical Patients at the Kenyatta National Hospital

Part 1: Information Sheet

Introduction

Dr. Kenneth Matu is a postgraduate student in the Orthopaedic surgery unit, department of surgery, University of Nairobi, currently carrying out a study titled: Association Between Injury Severity Score & Post Traumatic Stress Disorder Among Orthopedic Trauma Surgical Patients at the Kenyatta National Hospital.

You are invited to participate in this study and can take all the time you need to decide if you want to participate or not. Kindly take time to read through the information provided. If there are any questions, comments, or clarifications, please feel free to ask the principal investigator or the research assistants.

Purpose of the study

The purpose of this study is to determine the association between severity score and post-traumatic stress disorder among orthopedic trauma surgical patients at the Kenyatta National Hospital.

The findings from this study will help improve the management of patients with trauma Procedures.

The research assistant or I will obtain information about you using a questionnaire. This will be done physically but at a safe distance and by observing all the COVID 19 protocols.

Risk, stress, or discomfort

Completing your questionnaire would take approximately 10 minutes of your time.

Bad memories of the traumatic event may be perceived during this exercise.

The investigator will reassure you at all times in a compassionate manner. If the memories become overwhelming, the investigator will stop the exercise.

Confidentiality

All the information obtained from you will be treated with the utmost confidentiality. Your name will not appear on the questionnaire. A study number will be used instead. You may choose to withdraw from the study or refuse to answer questions.

Subject's statement

I voluntarily agree to participate in the study. I understand that participation in the study does not entail financial benefits. I have been informed that the information obtained will be treated with the utmost confidentiality.

I have had a chance to ask questions. If I have questions later, I can ask the researcher. Suppose I have questions later about my rights as a research subject or complaints about the study. In that case, I can call the ethical review committee at Kenyatta National Hospital on phone number 020726300. No coercion has been used to influence my decision to participate in the study whose nature, benefits, and risks have been explained to me by Dr/Mr./Mrs.

Subject's signature.....

Date.....

OR

Subject's left thumbprint.....

Date.....

Subject's name.....

Subject's Telephone number:

I ASSURE YOU THAT I HAVE FULLY EXPLAINED TO THE ABOVE STUDY VOLUNTEER/AUTHORIZED REPRESENTATIVE THE NATURE AND PURPOSE, PROCEDURES, AND THE POSSIBLE RISK AND POTENTIAL BENEFITS OF THIS RESEARCH STUDY.

Investigators signature.....

Date.....

Principal investigator: Dr. Kenneth Matu, 0720299405

Secretary KNH-UoN ERCP.O Box: 19676-00202 Nairobi

Phone number: (254-020)2726300-9

Email address: uonknh_erc@uonbi.ac.ke

Annex B: Ridhaa ya mafunzo sehemu ya kwanza: maelezo

Utangulizi:

Daktari Kenneth Matu ni mwanafunzi wa Chuo Kikuu cha Nairobi. Anaangazia maswala ya upasuaji. Ili kuhitimu katika masomo yake, Dkt Ken anafanya uchunguzi kuhusu: **Uhusiano wa magonjwa yanayotokana na ajali na uwezekano wa kupata magonjwa ya akili** katika hospitali kuu ya Kenyatta. Unakaribishwa kushiriki katika uchunguzi huu na uamuzi wakushiriki ni kwa hiari yako. Kama kuna maswali yoyote au ufafanuzi utakaohitajika, kuwahurusu kuwasiliana na mdadisi mkuu au manaibu wake, tafadhali ulizia wakati wowote.

Lengo la utafiti Uchunguzi huu unania ya kutambua kama kuna uwezekano wauhusiano wowote kati ya **magonjwa yanayotokana na ajali na uwezekano wa kupata magonjwa ya akili.**

Name

Ukiamua kushiriki katika utafiti huu, utatia sahihi na tarehe katika fomu yamakubaliano. Utabaki na nakala moja yamakubaliano haya. Utahitajika kujibu maswali utakayopatiwa, nakutakuwa na msaidizi iwapomaelezo zaidi yatahitajika.

Hasara inayotarajiwa Hakuna hasara ama madhara inayotarajiwa katika uchunguzi huu.

Faidainayotarajiwa Matokeo ya uchunguzi huu yanalengo la kutoa matibabu bora kwa akina mama wanaojifungua katika hospitali yetu pamoja na Watoto wao

Usiri

Matokeo ya uchunguzi huu yatawekwa siri. Hakuna majina yatatumika, kila muhusika atapewa nambari halisi. Matokeo ya uchunguzi yatakabidhiwa kwa wanaohusika.

Haki ya kukataa

Kushiriki katika uchunguzi huu nikwakujitolea kwahiari yako. Unahaki ya kujitoa kwa uchunguzi wakati wowote.

Sehemu Ya kukubaliana

Nimesoma nanikaelewa ujumbe ulioko hapa juu. Nimeelezwa kwamakini kuhusu uchunguzi huu na nilipata nafasi ya kuuliza maswali yaliyojibiwa kamili. Nimekubali kushiriki katika uchunguzi huu bila kulazimishwa ama kupewa hongo.

Jina la Muhusika:

AU

Alama ya Kidole.....

Saini ya Muhusika:

Tarehe:

Saini ya Shahidi:

Tarehe:

Taarifa ya Mdadisi

Nimewaelezea wahusika kuhusu utafiti na nikawapatia nafasi ya kuuliza maswali. Nimeyajibu maswali yote niwezavyo. Nimehakikisha kuwa wanaohusika wamekubali kwa hiari yao.

Jina la mdadisi:

Saini:

Tarehe:

Kuwasiliana

Kwa maswali yoyote au ufafanuzi wowote wasiliana na:

Daktari Kenneth Matu

Nambari ya simu: 0720299405

Katibu,KNH-UoN ERC Sanduku la Posta: 19676-00202 Nairobi

Nambari ya simu: (254-020)2726300-9

BaruaPepe: uonknh_erc@uonbi.ac.ke

Annex C: Study Questionnaire

Section A: Socio-Demographic and Surgical History

1. Study number:
2. What is your marital status?
 - Single [1]
 - Married [2]
 - Separated [3]
 - Other. Please state ----- [4]
3. Where is your current residence? -----
4. What is your level of education?
 - Lower Primary [1]
 - Upper Primary [2]
 - Secondary [3]
 - Tertiary [4]
 - None [5]
5. What is your employment status?
 - A** Self - employed [1]
 - B** Employed [2]
 - Unemployed [3]
 - Other. Please state ----- [4]
6. What is the total level of income per month in your family?
 - <6000 ksh/month [1]
 - 6,001- 15,000 Ksh/month [2]
 - 15,001- 30,000 Ksh/month [3]
 - >30,001 Ksh/month [4]
7. With whom do you stay with?
 - Alone
 - With wife/spouse/friend
 - With parents
8. Number of sites injured
 - One
 - Two
 - More than two

Annex D: Injury Severity Score Assessment

| Body Region | AIS | AIS (squared) |
|----------------------------------|-----|---------------|
| 1. Head | | |
| 2. Face | | |
| 3. Neck | | |
| 4. Thorax | | |
| 5. Abdominal and pelvic contents | | |
| 6. Spine | | |
| 7. Upper extremity | | |
| 8. Lower extremity | | |
| 9. External | | |
| ISS SCORE | | |

- Abbreviated Injury Scale (AIS) grades
 - 0 - no injury
 - 1 - minor
 - 2 - moderate
 - 3 - severe (not life-threatening)
 - 4 - severe (life-threatening, survival probable)
 - 5 - severe (critical, survival uncertain)
 - 6 - maximal, possibly fatal
- ISS
 - ISS = sum of squares for the highest AIS grades in the three most severely injured ISS body regions
 - $ISS = A^2 + B^2 + C^2$
 - where A, B, C are the AIS scores of the three most severely injured ISS body regions
 - scores range from 1 to 75
 - single score of 6 on any AIS region results in automatic score of 75

Annex E: Impact of Event Scale- Revised (IES-R) Assessment



NovoPsych

The Impact of Event Scale - Revised (IES-R)

Instructions:

Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you DURING THE PAST SEVEN DAYS with respect to (the event). How much were you distressed or bothered by these difficulties?

| | | Not at all | A little bit | Moderately | Quite a bit | Extremely |
|----|--|------------|--------------|------------|-------------|-----------|
| 1 | Any reminder brought back feelings about it | 0 | 1 | 2 | 3 | 4 |
| 2 | I had trouble staying asleep | 0 | 1 | 2 | 3 | 4 |
| 3 | Other things kept making me think about it | 0 | 1 | 2 | 3 | 4 |
| 4 | I felt irritable and angry | 0 | 1 | 2 | 3 | 4 |
| 5 | I avoided letting myself get upset when I thought about it or was reminded of it | 0 | 1 | 2 | 3 | 4 |
| 6 | I thought about it when I didn't mean to | 0 | 1 | 2 | 3 | 4 |
| 7 | I felt as if it hadn't happened or wasn't real | 0 | 1 | 2 | 3 | 4 |
| 8 | I stayed away from reminders about it | 0 | 1 | 2 | 3 | 4 |
| 9 | Pictures about it popped into my mind | 0 | 1 | 2 | 3 | 4 |
| 10 | I was jumpy and easily startled | 0 | 1 | 2 | 3 | 4 |
| 11 | I tried not to think about it | 0 | 1 | 2 | 3 | 4 |
| 12 | I was aware that I still had a lot of feelings about it, but I didn't deal with them | 0 | 1 | 2 | 3 | 4 |
| 13 | My feelings about it were kind of numb | 0 | 1 | 2 | 3 | 4 |
| 14 | I found myself acting or feeling as though I was back at that time | 0 | 1 | 2 | 3 | 4 |
| 15 | I had trouble falling asleep | 0 | 1 | 2 | 3 | 4 |
| 16 | I had waves of strong feelings about it | 0 | 1 | 2 | 3 | 4 |



| | | Not at all | A little bit | Moderately | Quite a bit | Extremely |
|----|--|------------|--------------|------------|-------------|-----------|
| 17 | I tried to remove it from my memory | 0 | 1 | 2 | 3 | 4 |
| 18 | I had trouble concentrating | 0 | 1 | 2 | 3 | 4 |
| 19 | Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart | 0 | 1 | 2 | 3 | 4 |
| 20 | I had dreams about it | 0 | 1 | 2 | 3 | 4 |
| 21 | I felt watchful or on-guard | 0 | 1 | 2 | 3 | 4 |
| 22 | I tried not to talk about it | 0 | 1 | 2 | 3 | 4 |

Developer Reference:

Weiss, D.S., & Marmar, C.R. (1997). The Impact of Event Scale-Revised. In J.P. Wilson, & T.M. Keane (Eds.), *Assessing Psychological Trauma and PTSD: A Practitioner's Handbook* (pp. 399-411). New York: Guilford Press. The original Impact of events Scale (IES) was developed in the 1980s

RELATIONSHIP BETWEEN INJURY SEVERITY SCORE & POST-TRAUMATIC STRESS DISORDER AMONG ORTHOPAEDIC TRAUMA SURGICAL PATIENTS AT THE KENYATTA NATIONAL HOSPITAL

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[Handwritten signatures and notes]
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24/08/2022

