

**PATTERNS AND OUTCOMES OF NECK INJURY AT THE
KENYATTA NATIONAL HOSPITAL**

PRINCIPAL INVESTIGATOR

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I declare that this dissertation is my original work which has not been presented at any other university.

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ABBREVIATIONS

A&E:	Accident and Emergency
AAO-HNS:	American Academy of Otolaryngology -Head and Neck Surgery
ATLS:	Advanced Trauma Life Support
CBC:	Complete Blood Count
CT:	Computed Tomography
CTA:	Computed Tomographic Angiogram
ENT	Ear Nose Throat
ERC:	Ethics and Research Committee
KNH:	The Kenyatta National Hospital
ICU:	Intensive care unit
PNI:	Penetrating Neck Injury
SPSS:	Statistical Package for Social Sciences
UoN:	The University of Nairobi
WTA:	Western Trauma Association

ABSTRACT

Introduction: Trauma is one of the leading causes of morbidity and mortality worldwide. Neck injuries are on the rise with the morbidity and mortality experienced from these injuries being very significant.

Objective: To determine the patterns and outcomes of neck injuries seen at the Kenyatta National Hospital.

Study methodology: The study was a prospective observational study carried out over a period of 10 months. Thirty-eight patients who presented with neck injury during this period were recruited after obtaining consent. Patients' history was taken and physical examination done, and they were followed up through investigation and management. Patients were reviewed at one week and at one month for complications. Data was collected using a questionnaire. Descriptive statistics and correlation analysis were done, with statistical significance set at a P value of <0.05 at 95% confidence interval. The independent sample T-test and Fischer's exact test were used for this analysis.

Results: Thirty-eight patients were recruited in the study. The prevalence of neck injury was 0.2% of A&E admissions and 0.9% of trauma cases. Penetrating neck injuries were common (92%) and mostly involved zone II (68%). Most injuries were secondary to assault (60%), with 24% resulting from suicide attempts. Thirty-four patients underwent neck explorations, with a positive rate of 85.3%. There was a mortality of 2.6% during the study period. Late presentation was a predictor of development of complications ($P=0.03$). Complications in the first week of management was a determinant of complications a month later ($P<0.001$). Patients with complications had longer hospital stay ($P<0.001$)

Conclusion: The present study demonstrates that neck injuries are not common in our setting with a prevalence of 0.2% of A&E admissions and 0.9% of trauma admissions. Penetrating neck injuries were more common with a majority being in Zone II and secondary to assault. There was a high rate of positive neck explorations with muscle injuries. Longer duration from injury to definitive management was associated with increased risk of developing complications. Having early complications was a determinant of late complications.

CHAPTER ONE: INTRODUCTION

1.1 Background

Trauma is one of the leading causes of morbidity and mortality in most countries, and accounts for 10.6% of deaths recorded in Nairobi , Kenya⁽¹⁾. In Africa, motor vehicle injury and interpersonal violence have been shown to account for the greater proportion of victims of trauma ^(1,2). In Kenya, statistics from the National Police service have shown a steady rise in crime over the years, with significant occurrences of interpersonal violence and homicide ⁽³⁾. Several studies done have found these mechanisms of trauma to be the major causes of neck injuries which are on a rise ^(4,5). Most victims of neck injury have consistently been males irrespective of the area and time of study, and the population commonly affected are the young adults ^(4,6-8). The anatomy of the neck and superficial nature of its vital structures explains the vulnerability of this region to trauma. This also explains why injuries to the neck could be very fatal if not managed as emergencies. Nonetheless, the management of traumatic neck injury remains a topic of controversy, especially in the absence of local guidelines.

Roon and Christensen described anatomic zones of penetrating neck injuries (PNI) ⁽⁹⁾. The neck is divided into three zones, each containing vital structures and different levels of vulnerability. Several zones can be injured simultaneously, depending on the trajectory of the injury. Arguments have been raised recently in favour of the “no zone” approach, advocating more for clinical assessment of the patient in order to avoid unnecessary imaging and neck exploration ⁽¹⁰⁾. Most authors still use the zones in literature for ease of description of injuries.

Patients with neck trauma will generally fall under the categories of blunt or penetrating injuries. Penetrating neck injuries are neck injuries that breach the platysma muscle; injuries that do not breach platysma are referred to as blunt ⁽¹¹⁾. Blunt neck injuries on the other hand are less common and may present late. The anatomical structures at risk are the same as in PNIs and the surgeon will require good clinical judgement to avoid missing injuries

Different mechanisms are responsible for blunt and penetrating neck injuries, even though some of these mechanisms can result in both kinds of injury. The mechanisms of PNI are classified as high and low velocity mechanisms. This serves an important role as the higher the velocity of the weapon, the greater the damage hence increasing the morbidity and mortality from the injuries.

The initial management of all neck injury patients is based on recent ATLS guidelines, like any other case of trauma. Many neck injury patients will present with other associated injuries requiring prompt identification and surgical management. Historically, it was believed that all patients with neck wounds breaching the platysma required routine neck exploration to reduce morbidity and mortality ⁽¹²⁾. This concept was soon replaced with selective conservative management, with several studies done to prove its efficacy both in terms of patient morbidity and cost effectiveness ^(13,14).

Patients presenting with neck injury will either be managed and discharged home, or succumb to their injuries. The reports of mortality vary with different facilities and studies. Other complications encountered in patients with neck injuries include wound infections, neck abscesses, laryngo-tracheal stenosis, tracheo-oesophageal fistula, pharyngo-cutaneous fistulae, mediastinitis, septicaemia and delayed stroke. The optimum management of patients with neck injury will be guided by hospital protocols, and also based on the investigative capabilities and expertise available.

CHAPTER TWO: LITERATURE REVIEW

A limited number of studies address the prevalence of neck injuries in isolation. A trauma centre in south east London recorded an incidence of penetrating neck injury of 4.3 per 100000 population over a period of twelve months ⁽¹⁵⁾. They also noted a significant increase in penetrating neck injuries over the last twenty-three years which implies that neck injuries are on a rise. A much lower incidence of 0.61 per 100000 population was reported in Qatar and this was over a period of four years, which could be attributed to the exclusion of all patients who were stable and did not require admission ⁽⁴⁾. Despite the low the prevalence of these injuries, the consequences are usually devastating without prompt intervention and mortality can be as high as 12% ^(16,17)

The patterns of neck injury are similar in most populations, with very few variations noted. The penetrating neck injuries have been shown to have a much higher prevalence than blunt injuries, a finding which is consistent across several different populations ^(4,7,8,18). Still in Qatar, Al-thani et al ⁽⁴⁾ found the most common mechanism of injury to be motor vehicle crash, followed by stab wounds, machinery injuries and accidental falls from heights. Similar mechanisms of injury were noted in Canada with just the inclusion of sports injuries as a cause of blunt trauma ⁽⁷⁾. A different trend was noted in India and Tanzania whereby suicides and homicides were the most common causes of neck injuries reported ^(17,19). Motor vehicle crashes and falls also accounted for a number of cases. In Nairobi, 29% of deaths from road traffic accidents were linked to neck injuries ⁽²⁰⁾. Most studies applied the neck zones described by Roon and Christensen for description of neck injuries in their studies. The consistent finding was that of zone 2 injuries being the most prevalent, with zone 1 and 3 accounting for a small proportion ^(4,7,17,19)

The management of patients with neck injuries has evolved over several years from mandatory to selective neck explorations, with controversies still existing on which patients will benefit from neck explorations. There are also existing debates on what a therapeutic neck exploration entails, and what is considered a positive or negative neck exploration. In favour of selective neck exploration, there has been evidence of increased morbidity and financial implications in negative neck explorations ^(14,21). Some centres however still choose to surgically explore most of their patients, thereby attaining 100% survival but overlooking morbidity ⁽⁸⁾. In 2011, a hallmark study was carried out following the Operation Iraqi Freedom war, the findings of which have been instrumental in the formulation of the AAO-HNS guidelines of 2012 ⁽²²⁾.

Selective neck exploration was applied in this study but still a high rate of negative explorations was recorded (31%). This was justified by the associated injuries which led to patients presenting with hemodynamic instability. Lower rates of negative neck explorations have been noted with selective neck explorations in civilian populations ^(5,21). However, the Western Trauma Association (WTA) guidelines define neck exploration based on the zones of injury, with the shortcoming being that of over exploration, as all symptomatic zone 2 injuries will be surgically explored ⁽⁹⁾. Various studies have used different definitions of positive and negative neck exploration which influence their reported outcomes. Brennan et al defined positive neck explorations in their study as explorations with any structural injuries that required surgical repair ⁽²²⁾. Ibraheem et al excluded all explorations that did not reveal major aerodigestive and vascular injuries as negative neck explorations ⁽¹⁰⁾. A retrospective case review in Canada considered muscle injury repair as positive neck exploration, giving them a low negative exploration rate of 14% ⁽⁷⁾.

The findings on neck exploration reported by most studies have been injury to the larynx, trachea, internal and external jugular veins, hypopharynx, carotid arteries, vertebral arteries and the thyroid gland ^(4,17,19,22). Ghnam et al had a single case of cervical spine injury who succumbed to the injury ⁽¹⁶⁾. The overall morbidity and mortality increases with associated injuries such as traumatic brain injury, thoracic injury, abdominal injury and injury to the extremities (4). Younger victims of neck injuries have been shown to have higher chances of survival (6). On the other hand, presentation to the hospital more than 6 hours following the injury and development of complications are significant predictors of mortality ⁽¹⁷⁾. Massive haemorrhage and exsanguination has been shown to be the main cause of death in most PNIs ⁽²³⁾.

2.1 Study Justification/Rationale

Kenyatta National Hospital is a national referral hospital in Kenya, which implies that it bears the burden of complex diseases and injuries. The exact burden of neck trauma has not been established, considering the morbidity and mortality associated with the resulting injuries. KNH has no written protocols to guide the management of patients with neck injuries, which occasionally leads to difficulties in making clinical decisions for the patients. Knowledge of the patterns of injury in each population is necessary to help centres managing these patients optimize their outcomes based on the facilities and resources available. The study can serve as a guide to develop management protocols for patients who present with neck injuries at KNH.

2.2 Research Question

What are the patterns and outcomes of neck injury seen at the Kenyatta National Hospital (KNH)?

2.3 Objectives

2.3.1 Main Objective

To determine the patterns and outcomes of patients presenting with neck injury at the Kenyatta National Hospital.

2.3.2 Specific Objectives

- i.** To determine the prevalence of neck injury seen at KNH.
- ii.** To determine the patterns of neck injury seen at KNH.
- iii.** To determine the management modalities applied for neck injuries at KNH.
- iv.** To determine the factors affecting the outcomes of neck injuries at KNH.

CHAPTER THREE: STUDY METHODOLOGY

3.1 Study Design

The study was a prospective observational study

3.2 Setting

The study was undertaken at the Kenyatta National Hospital, specifically at the A&E and all surgical wards.

3.3 Study Duration

This study was carried out over a period of 10 months from April 2019 to February 2020.

3.4 Study Population

The study population comprised all patients who presented to the A&E department of the Kenyatta National Hospital with injuries to the neck during the study period.

3.5 Inclusion Criteria

- i. Patients presenting to the Accident and Emergency unit of KNH with neck injury during the study period.
- ii. Patients who consented to be part of the study.

3.6 Exclusion Criteria

- i) Patients with burn injuries to the neck region presenting during the study period

3.7 Sample Size Determination

The sample size was determined using a formula for calculating sample sizes for prevalence studies (24);

$$n = Z^2 \times P \times (1-P) / d^2$$

whereby;

n = sample size

Z = statistic value for a desired level of confidence

P = expected prevalence or proportion

d = precision

A study done in south east London (19) found the incidence of neck injury to be at 4.3/100000 population. Using a formula for conversion of incidence to prevalence (25), a prevalence of 0.05% was attained. With Z=1.96 for a 95% confidence interval and d=0.07, the estimated sample size was calculated to be;

$$Z^2 \times P \times (1-P) / d^2$$

$$1.96^2 \times 0.05 \times (1-0.05) / 0.07^2$$

$$=37.24$$

The estimated sample size was rounded up to **38** patients

3.8 Sampling

A system of convenience sampling was used, whereby all patients presenting to A&E-KNH during the study period and who met the inclusion criteria were enrolled. A total of 18477 patients were seen at the A&E during the study duration, and 4060 were trauma patients. Of these, 38 patients with neck injury met the inclusion criteria and were recruited as shown in figure 1 below.

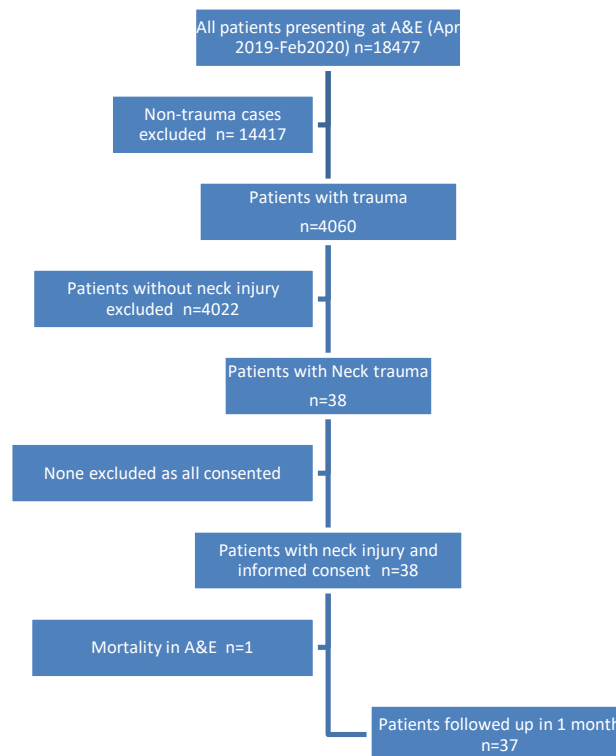


Figure 1: Flowchart for patient recruitment

3.9 Data Collection

3.9.1 Data Collection tool

A questionnaire was used for the collection of data in this study (refer to appendix II)

3.9.2 Data collection procedure

A pretest was carried out using the data collection tool and corrections were made before data collection was commenced. The principal investigator was notified by colleagues on duty for each new patient who presented to the A&E-KNH with neck injury. The process of data collection did not interfere with patient management. Consent for participation in the research was sought only after the patient had been stabilized and was out of danger. During the course of management, information on the patient's injury patterns, management and outcomes were obtained using the data collection sheet. All 38 patients approached gave consent hence 38 questionnaires were completely filled.

The variables sought included the following;

- a) Age and sex distribution.
- b) Type of neck injury, cause of neck injury, zone of neck injury, extent of the injury, associated injuries.
- c) Choice of emergency surgical intervention or conservative management, need for resuscitation, need for ICU admission and duration.
- d) Modality of treatment, complications developed, outcomes both early and 1 month later, length of hospital stay defined in this study as the number of days from admission to discharge or death.

In this study, any structural damage in the neck requiring surgical repair was considered a positive neck exploration. Normal findings intra operatively requiring just wound suturing were considered negative exploration. Patients who were discharged from casualty on analgesics, patients who underwent rigid endoscopy only or who were admitted for 24 hours of observation without surgical intervention were considered to have undergone conservative management.

3.10 Data Management and Analysis

3.10.1 Data Management

The data collected in this study was sorted, coded, entered and analysed using the SPSS version 22.

3.10.2 Data Analysis

Descriptive statistics was done using means for normally distributed variables like age. Correlation analysis was done using Pearson's correlation test to establish relationships between dependent variables. Relationship between two or more dependent variables with the outcome variable was assessed using multiple binary logistic regressions. Significance of results was set at a P value of <0.05 at 95% confidence interval.

3.11 Ethical Consideration

Collection of data only started after obtaining ethical approval from the KNH/UON Ethics and Research committee. Informed consent was sought from the patient or next of kin as the case required, but only after the patient had received the necessary emergency care they required. Patient confidentiality was ensured by use of codes for patient identification instead of names or any information that would have disclosed their identity. Data collected was not shared with a third party, and was used only for the purpose of this research. The study did not interfere with or deprive the patient of the standard of care they were supposed to receive.

3.12 Study Dissemination Plan

Copies of the results of this study will be made available to the head of department of surgery UON, the head of department of surgery KNH and the library of the college of health sciences. The research findings will also be published online for access by other researchers.

3.13 Study Limitation

A few patients with minor injuries were missed following discharge from the A&E. The sample size for this study was relatively smaller than other similar studies in other settings, and the duration of data collection was also comparatively shorter.

CHAPTER FOUR: RESULTS

4.1 Demographic Information

A total of 38 patients met the inclusion criteria for the study and were recruited. All patients presenting with neck injuries during the 10 months of the study gave consent, giving a prevalence of neck injuries among A&E admissions of 0.2% (total number of patients seen at A&E from April 2019 to Feb 2020 was 18477) and a prevalence of neck injuries among trauma patients of 0.9% (number of trauma patients seen at A&E during study duration was 4060). The mean age was 29.97 yrs±9yrs, ranging from 9yrs to 52yrs. There were 35(92.1%) males, and 3(7.9%) females, giving a male to female ratio of 11.6:1.

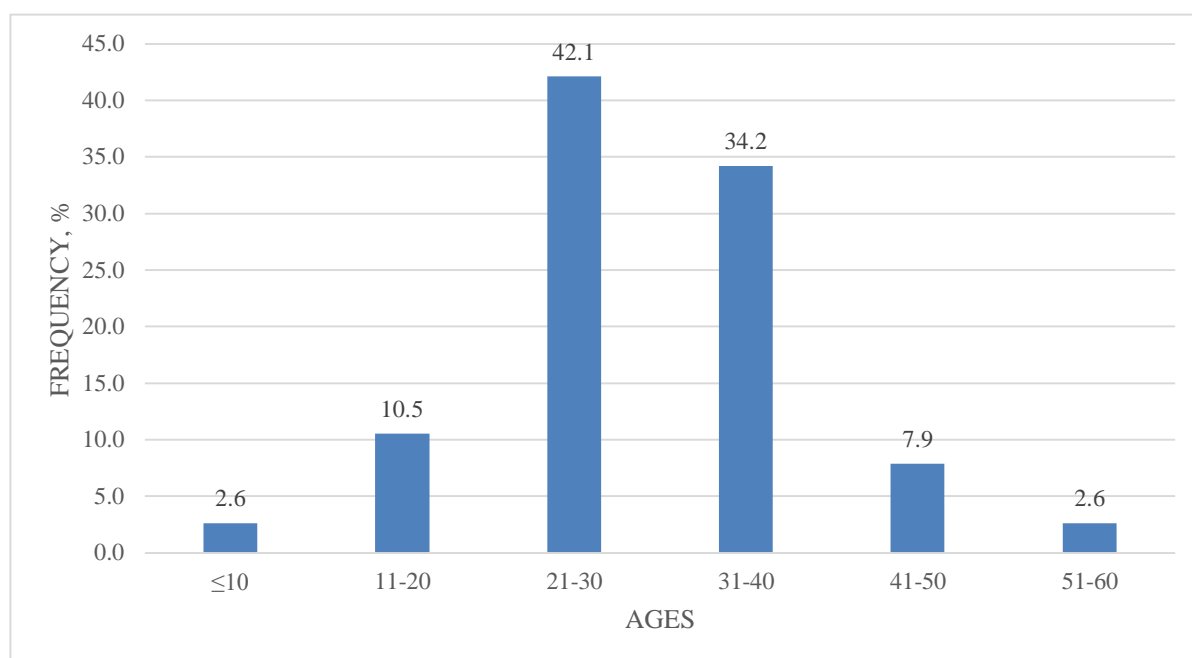


Figure 2: Age distribution of study population

Table 1: Source of referred patients with neck injuries

Source of referral	Frequency = n	%
Level 1	n=0	0.0
Level 2	n=3	12.0
Level 3	n=7	28.0
Level 4	n=8	32.0
Level 5	n=7	28.0
Level 6	n=0	0.0
Total	n=25	100.0

Sixty-five percent (25 of our study participants) were referred to our hospital from other health facilities, the majority being level 4 referrals (32%). The remaining 13 (34.2%) either presented themselves or were brought in by caregivers.

The mean duration from time of injury to arrival at our facility was 13.9±18.2hrs

Table 2:Duration from of injury to arrival

Time to presentation (Hours)	Frequency (%)
0-12	28(73.7)
13-24	4(10.5)
25-36	2(5.3)
37-48	00
49-60	2(5.3)
61-72	2(5.3)

4.2 Patterns of Neck injury

4.2.1 Type of Injury

Majority of cases reported were penetrating neck injuries 25(92.1%) with two cases of blunt neck injury (5.35%) and one case (2.6%) that had both a stab to the neck and strangulation injury at the same time.

Table 3:Type of neck injury

Type of injury	Frequency=n	%
Penetrating	n=35	92.1
Blunt	n=2	5.3
Mixed	n=1	2.6
Total	n=38	100.0

4.2.2 Zone of Injury

Zone II injuries were the most common in our study 26(68%), followed by zone III 6(16%) and zone I 3(8%). Three patients (8%) had injury to more than one zone of the neck.

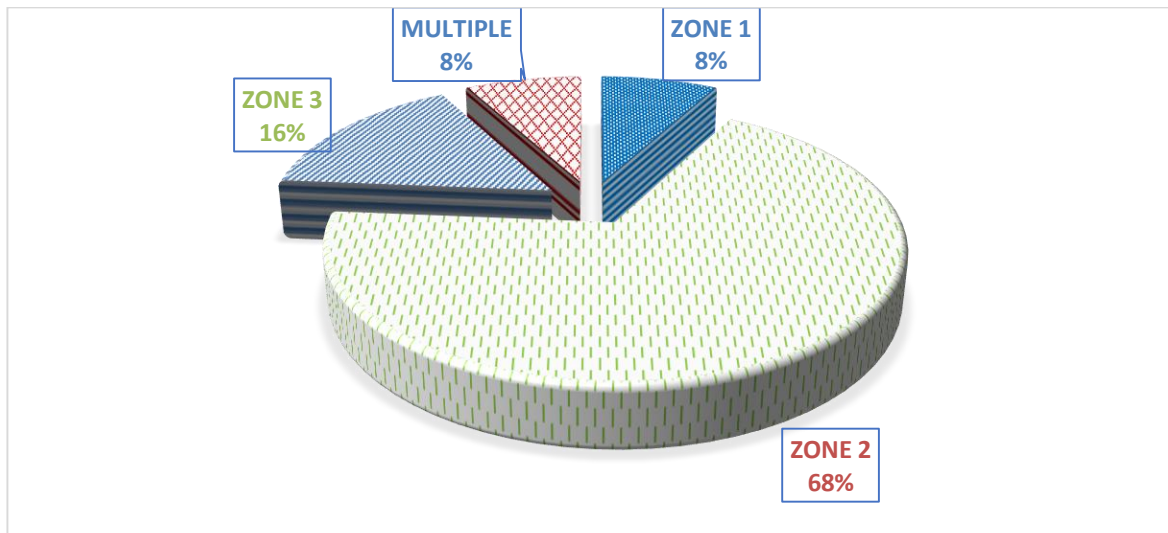


Figure 3:Zones of neck injury

4.2.3 Other Injuries

Of our study participants, 15 (39.5%) presented with other injuries which included head injuries 4(10.5%), thoracic injury 5(13.5%), limb injuries 6(15.7%), C-spine injury 2(5.4%), facial nerve injury 1(2.7%) and abdominal injury 1(2.7%). Of the patients with associated injuries, 3(20%) had early complications (P=1.00), while 4(26.7%) had complications at 1month (P=0.40). However, this relationship was not statistically significant. Associated injuries was therefore not a significant predictor of developing complications in this setting.

Table 4:Other injuries

Type of Injury	Frequency=n	%
Head injury	n=4	10.5
Thoracic injury	n=5	13.5
Limb injury	n=6	15.7
C-spine injury	n=2	5.4
Facial nerve injury	n=1	2.7
Abdominal injury	n=1	2.7

4.2.4 Mechanism of Injury

The injuries in our study were primarily due to assault (60.5%), followed by suicide (23.7%). All 3 female patients had injury secondary to assault, 2 of which were by people known to

them. Eighty-four percent (84%) of the assault or suicide weapons were low velocity weapons such as knives, machetes and broken bottle pieces.

Table 5: Mechanisms of Neck Injury

Mechanism of Injury	Frequency=n	%
Assault	n=23	60.5
Fall from height	n=2	5.3
Motor bike crash	n=1	2.6
Motor vehicle crash	n=1	2.6
Strangulation	n=1	2.6
Suicide	n=9	23.7
Work injury	n=1	2.6
Total	n=38	100.0

4.3 Comorbidities, Hard and Soft signs

Seven (18%) of our study participants were diagnosed psychiatric patients. Of these, 57% were known prior to injury, while 43% of psychiatric illness was diagnosed on admission. Among this group of psychiatric patients, all injuries were secondary to suicide and all were zone II injuries. Other comorbidities reported included hypertension 2(5.2%) and diabetes mellitus 1(2.6%).

Hard signs were present in 24(63.2%) of the study participants.

Table 6 :Hard signs of neck injury

Hard signs	Frequency=n	%
Acute respiratory distress	n=3	10.3
Large blowing wound	n=7	24.1
Major hemoptysis	n=2	6.8
Severe active bleeding	n=13	44.8
Shock/ non responder	n=2	6.8
Expanding hematoma	n=2	6.8
Total	n=29	100

Soft signs were present in 16(42.9%) of our study participants.

Table 7:Soft signs of neck injury

Soft signs	Frequency=n	%
Dysphonia	n=4	11.1
Dysphagia	n=8	22.2
Wound leaking saliva	n=5	13.8
Odynophagia	n=9	25.0
Subcutaneous emphysema	n=7	19.4
Hematemesis	n=2	5.5
Non-expansile hematoma	n=1	2.7
Total	n=36	100

4.4 Management

Investigations and findings

Patients were investigated in this study depending on the presenting clinical findings. Ten (26.3%) of our patients had CT scans. Of these, 6 were head and neck CT scans without contrast, done at other facilities before referral, and none showed any abnormal findings. Four CT scans were requested in our facility; 2 of these were head and neck CT scans without contrast and 2 were CT angiograms. One Head and neck CT showed a crushed larynx, while the other had normal findings. For the CT angiogram, one showed IJV injury and the other was normal.

Fifteen (39.4%) of the patients had a rigid oesophagoscopy done under anaesthesia and the findings were as shown in table 8 below.

Table 8:Oesophagoscopy Findings

Number done	Findings
13	Normal
1	Hypopharyngeal collapse
1	Posterior hypopharyngeal wall injury
Total = 15	

Thirteen (34.2%) of the patients had a rigid laryngoscopy done under general anaesthesia with findings shown in Table 9 below. One patient (2.6%) had a rigid bronchoscopy with normal findings.

Table 9:Laryngoscopy Findings

Number done	Findings
3	Normal
8	Laryngeal edema
1	Transected epiglottis
1	Laryngeal collapse
Total = 13	

Definitive Management

Out of 34 patients who had neck exploration, a positive neck exploration was recorded in 29(85.3%) of the patients. Five (14.7%) had negative neck explorations and 4 patients were not

explored. One mortality occurred in the A&E during resuscitation, giving a mortality rate of 2.6%. Five (13.2%) of the patients were given blood transfusions on arrival due to hemodynamic instability. Tracheostomy was done in 8(21.1%) patients with airway compromise, while nasogastric tubes were inserted for feeding in 13 (34.2%) patients. Surgical debridement and primary wound closure followed repair of any injured structures 35(92.1%). Four (10.5%) of our study participants got admitted to the ICU.

Most of the injuries encountered intraoperatively were muscular 30(88.2%). Others included laryngeal injury 12(35.3%), hypopharyngeal 8(23.5%), vascular 8(23.5%), oesophageal 5(14.7%), chylous 5(14.7%) and tracheal 2(5.8%)

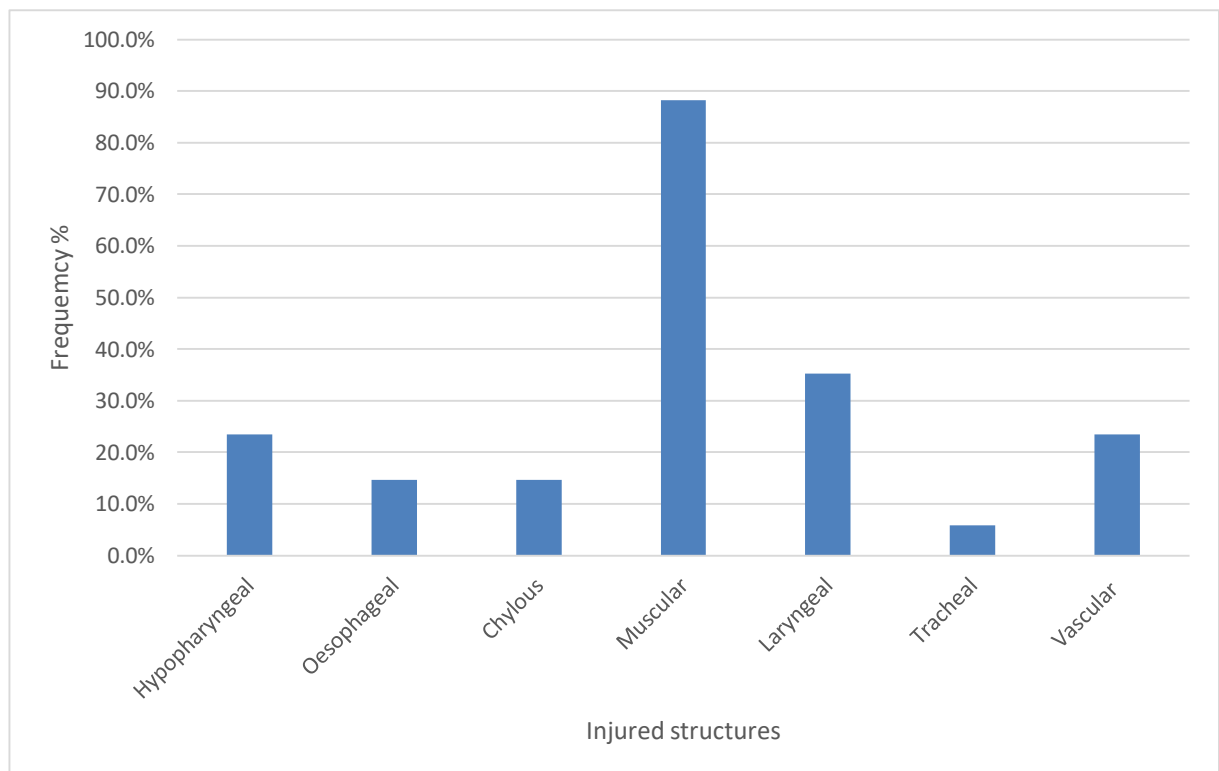


Figure 4: Findings on neck exploration

4.5 Complications

Early complications were those recorded within a week of the injury. Nine (23.7%) developed early complications which included pharyngocutaneous fistulas 4(10.5%), surgical site infections 2(5.3%), oesophago-tracheal fistula 1(2.6%), primary hemorrhage 1(2.6%), Post op

hematoma 1(2.6%), pharyngeal collapse 1(2.6%), laryngeal collapse 1(2.6%) and death 1(2.6%).

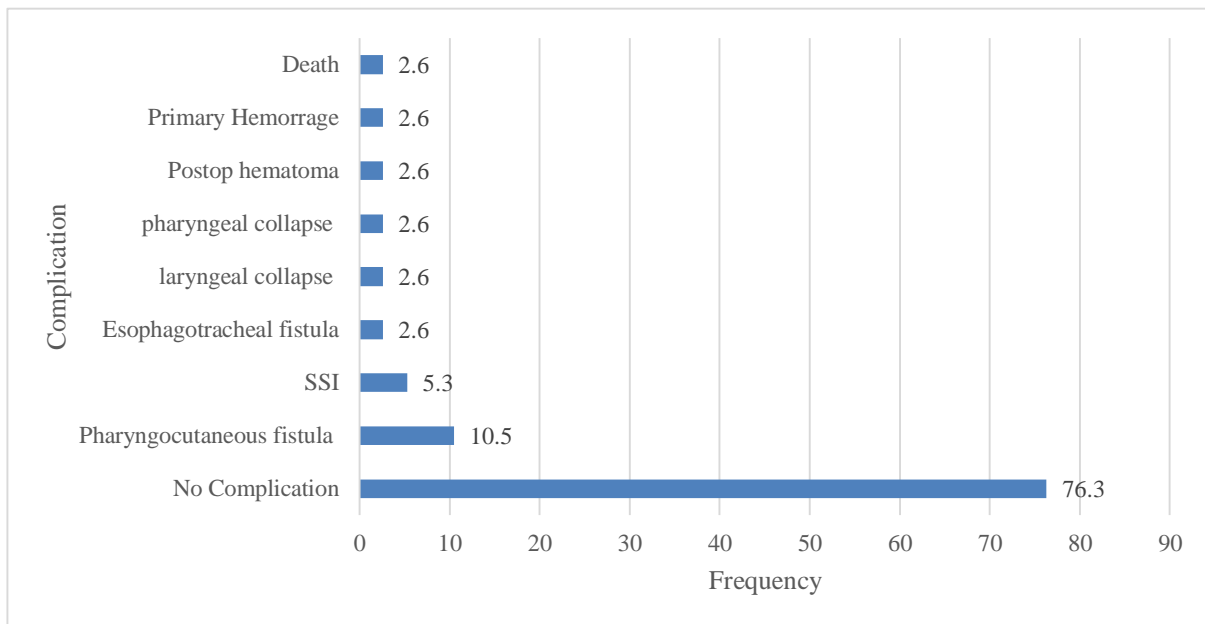


Figure 5: Early Complications of neck injury

At one month follow up, patients were assessed for any new onset of complications or persistence of those noted early in their management. The number of patients with complications at 1 month was 7(18.4%). Pharyngocutaneous fistulas were found to be more prevalent 4(10.5%). Laryngeal stenosis 2(5.3%) and oesophagotracheal fistulas 1(2.6%) were also noted to persist through to the 1-month review. Surgical site infections, hemorrhage and hematomas were only experienced in the first week post operatively.

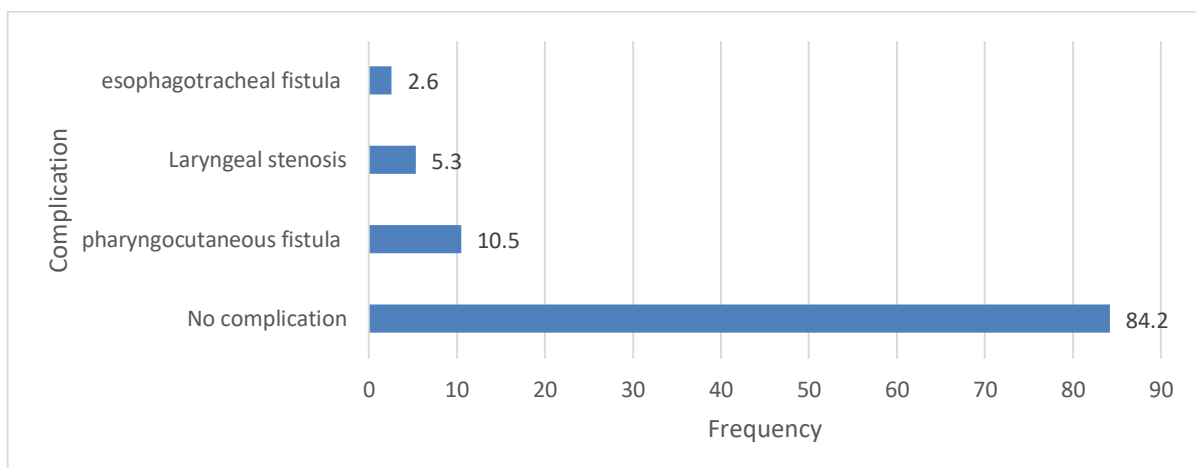


Figure 6: Complications at 1month following neck injury

4.6 Factors Affecting Outcomes of Neck Injury

Table 10: Factors affecting outcomes of neck injury

Characteristic		Complication		P-value
		No	Yes	
Age	≤10	1(100%)	0(0.0)	0.09
	11-20	3(75%)	1(25%)	
	21-30	15(93.8)	1(6.3)	
	31-40	8(61.5)	5(38.5)	
	41-50	2(66.7)	1(33.3)	
	51-60	0	1(100)	
Gender	Male	27(77%)	8(22.9%)	1
	Female	3(100%)	0	
Zone	Mixed	3(100)	0(0.0)	0.92
	Zone 1	2(66.7)	1(33.3)	
	Zone 2	19(73.1)	7(26.9)	
	Zone 3	5(83.3)	1(16.7)	
Comorbidity	NO	23(79.3)	6(20.7)	0.66
	YES	6(66.7)	3(33.3)	
Mode of transportation	Non-ambulance	15(78.9)	4(21.1)	1.00
	Ambulance	14(73.7)	5(26.3)	
Hard signs	NO	10(71.4)	4(28.6)	0.70
	YES	19(79.2)	5(20.8)	

4.7 Complication vs. Time to Presentation

Patients who developed complication had a longer mean time from injury to presentation 25.1hrs \pm 26hrs vs 10.4hrs \pm 13hrs, **P=0.03**. Patients who were referred were noted to have taken longer to arrive at our facility compared to those not referred (14.8 \pm 16.5 vs 12.2 \pm 21.8). However the relationship was not statistically significant, P=0.69
Of those referred, only 3 (12%) had any form of resuscitation before referral. No statistically significant difference was found with respect to development of complications between patients referred from other facilities and those who were self-referred (P=0.69).

4.8 Immediate Outcome vs Outcome at 1month

Having a poor immediate outcome was significantly related to having a poor outcome at 1month, **P<0.001**

Table 11:Relationship between immediate and late outcomes

	Complication at 1 month		P value
Early complication	Yes	No	<0.001
Yes	6(75%)	2(25%)	
No	1(3.4%)	28(96.6%)	

4.9 Length of Hospital Stay

Median length of hospital stay was 6days IQR 2-33.5days. Patients with complications had a significantly longer hospital stay than those without 10.0 \pm 22.5 vs 56.8 \pm 39.7 days, **P<0.001**

CHAPTER FIVE: DISCUSSION

The assessment and management of neck injuries remains a debated topic in different setups with no single consensus on which is superior. Kenyatta National Hospital is no exemption, with no specific guidelines tailored for the management of neck injuries in our limited resource setup. Our study investigated the patterns and outcomes of neck injury at the Kenyatta National hospital, which is the main referral hospital in Kenya. The prevalence of neck injury was found to be 0.2% of A&E admissions, and 0.9% of trauma cases. Like most other studies, our study population was predominantly males (92.1%), and the age group most affected being twenty to forty years ^(15,16,17,19). This represents not only the risk-taking behavior of this specific population, but also the major workforce of society, hence negatively impacting the economy. Another consistent finding in literature has been that of Penetrating neck injuries superseding blunt neck injuries, with zone 2 injuries being the most prevalent ^(7,15,16,17,19). In our study, 92% of the neck injuries were penetrating neck injuries, defined in this study as any injuries breaching the platysma muscle, while 68% involved zone II. Zone II as originally defined by Roon and Christensen and currently adopted by AAOHNS is the zone between the inferior border of the cricoid cartilage and the angle of the mandible, and is the part of the neck most vulnerable to trauma. Management of neck injuries has historically been based on these neck zones, although recent studies seem to advocate more for a “no zone” approach whereby patients are managed based on clinical presentation ⁽¹⁰⁾.

The most common mechanism of injury reported in our facility was assault at 60%, followed by self-inflicted injuries which made up 23% of our study participants. This statistic supports the Kenya National Police statistics which have shown a steady rise in interpersonal violence over the past years (3). The mechanism of injury will normally vary depending on various socioeconomic factors of a given population. A study done in Saudi Arabia showed road traffic accidents to be the most common mechanism of neck injury, meanwhile in Guhawati India and Tanzania, homicides and suicides predominated ^(16,17,19). However, it should be noted that the study in Tanzania by Gilyoma and colleagues was specifically on cut throat injuries, which had a bias on the mechanism of injuries presented.

Thirty-four (89.4%) patients in this study underwent neck exploration. One patient had their wounds sutured in the accident and emergency unit under local anaesthesia and discharged. Another succumbed during resuscitation attempts giving us a mortality rate of 2.6% as this was the only mortality recorded. In Saudi Arabia, Ghnam et al reported a mortality of 12.2% in a setting where road traffic accidents were the commonest mechanism of injury, and related their

deaths to injury severity⁽¹⁶⁾. On the other hand, Gilyoma et al experienced a mortality of 11.2% with homicides being the commonest cause of injury, and attributed their mortality to presence of comorbidities, delayed presentation, complications and poor follow-up⁽¹⁷⁾. In this study, the clinical judgement of the surgeons determined the choice of investigation and management of the patients. Ten of the patients had CT scans done, of which 4 were requested at our facility. The basis on which the scans were done at referring facilities was not well documented hence an analysis of its utility could not be made. Studies looking at the utility of investigations in neck injury management followed a standard protocol for management applied by all clinicians involved in management of these patients¹⁰. Our patients also had rigid endoscopies done under general anaesthesia, with oesophagoscopies having very few positive findings compared to the laryngoscopies. Considering the risk of iatrogenic oesophageal perforation with rigid instrumentation, it is worth considering stricter criteria for performing these diagnostic endoscopic procedures.

Of the 34 patients admitted for neck exploration, 85.3% were found to have injured structures requiring repair, while 14.7% had negative neck explorations. The high rate of positive exploration in this study is due to our definition of positive neck exploration which included any structural damage requiring surgical repair. This however is an inconsistency observed in several studies due to varying definitions of a positive neck exploration. Earlier in the history of management of neck injuries, mandatory neck exploration was the standard protocol for management with higher morbidities recorded from the high rates of negative explorations, but lower mortalities due to the lower risk of missed injuries. Several studies have applied selective neck explorations with use of CTA, yet recording higher negative exploration rates than that seen in our study^(10,22). In the absence of standard protocols for management of neck injuries in our facilities, as well as limited resources, surgeons more often than not make the decision of neck exploration based on the patient's clinical presentation. This is a trend that may be seen more in the future with few authors now advocating for a shift towards thorough physical examination as the main tool for deciding on neck explorations and use of CTA or not (10).

Nine (23%) of our study participants developed complications in the course of management, and it was noted that this was significantly related to increased delays in time to presentation at our health facility from the time of injury ($P=0.03$). The patients referred to our facility from other hospitals were noted to experience more delays from the time of injury to definitive management despite not being a significant correlation. The health facilities with the most referrals were levels 3, 4 and 5 facilities which function as district and county referral hospitals (Kenyatta National Hospital is a level 6 facility and considered the national referral hospital).

It will be expected that patients attended to in these county health facilities will receive basic trauma management before referral, hence better outcomes compared to self-referrals. This however was not the case considering only 3 out of 25 of the referred patients had any form of resuscitation before referral. Therefore, being seen at a health facility prior to referral contrary to self-referral did not determine patients' chances of getting complications (P=0.69). Gilyoma et al reported similar results with delayed presentation and zone of injury being significantly associated to the rate of complications in a study in Tanzania⁽¹⁷⁾. Having complications within the first week of management also significantly increased our patients' chances of having complications by their one-month review (P=0.001). These complications noted at one month were mainly fistulas and laryngeal stenosis, which have a protracted course and are initially managed conservatively. In this study, factors such as age group, gender, associated injuries, Zone of injury and presence of comorbidities did not show any significant correlation to development of complications. The median length of stay of patients in the hospital during their time of management was 6days, with a significantly longer stay for those who developed complications within the first week of treatment (P=0.001)

5.1 Conclusion

The present study demonstrated a prevalence of neck injury at 0.2% of A&E admissions and 0.9% of trauma admissions. Penetrating neck injuries were more common with a majority being in Zone II, and secondary to assault. A good number of our patients were referrals from district and county referral hospitals. Rigid endoscopy under general anaesthesia was the most frequently used investigation. There was a high rate of positive neck explorations with muscle injuries being the most common intraoperative finding. A few patients experienced complications in this study, and longer duration from injury to definitive management was associated with increased risk of developing complications. Having early complications was a determinant of late complications, and the presence of complications significantly influenced the patients' length of hospital stay.

5.2 Recommendations

Institutional protocols on the management of neck injuries will go a long way to standardize management pathways.

Most of our referrals were from district and county referral facilities which might imply a focus on training of health workers and adequate equipping for acute trauma management is required at these facilities.

A follow up to this study can be done to assess the utility of the various investigations used in neck injury management. This will be important to come up with protocols for judicious use of limited resources.

REFERENCES

1. Gathecha GK, Githinji WM, Maina AK. Demographic profile and pattern of fatal injuries in Nairobi, Kenya, January–June 2014. *BMC Public Health*. 2017 Jan 6;17(1):34.
2. Nicol A, Knowlton LM, Schuurman N, et al. Trauma Surveillance in Cape Town, South Africa: An Analysis of 9236 Consecutive Trauma Center Admissions. *JAMA Surg*. 2014 Jun 1;149(6):549–556.
3. Crime Statistics - Crime Statistics [Internet]. [cited 2018 Jul 5]. Available from: <http://www.nationalpolice.go.ke/crime-statistics.html#>
4. Al-Thani H, El-Menyar A, Mathew S, et al. Patterns and outcomes of traumatic neck injuries: A population-based observational study. *J Emerg Trauma Shock*. 2015;8(3):154–158.
5. Mahmoodie M, Sanei B, Moazeni-Bistgani M, et al. Penetrating Neck Trauma: Review of 192 Cases. *Arch Trauma Res*. 2012 Mar 30;1(1):14–18.
6. Cruvinel Neto J, Dedivitis RA. [Prognostic factors of penetrating neck trauma]. *Braz J Otorhinolaryngol*. 2011 Feb;77(1):121–124.
7. Irish JC, Hekkenberg R, Gullane PJ, et al. Penetrating and blunt neck trauma: 10-year review of a Canadian experience. *Can J Surg J Can Chir*. 1997 Feb;40(1):33–38.
8. Cobzeanu MD, Palade D, Manea C. Epidemiological features and management of complex neck trauma from an ENT surgeon's perspective. *Chir Buchar Rom* 1990. 2013 Jun;108(3):360–364.
9. Sperry JL, Moore EE, Coimbra R, et al. Western Trauma Association Critical Decisions in Trauma: Penetrating neck trauma. *J Trauma Acute Care Surg*. 2013 Dec;75(6):936–940.
10. Ibraheem K, Khan M, Rhee P, et al. “No zone” approach in penetrating neck trauma reduces unnecessary computed tomography angiography and negative explorations. *J Surg Res*. 2018 Jan;221:113–120.
11. Nowicki J, Stew B, Ooi E. Penetrating neck injuries: a guide to evaluation and management. *Ann R Coll Surg Engl*. 2017 Oct 19;100(1):6–11.
12. Roon AJ, Christensen N. Evaluation and treatment of penetrating cervical injuries. *J Trauma*. 1979 Jun;19(6):391–397.
13. Demetriades D, Stewart M. Penetrating injuries of the neck. *Ann R Coll Surg Engl*. 1985 Mar;67(2):71–74.
14. Merion RM, Harness JK, Ramsburgh SR, et al. Selective Management of Penetrating Neck Trauma: Cost Implications. *Arch Surg*. 1981 May 1;116(5):691–696.

15. Harris R, Olding C, Lacey C, et al. Changing incidence and management of penetrating neck injuries in the South East London trauma centre. *Ann R Coll Surg Engl*. 2012 May;94(4):240–244.
16. Ghnam WM, Al-Mastour AS, Bazeed MF. Penetrating Neck Trauma in a Level II Trauma Hospital, Saudi Arabia [Internet]. *International Scholarly Research Notices*. 2012 [cited 2018 Jul 19]. Available from: <https://www.hindawi.com/journals/isrn/2012/672948/>
17. Gilyoma JM, Hauli KA, Chalya PL. Cut throat injuries at a university teaching hospital in northwestern Tanzania: a review of 98 cases. *BMC Emerg Med*. 2014 Jan 14;14:1.
18. Rathlev NK, Medzon R, Bracken ME. Evaluation and Management of Neck Trauma. *Emerg Med Clin North Am*. 2007 Aug;25(3):679–694.
19. De DS, Kr. Sarma DM. Cut throat injuries at a tertiary referral hospital in guwahati: a review of 165 cases. *IOSR J Dent Med Sci*. 2016 Aug;15(08):36–41.
20. Okemwa M P REA Rana F. Pattern of road traffic fatalities in Nairobi. *Ann Afr Surg*. 2008;3:15–20.
21. A. Ahmed. Selective observational management of penetrating neck injury in Northern Nigeria. *SAJS*. 47(3).
22. Brennan J, Lopez M, Gibbons MD, et al. Penetrating Neck Trauma in Operation Iraqi Freedom. *Otolaryngol Neck Surg*. 2011 Feb 1;144(2):180–5.
23. Cummings CW, editor. *Cummings otolaryngology head & neck surgery*. 4th ed. Philadelphia, Pa: Elsevier Mosby; 2005. 4 p.
24. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. *Gastroenterol Hepatol Bed Bench*. 2013;6(1):14–17.
25. A. Indrayan. Measures of Morbidity in a Community Prevalence and Incidence. *Ganga Ram Journal*. 2013;3(1):38–41.

TIMELINE

Activity	August 2018- September 2018	December 2018- March 2019	April 2019- January 2020	February 2020	April 2020
Research proposal development					
Ethical approval					
Data collection, entry and cleaning					
Data analysis and report writing					
Thesis presentation at Department					

BUDGET

ITEM/ACTIVITY	COST (Ksh)
Literature write up; internet bundles	10000
Printing of proposals	10000
Ethical clearance	2000
Printing of data collection tools	4000
Data collection and entry	10000
Statistician	20000
Research assistant	10000
Total	66000

APPENDICES

Appendix 1: Consent/Assent Form

Part 1: Introduction

I am Dr. Penngan Keafon Nchifor, a Masters Student of Otolaryngology/Head and Neck Surgery at the University of Nairobi. I am conducting research PATTERNS AND OUTCOMES OF NECK INJURIES AT THE KENYATTA NATIONAL HOSPITAL. You have been selected to assist in this research. Once you have given consent to participate in this study, we will access your medical records and extract information regarding the injuries you sustained and how they were managed.

Purpose of the research

Neck trauma is on the rise and the outcome can be devastating without appropriate management. We seek to determine how prevalent these injuries are, the population most affected, the outcomes of management and factors that influence these outcomes. This study will aid in guiding protocol development in our setup on how to better manage patients with these injuries. An invitation to participate in the study is thereby extended to you. You will be given the opportunity to ask any question you might have regarding your participation.

Confidentiality

The information you provide concerning yourself will be kept confidential and used only for purposes of this research. We will not use your name, phone number or email address. Your file will be assigned a code that bears no relationship to your personal identification.

Sharing the Results

Results of this study will be made available to the department of surgery of the University of Nairobi, College of health sciences library and the head of department for surgery at KNH. The study results will also be published online for access to anyone who might require them.

Risks

The study will not expose you to any risks. You will be accorded appropriate management with respect to your injuries

Study Benefits

The study might not be beneficial to you as an individual, but will go a long way to improve the level of care of subsequent patients who will present with similar injuries

Costs and Compensation

You will not incur any cost by participating in this study. You will also not have any financial benefits from participating in the study.

Voluntariness of Study and Right of Withdrawal

Participating in this study is your choice and you will not be managed any less for not participating. You may also withdraw from the study at any point if you feel you no longer want to participate.

In case of any enquiries, you may contact the principal investigator using the details provided below;

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ENT/Head and Neck Resident, UoN

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Honorary Lecturer, Department of Surgery

Further enquiries can be made to the Secretary, KNH/UoN-ERC, P.O Box 20723 KNH, Nairobi 00202 . Tel: 726300-9. Email: uonknh_erc@uonbi.ac.ke

Part Two: Certificate of Consent

The research has been explained to me and I voluntarily consent to participate. I have had an opportunity for my questions to be answered.

Patient’s signature/thumb print:

Guardian/ Next of kin:

Date:

Part Three: Statement by the Researcher

I have accurately read the consent out to the participant and to the best of my ability made sure that the participant understands the following:

- a) The participant has the right to refuse consent or withdraw from the study at any point.
- b) All information given will be treated confidentially.
- c) The results of this study will be published to help in management of neck injuries at KNH and Kenya as a whole.

The participant was given an opportunity to ask questions about the study and all the questions asked were answered satisfactorily to the best of my ability. I confirm the participant has not been coerced to give consent in any way.

Name of researcher:

Signature of researcher:

Date:

Assent Form

Project Title: Patterns and outcomes of Neck Injury at the Kenyatta National Hospital

Investigator(s): Dr Keafon Nchifor

Purpose of Research: We are doing a research study about patients who present to Kenyatta National Hospital with injuries to their necks. Permission has been granted to undertake this study by the Kenyatta National Hospital-University of Nairobi Ethics and Research Committee. This research study is a way to learn more about people, and several other children will be participating in this research study with you.

This study will involve documenting your progress as you are being managed in the hospital.

Risks: The study will not interfere with your treatment, or be harmful to you in any way.

Privacy/ Confidentiality: No one will also know that you are part of the study, because I will keep your details private.

Study benefit: There will be no reward for participating, but this research study will go a long way to help similar patients in the future who will present with injuries similar to yours.

Voluntariness and right of withdrawal: If you do not want to be in this research study, you will still get the treatment you require. You can decide not to participate at any point.

When we are finished with this study we will write a report about what was learned. This report will not include your name or that you were in the study.

You do not have to be in this study if you do not want to be. If you decide to stop after we begin, that's okay too. Your parents know about the study too.

If you decide you want to be in this study, please sign your name.

I, _____, want to be in this research study.

(Signature/Thumb stamp)

(Date)

KIAMBATISHO 1: IDHINI KWA KISWAHILI

FOMU YA IDHINI

Fomu hii ina sehemu tatu

- a) Maelezo ya Mtafiti
- b) Fomu ya idhini ya msajiliwa
- c) Kiapo cha Mtafiti

(i) Sehemu ya kwanza –Maelezo ya Mtafiti

Mimi ni Dkt Penngan Keafon Nchifor, kutoka chuo kikuu cha Nairobi, Shule ya Utabibu, Idara ya upasuaji, sehemu ya ENT. Ninafanya utafiti wa kuangalia “PATTERNS AND OUTCOMES OF NECK INJURIES AT THE KENYATTA NATIONAL HOSPITAL”, yani kuangalia mfumo na matokeo ya majeraha ya shingo kwa wagonjwa watakao onekana katika hospitali kuu ya Kenyatta. Umechaguliwa kuungana na utafiti huu lakini idhini yako yahitajika ili kuendelea na utafiti wenyewe.

Sababu na manufaa za utafiti

Utafiti huu unaangalia asili mia ya watu ambao wanapata majeraha ya shingo, mambo ambayo yanarahisisha upataji wa majeraha haya, aina za matibabu zinazopatiwa na matokeo ya matibabu haya. Matokeo ya utafiti yatasaidia kusawazisha utaratibu wa kutibu majeraha haya ili matokeo ya matibabu yawe yakufa zaidi.

Hiari ya kukubali

Kukubali kwako ni kwa hiari yako na sio kwa kulazimishwa. Kukataa kwako hakutadhuru matibabu unayofaa kupata, yani hautakatazwa matibabu kwasababu ya kukataa kujiunga na utafiti huu.

Madhara na Gharama ya Utafiti

Kujiunga na utafiti huu hakutakudhuru kwa njia yoyote. Matibabu utakayopata yanaambatana na utaratibu wa kawaida wa kutatua majeraha ya shingo. Pia, hutahitajika kulipa pesa zaidi ili kujiunga na utafiti huu. Garama ya matibabu yote yatakua ya kawaida kulingana na matibabu utakayopata na malipo haya yataelekezwa kwa hospitali kuu ya Kenyatta.

Usiri wa msajiliwa

Habari zozote za kibinafsi zitakazokusanywa kutoka kwako, kama majina, zitashughulikiwa kwa usiri. Habari hazitasambazwa kwa yeyote ila tu kwa rufusa kutoka kwa kamiti kuu ya utafiti ya chuo kikuu cha Nairobi na hospitali kuu ya Kenyatta (KNH/UON ERC).

Matokeo ya Utafiti

Matokeo ya utafiti huu, yatasambazwa kwa madakitari, wauguzi na uma kwa ujumla kwani majibu yenyewe yatapatikana katika maktaba ya chuo kikuu cha Nairobi, Hospitali kuu ya Kenyatta na pia kwenye internet.

Maswali ya ziada na ufafanuzi zaidi

Unaweza kupata uchambuzi wa utafiti huu na maelezo zaidi kutoka kwa:

Katibu Mkuu wa utafiti,

Hospitali kuu ya Kenyatta na Chuo kikuu cha Nairobi(KNH/UON ERC).

Sanduku la Posta 20723 KNH, Nairobi 00202.

Nambari ya simu 020726300-9

Barua pepe; uonknh_erc@uonbi.ac.ke

Wasimamizi wa utafiti

Dkt. Joyce Aswani

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Nambari ya simu: 0202726300

Dkt. Mary Omutsani

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Nairobi, Kenya

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Mtafiti Mkuu:

Dkt Penngan Keafon Nchifor

Sanduku la Posta19676-00202

Nairobi, Kenya

Nambari ya simu ya rununu: 0790942941

Barua pepe: keafonnchifor.kn@gmail.com

ii) Sehemu ya pili– Idhini ya mgonjwa.

Mimi (Majina)..... kwa hiari yangu, nimekubali kushiriki katika utafiti huu ambao unafanywa na Daktari Penngan Keafon Nchifor. Nimeelezwa manufaa na madhara ya utafiti huu kwa undani na nimeyaelewa.

Jina la Mgonjwa/ Mzazi.....

Sahihi.....

Tarehe.....

Nambari ya utafiti.....

(iii) Sehemu ya tatu – Kiapo cha mtafiti

Naapa yakwamba nimeelezea msajili manufaa na madhara yote yanayohusu utafiti huu. Msajili ameelewa yote yanayohitajika na yanayohusu utafiti huu na usajili wake. Idhini yake imepewa kwa hiari yake bila kulazimishwa au kuahidiwa pesa, zawadi au matibabu ya ziada.

Jina la mtafiti

Sahihi..... Tarehe.....

Fomu ya Usaidizi

Kichwa cha Mradi: Sampuli na Matokeo ya Kuumia Mkovu katika Mtafiti wa Hospitali ya Taifa ya Kenyatta.

Mimi ni Dkt Keafon Nchifor. Tunafanya utafiti wa utafiti kuhusu wagonjwa ambao wanawasilisha hospitali ya Taifa ya Kenyatta na majeraha kwa shingo zao. Ruhusa imepewa kufanya utafiti huu na Kliniki ya Taifa ya Kenyatta-Chuo Kikuu cha Nairobi Kamati ya Maadili na Utafiti

Utafiti huu wa utafiti ni njia ya kujifunza zaidi kuhusu watu, na watoto wengine kadhaa watashiriki katika utafiti huu wa utafiti na wewe.

Utafiti huu utahusisha kuandika maendeleo yako unaposimamiwa hospitali. Haiwezi kuingiliana na matibabu yako, au kuwa na madhara kwako kwa njia yoyote. Hakuna mtu atakayejua pia kwamba wewe ni sehemu ya utafiti, kwa sababu nitaweka maelezo yako binafsi. Hutakuwa na malipo kwa kushiriki, lakini utafiti huu wa utafiti utaenda kwa muda mrefu ili kuwasaidia wagonjwa sawa katika siku zijazo ambao watawasilisha kwa majeraha sawa na yako.

Ikiwa hutaki kuwa katika utafiti huu wa utafiti, bado utapata matibabu unayohitaji.

Tunapomaliza na somo hili tutaandika ripoti kuhusu kile kilichojifunza. Ripoti hii haitajumuisha jina lako au ulikuwa katika utafiti. Huna budi kuwa katika utafiti huu ikiwa hutaki kuwa. Ikiwa unaamua kuacha baada ya kuanza, hiyo ni sawa pia. Wazazi wako wanajua kuhusu utafiti pia.

Ikiwa unaamua unataka kuwa katika somo hili, tafadhali saini jina lako.

Mimi, _____, nataka kuwa katika utafiti huu wa utafiti.

(Sahihi / sahani ya kitambulisho)

(Tarehe)

Appendix II: Data Collection Form

Questionnaire Number..... Patient's code.....

SECTION A: SOCIODEMOGRAPHIC DATA

- 1) Age of patient years
- 2) Gender
 - a) Male
 - b) Female
- 3) Referral
 - a) Yes (specify where)
 - b) No

SECTION B: CLINICAL CHARACTERISTICS

- 4) Clinical evaluation on arrival at A&E

Airway	Airway compromise a) Yes (specify) b) No
Breathing	a) Yes (specify respiratory rate) b) No c) O2 Saturation
Circulation	Vital signs a)BP b)Heart rate Response to resuscitation (in case of shock) d) Responder Yes..... No e) Transient responder Yes..... No f) Non responder Yes No.....
Disability	GCS Pupils reactive; Yes..... No Limb muscle power; Upper limbs..... Lower limbs.....
exposure	Associated injuries g) Facial injury Yes..... No..... h) Head injury Yes..... No..... i) Cervical spine injury Yes..... No..... j) Thoracic injury Yes..... No..... k) Injury to upper limbs Yes..... No..... l) Injury to lower limbs Yes..... No..... m) Abdominal injury Yes..... No..... n) Pelvic injury Yes..... No.....

5) Elapsed time from injury to hospital presentation Hrs

6) Mode of transportation to the hospital

i. Ambulance Yes No

ii. Taxi/ personal vehicle Yes No

iii. Motor bike Yes No

iv. Other (specify)

7) Fluid resuscitation before presentation to hospital

a) Yes

i. Blood Units

ii. IV fluids units

b) No

8) Hard and soft signs

Hard signs	Yes	No	Soft signs	Yes	No
Severe active bleeding			Hoarseness		
Shock/non responder			Dysphonia		
Expanding hematoma			Hematemesis		
Large blowing wound			Subcut. emphysema		
Major hemoptysis			Odynophagia		
Acute respiratory distress			Dysphagia		
Others			Wound leaking saliva		
			Others		

9) Comorbidity

	Yes	No
Diabetes mellitus		
Hypertension		
Cardiac disease		
Previous stroke		
Cancer		
Psychiatric illness		
Other (specify)		

SECTION C: INJURY CHARACTERISTICS

10) Mechanism of injury

- i. Motor vehicle crash
- ii. Assault
- iii. Fall from a height
- iv. Suicide
- v. Homicide
- vi. Other (specify)

11) Type of injury

- a) Blunt neck injury
- b) Penetrating neck injury

12) Zone of injury

- i. Zone 1
- ii. Zone 2
- iii. Zone 3
- iv. Multiple zones (specify which)

13) Type of weapon (where applicable)

- i. High velocity (specify)
- ii. Low velocity (specify)

SECTION D: NECK INJURY MANAGEMENT

14) Diagnostic procedures done

Procedure	Yes	No
CT Angiogram		
CT Neck		
Laryngoscopy		
Bronchoscopy		
Oesophagoscopy		
Oesophagogram		
Other		

15) Intra operative findings for neck wounds explored

	Yes	No
Laryngeal injury		
Tracheal injury		
Hypopharyngeal injury		
Oesophageal injury		
Vascular injury (specify)		
Chylous injury		
Neurological injury (specify)		
Muscular injury		
Other		

16) Positive neck exploration (any structural damage in the neck requiring surgical repair

Yes..... No

17) Management of neck injury

Management	Yes	No	Timing from admission in hrs
Transfusion			
Surgical debridement			
Primary wound closure			
Tracheostomy			
Ligation of major veins			
Ligation of major arteries			
Laryngeal repair			
Hypopharyngeal repair			
Nasogastric tube insertion			
ICU admission			
Non-surgical mgt			
Others			

SECTION E: OUTCOMES (IMMEDIATE)

18) Outcome of treatment

	Yes	No	Timing from admission in days
A&E discharge			
ICU admission			
HDU admission			
Ward admission			
Complications			
Missed injuries			
Death			
Others			
Overall length of hospital stay			

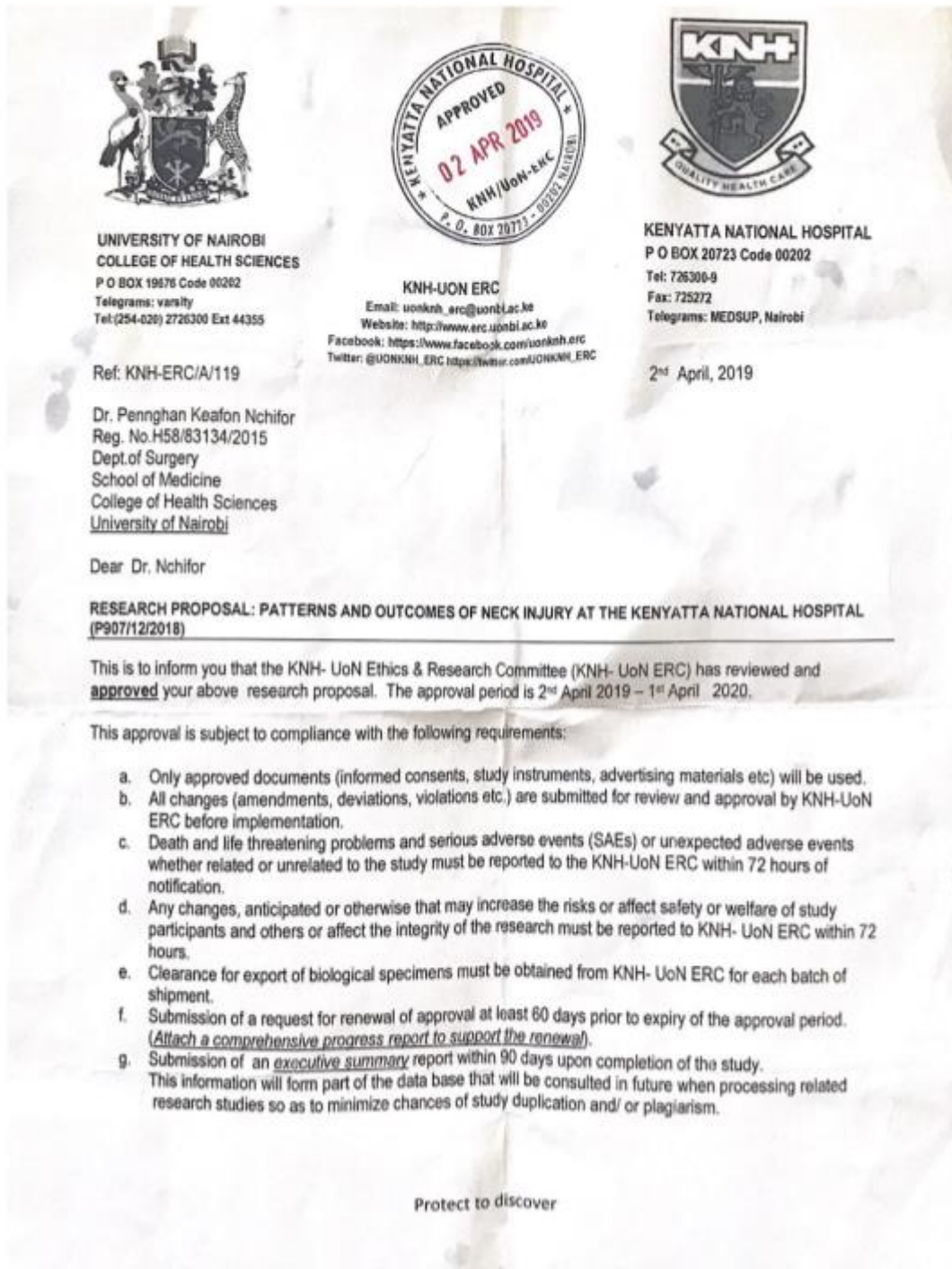
19) Complications observed if any

	Yes	No
Surgical site infection		
Laryngeal stenosis		
Pharyngeal stenosis		
Pharyngo-cutaneous fistula		
Oesophago-tracheal fistula		
Mediastinitis		
Tracheal stenosis		
Others		

SECTION F: OUTCOMES (1 MONTH AFTER INJURY)

	Yes	No
Laryngeal stenosis		
Pharyngeal stenosis		
Pharyngo-cutaneous fistula		
Oesophago-tracheal fistula		
Mediastinitis		
Tracheal stenosis		
Others		

Appendix III: KNH/UON-ERC Letter of Approval



Appendix IV: Plagiarism Certificate



Turnitin Originality Report

PATTERNS AND OUTCOMES OF NECK INJURY AT THE KENYATTA NATIONAL HOSPITAL

by Pennghan Keafon Nchifor

From Otorhinolaryngology, Head and Neck Surgery (Master of Medicine)

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