PATTERN AND OUTCOME OF ABDOMINAL INJURIES IN KENYATTA NATIONAL HOSPITAL (KNH)

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DECLARATION

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I certify that this dissertation is my original work and that it has not been submitted for a degree in any other university.

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DEDICATION

I dedicate this work to my wife, Angeline, for not only being patient and understanding but also putting a lot of secretarial work into it; and to my sons, William and Wayne for putting up with my absence during the period of study.

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1.0 SUMMARY

Eighty consecutive admissions of patients with abdominal injuries were recruited into this prospective study conducted over a period of three and half months between November 2004 and mid-February 2005. It involved patients in the adult general surgical wards only. There were 74 males and 6 females giving a male to female ratio of 12.3:1. The age ranged from 15 years to 56 years with a mean of 28.2 years. Majority of the patients (53.8%) were in the third decade of life.

Fifty-three patients had penetrating while 27 had blunt abdominal injuries. The common causes of penetrating abdominal injuries were stab wounds (64.2%), gunshot wounds (32.1%) and arrow wound (3.7%). Road Traffic Accidents (44.4%), assault (37.0%) and fall from heights (14.8%) were the leading causes of blunt abdominal injury. Overall, stab wounds, gunshot wounds (GSWs) and Road Traffic Accidents (RTAs) are the three top causes of abdominal injuries.

Fifty-two patients (65%) had isolated abdominal injuries while the remaining 28 had associated extra-abdominal injuries. Seven of these had more than one extra-abdominal injury. Blunt abdominal injuries had a higher tendency to have associated extra-abdominal injuries. The injured extra-abdominal parts included the chest, limbs, head and pelvis.

The duration prior to presentation to hospital depended on the degree of injury. Severe injuries presented early and vice-versa. The shortest duration was one hour and the longest one week. Sixty patients (75%) presented within the first six hours of injury. The type of injury did not determine the duration prior to presentation to hospital.

As of the time of admission, 80% of the patients had normal vital signs. Out of 16 patients admitted with abnormal vital signs, 11 had penetrating abdominal injury. Eighty percent of the blunt abdominal injuries with abnormal vital signs died. Less than 40% (36.4%) of the penetrating abdominal injuries with abnormal vital signs died, showing a better interventional outcome in the penetrating than blunt abdominal injuries.

Patients were managed according to decisions made by the attending firms (wards 5A, 5B and 5D). Fifty-six patients (70%) were operated on while 24 were subjected to conservative management. The modes of management and success of interventions varied from firm to firm.

Of the operated, 6 had initially been on conservative management (five blunt and one penetrating), showing a 20% change in the mode of management. Nine patients of the 56 operated on had negative laparotomies, giving a 16.1% rate of negative laparotomies. Eighty percent of the initially conserved patients with blunt injuries had positive findings on laparotomy.

The waiting period before surgery for those primarily operated on ranged from half an hour to twenty hours and was depended on the degree of injury and state of patient rather than type of injury. For the initially conserved patients, blunt abdominal injuries took almost three times the penetrating injury waiting time before surgery could be performed. This would suggest greater dilemma in the management of the stable patients with blunt abdominal injury as to when to change instituted mode of treatment. There was correlation between duration prior to surgery and complications as well as deaths.

Ten patients developed complications, giving a 12.5% rate of complications. The complications included sepsis, rebleed, enterocutaneous fistula and gas gangrene of anterior abdominal wall. Ninety percent of the patients who had complications had undergone surgery.

Eight patients (10%) were admitted to the Intensive Care Unit (ICU). Surgery had been performed in all of them. While there was no difference between type of injury and need for ICU admission, the mortality rate was higher in blunt than in penetrating abdominal injuries (75% vs 50%). The overall mortality for patients with abdominal injury admitted to ICU was 62.5%.

Twenty-three patients (fifteen penetrating and eight blunt) had blood transfusion. Twenty-one of these patients had laparotomy performed, yielding 19 positive and 2 negative laparotomies. Operative interventions was a strong reason for blood transfusion even in those with negative laparotomies. The 2 negative laparotomy patients who were transfused had a pre-existing anaemia that required transfusion after surgery.

Ten patients (six blunt and four penetrating) succumbed to their injuries, making the mortality rate in abdominal injuries to be 12.5%. The correlates for mortality were long periods of conservative management in patients not showing improvement, associated extra-abdominal injuries, duration prior to admission, duration prior to surgery, admission to ICU and need for blood transfusion.

Majority of the patients (32) stayed up to five days. Within ten days, 88.6% of the patients had been discharged. The duration of stay depended on whether or not there were associated extra-abdominal injuries and presence or absence of complications. On the whole, the average duration of stay for abdominal injuries was 6.4 days with no significant difference between the type of injury and duration of stay for the simple, isolated injuries. For the abdominal injuries with resultant complications, blunt injuries stayed almost twice as long as the penetrating injuries.

2.0 INTRODUCTION

Injuries have been with us for eons. Even in the days of Hippocrates, trauma occupied a significant position in patient management. It is a leading cause of disability and death in the first four decades of life in the developed world[1].

With an increasing vehicular traffic, industrialisation, domestic upheavals and general globalisation, the developing world is progressively acquiring traits similar to those in the west. Gunshot wounds are becoming more than in the past and aggression in a volatile society has markedly increased[2].

Abdominal injuries constitute a significant proportion of patients who present to Kenyatta National Hospital (KNH). Surprisingly, short of a cursory look, no study had been done on the pattern and outcome of these injuries. Kibosia[1] looked at the penetrating abdominal injury in exclusion of gunshot wounds.

Management of abdominal trauma has remained a challenge over the years. The best managed abdominal injury is one that gets diagnosed appropriately and proper intervention instituted in time to avoid the complications leading to morbidity and mortality. But ideals remain targets and the progress in management of abdominal injuries has been due to attempts to achieve this ideal scenario.

Prior to 1960, laparotomy was an issue of when and not whether to perform in abdominal injuries[1]. Then, Shaftan drew the attention of practitioners to the unacceptable levels of negative laparotomy. But controversies remain on abdominal injury management with entrenched schools of thought leading to what is considered to be inadequate preparation of surgeons for the management of torso injuries[2]. Clinical evaluation and investigations taken apart and even in combination remain inadequate to clinch the true diagnosis in abdominal injuries[1].

Hence the concept of selective management of abdominal injuries. Expectant management of abdominal injuries depending on established criteria is what is in vogue[1,4,5] and this includes gunshot wounds to the abdomen[6,7,8,9].

The past has taught us that an abdominal injury may be in isolation or in association with other injuries. There are established factors for morbidity and mortality and these include the severity of injury, blood transfusion and haemodynamic instability[10]. The type of injury determines the likely contents of the abdomen to be hurt[11,12,13,14]. It has also been known that while early active interventions is desirable, negative laparotomy has an increase in morbidity and mortality[15,16,17]. A delay in appropriate management on the other hand will have a similar effect[18].

The management of abdominal injury would therefore require a protocol that takes various parameters into consideration[19]. The key management principles include resuscitation and timely intervention[20]. The evaluation of the patient should take account of the clinical findings, investigations and ongoing update of the instituted management[21,22,23,24]. A decision to operate should be based on sound clinical findings backed by plausible investigations where doubt exist on diagnosis and plan of management[25,26,27,28].

3.0 LITERATURE REVIEW

Abdominal injuries are either blunt or penetrating. The penetrating abdominal injury may be caused by a sharp object or missile that is either low-velocity or high-velocity. The trend of abdominal injuries has been changing with time[28] as evidence of societal progression. In the developing world, the use of firearm is of a limited nature. But with affluence and corresponding levels of crime, more and more people are getting shot at, either by the police, in self defence or by thugs while stealing. Adesanya et al in Nigeria noted a ten-fold increase in gunshot wounds over a decade[28], while in South Africa, Muckart et al noted 800% increase.

Trauma predominantly involves males and abdominal injuries are no exception. But given the varied causes of abdominal injuries and the evolving world trends, the gap may narrow with time. For now, abdominal injury is dominated by men, probably due to the common causes. Heavy alcohol intake is linked to road traffic accidents. Assaults, thuggery and use of unlawful weapons in aggression or crime are commonly associated with males. Two studies[5,21] found being male to be a likely factor in the leading causes of abdominal injuries, particularly the young and aggressive type.

An abdominal injury is one in which the main signs and symptoms in a patient with physical injury are in the abdomen. A delay in management will lead to complications while a negative laparotomy is just as bad. Stewart et al found a rise in morbidity with a delay in intervention greater than 4 hours[18]. Subtle injuries that take longer to diagnose[29] and multiple injuries[30] determine the general outcome when surgical interventions are finally instituted. Yet while early intervention is desirable, a negative laparotomy may increase morbidity by 22% and mortality by 6%[15]. A surgeon is, therefore, in a dilemma of possible adverse outcomes whether he delays or operates early, particularly if there is associated injuries or pre-existing diseases. The ideal situation is one in which clear diagnosis is arrived at expeditiously and appropriate measures taken to avoid both delayed or unnecessary surgery that leads to increase in morbidity and/or mortality[16,17]. This in turn calls for clinical acumen, readily accessible and reliable investigative modes and theatre space available at the right moment.

The type of injury (blunt or penetrating) and causative agent determines the state of patient at presentation and organ likely to have been injured. Intestinal injury is common after penetrating injury but rare in blunt[11,14]. Blunt injuries commonly injure the solid organs, spleen and liver[13,31].

The decision to conserve or operate a patient with abdominal injury will have to take cognisance of the patient's state, degree of injury to intraabdominal contents and whether the patient can maximally benefit from the instituted management. It will be a culmination of clinical assessment, appraisal of indicated investigations and an interplay of these and the attendant's experience and acumen. Some people will argue for mandatory exploration of a gun shot wound but evidence is accumulating that even gunshot wounds to the abdomen can be managed conservatively effectively[6,7,8]. In a study by Ivatury et all in New York City, up to 60% of patients with abdominal gun shot wounds needed no laparotomy. Similarly, stable patient with evisceration can be managed nonoperatively after surgical toilet and return of eviscerated gut[26]. What needs to be borne in mind is that the abdomen is like a Pandora box, never short of clinical surprises and unlikely to fit into any hard and fast rule on likely organ to be injured. The mechanism of injury and site are more important than the type of abdominal injury. Shearing forces and direct blow to the relatively immobile segments of the gut like duodenum and transition into the jejunum as well as the ascending and descending colons will cause a perforation just as easily as a perforating injury. The only difference is that this happens less often but may be catastrophic on happening due to degree of injury, possible delay in diagnosis or associated injuries that may be life threatening in nature[11,14].

Effective management of abdominal injury however requires sound decision-making process. Unstable patients after resuscitation will require surgery. The stable patients can be subjected to investigations and interventions aimed at optimizing the outcome. Diagnostic procedures may be laboratory, radiological or minimally invasive procedures like Diagnostic Peritoneal Lavage (DPL) and Diagnostic Laparascopy. Diagnostic Peritoneal Lavage has gained popularity as cheap, safe, practical and reliable[21,22,23,32,33]. Ceelen et al found DPL superior to radiological investigations including Computerized Tomogram (CT) while Catre MG suggested a CT scan where DPL is not possible e.g. those who have had previous abdominal surgery. In a study done in Kenyatta National Hospital (KNH) in 1995[33], DPL was recommended as a basic tool in assessment of abdominal trauma. In the study, negative laparotomy was reduced from 50% to 6.9%. A word of caution here is that CT scan and DPL are investigations to be done on the stable patient with equivocal signs in an effort to reach a conclusion as to whether surgery is needed or conservative management would be therapeutic.

Laparascopy has the dual capacity of diagnosing and intervening therapeutically[24,34]. But no single procedure can replace the orderly fashion composed of constant appraisal of the patient's condition.

The trigger for operative management of abdominal injury is peritonism. In the absence of this, haemodynamic instability in spite of resuscitation with fluids (2litres in 15 minutes) or blood/blood products indicates need to operate[25]. In stable patients, aspiration of blood in the peritoneum does not indicate reason to operate[22] and neither should evisceration[26]. A balance has to be struck between clinical findings and the results of investigation. An experienced surgeon, on the basis of the past, will most often be right on what investigation result to put emphasis on and when to abandon one approach of management for another to optimise on patient care.

A stage-wise management constantly updating on inputs from clinical findings, investigation results and progress of patient would go a long way in the effective management of a patient with abdominal injury[19]. The challenges are even more daunting in the multiply injured patient[14] who will require greater diagnostic strategy[35] if a successful outcome is to be obtained[16]. It is important to constantly bear in mind the pattern of injuries and known statistics on the outcome in the particular place or region of practice[37,38] in order to avoid unnecessary delays and consequent complications[39]. Experience is about learning from the past. Abdominal injuries vary significantly even within the same age groups. The more often one handles these injuries, the better he gets[15] and while some patients obviously need surgery based on the cause of injury and presentation, the accomplished surgeon is the one who makes the right decision on 'when to and when not to cut'[9]. The aim should be to better the outcome of all those with abdominal injuries and this calls for alertness and prudent action on the part of the health care team.

3.1 Abdomen and Abdominal Injuries

The abdomen is that part of body between the thorax and pelvis with some extension into both. External markings of the abdomen are the nipples and the inguinal crease. Any injury within this span from whichever direction may affect abdominal structures.

The abdomen contains various structures obliterating the cavity. Were it an actual cavity, it would be lined by parietal peritoneum only. The visceral peritoneum creates a potential space between it and the parietal, filled by a thin film of fluid in healthy states.

An abdomen is protected by walls: anterolateral and posterior abdominal walls. The anterior one is principally muscles while the posterior one has muscles and fascia attached to the vertebrae, hipbone and ribs.

The anterior abdominal wall muscles are rectus abdominis, external and internal oblique and the transversus abdominis muscles. Some of these (the obliques) extend laterally to afford protection there. Looked from the outside to the inside, the anterior abdominal wall is made up of the skin, superficial fascia with fat, deep fascia, muscles, transversalis fascia, extraperitoneal fat and parietal peritoneum.

The posterior abdominal wall has muscles, fasciae and bones. The bones are lumbar vertebrae, sacrum and ilium. The muscles are psoas major, iliacus and quadratus lamborum with their corresponding fasciae: iliopsoas, quadratus lamborum and thoracolumbar fascia.

The contents of the abdomen are the gastrointestinal tract (stomach, small- and large intestines) and its accessory glands (liver and pancreas), kidneys and ureters, adrenal glands, the spleen, major blood vessels (abdominal aorta and inferior vena cava), mesentery, peritoneal folds and vessels, nerves and lymphatics draining the organs.

The human abdomen is divided for purposes of description into 9 regions by four imaginary lines as follows: -

(i). Two vertical lines – the right and left midclavicular lines touching the cartilages of the ninth rib on both sides.

(ii). Two horizontal lines – transpyloric at L_1 and transtubercular at L_5 and the iliac tubercles.

The nine subdivisions are (clockwise from right upper portion) right hypochondriac, epigastric, left hypochondriac, left lumbar, left iliac, hypogastric, right iliac and right lumbar. The ninth is the centrally placed umbilical region.

For gross division, the abdomen can be in quadrants demarcated by a transumbilical line and the midline. This yields the right and left upper and lower quadrants.

Injuries to the abdomen may be direct or indirect, blunt or penetrating and either isolated or in association with other injuries.

The mechanisms of injury are: -

(a) Direct blunt or penetrating forces.

(b) Accelerating or decelerating forces.

(c) Shearing forces.

(d) Torsion.

The parts injured depend on the mechanism. The spleen is commonest in blunt while the gut is injured most in penetrating injuries.

Injuries may arise from motor vehicle accidents either as driver, passenger or pedestrian, industrial accidents, assault, falls, gunshots and missiles among others. Thoracic and pelvic injuries may be associated with abdominal injuries due to proximity of structures and sharing of bony cages. The injuries may be overt or subtle. Blunt abdominal injuries are particularly taxing even to experienced surgeons.

Surgery in abdominal trauma should aim at minimizing the time from injury to appropriate, effective intervention. A patient would hope for optimized assessment, fast and accurate diagnosis and an intervention that does not exacerbate preexisting morbidity or mortality potential.

4.0 THE STUDY

4.1 Study question

This study had this as the study question: Among patients with abdominal injuries (blunt and penetrating), is there any difference in morbidity and mortality and is outcome of management dependent on the type of injury?

Abdominal injury in this study was considered as one that met either or both of the following two criteria: -

(i). Evident trauma to the abdomen with or without obvious injury to intra-abdominal contents and requiring in-patient care in the general surgical wards.

(ii). Patients involved in multiple injury states such as road traffic accidents or mob attacks but with main signs and symptoms ascribable to injury to the abdomen that needs in-patient care as above.

4.2 Aim and objectives

The aim of the study was to establish the pattern and outcome of abdominal injuries as presenting in Kenyatta National Hospital (KNH). The specific objectives were: -

1. Ascertain the demographic distribution of patients with abdominal injuries.
2. Find out the common causes of abdominal injuries in these patients.
3. Establish the duration from time of injury to presentation in hospital.
4. Elicit the common clinical findings on presentation after injury.
5. Find out the mode of management instituted, success and failure rates.
6. Establish the common intraoperative findings.
7. Correlate findings with outcome of management.
8. Establish the average duration of stay in hospital for the study group.
9. Find out prognostic indicators in abdominal injuries.
10. Draw conclusions and recommendations based on findings of the study.

4.3 Rationale of the study

The rationale behind the study was premised on the fact that abdominal injuries are fairly common occurrences in our society yet no study had been done in KNH to establish the pattern and outcome of the abdominal injuries. My study was therefore to provide information that would:

(i). Afford the hospital and surgical practice prospective as opposed to retrospective findings of significance.

(ii). Provide KNH with data on the pattern of abdominal injuries presenting to the hospital.

(iii). Give us statistics with which to compare our practice with other institutions and study findings.

(iv). Provide data that would contribute to effective training of general surgeons in the University of Nairobi.

(v). Avail a forum for review of previous related but detached studies in this area and assess their impact on current practice if any.

4.4 Study limitations

Viewed in totality, the following can be considered to be limitations in the study.

1. The picture gotten out of this study is one that obtains in the general surgical wards. Abdominal injuries that required admission to specialty wards like orthopaedic patients were deliberately left out because of likely skewing of duration of stay in hospital.
2. As a study that is descriptive, the investigator had limited input in the actual management of the patients as he was not conducting an interventional study and was not part of any of the firms during the period of study.

4.5 Study utility

In spite of these limitations, the study findings will go a long way in: -

(a) Establishing a data bank for KNH on pattern and outcome of abdominal injuries.

(b) Formulating protocol for effective management of abdominal injuries.

(c) Establishing the changes and benefits that have accrued since the preceding studies in related area of interest.

(d) Forming a basis for future reference on the management of abdominal injuries and the training of surgeons in KNH.

4.6 Study design and area

This was a descriptive, prospective hospital-based study that was conducted in the general surgical wards (5A, 5B and 5D) of Kenyatta National Hospital. Eighty consecutive admissions with abdominal injuries were recruited into the study over a period of three and half months; November 2004 to mid February 2005.

4.7 Sample size

In the calculation of the sample size, the following was assumed: -

1. Confidence interval of 95%.
2. An estimate that is 5% within true proportion.
3. Abdominal injury prevalence of 5%.

Thus using the formula $z = \sqrt{\frac{P_1 - p}{P_1 (1-P_1) / n}}$

Where z = standard deviation of 95th percentile = $1.9 \equiv 2$
P_1 = prevalence = 0.05
P = width of confidence interval = 0.05

$$2 = (0.05) / \sqrt{(0.05 \times 0.95/n)}$$

$$n = 2^2 \times \frac{0.05 \times 0.95}{(0.05)^2}$$

$= 76$: Round off to 80 patients

4.8 Ethical consideration

Potential study patients were those who met either or both of the two criteria of abdominal injury definition for the purpose of this study. There were approached by the investigator with a view to recruitment into the study. He/she was briefed on the objectives of the study and given an opportunity to seek clarifications. He/she was then asked to participate. The following considerations were taken into account: -

(i). Informed consent to participate was granted by the patient after briefing and questions from the patient answered to his/her satisfaction.

(ii). The information gathered was used only for the study and not for anything else.

(iii). Data entry was by codes and not by recognisable names.

(iv). Approval to conduct the study was sought and duly granted by the Research and Ethics Committee of KNH.

4.9 Inclusion and exclusion criteria

The inclusion criteria were: -

(i). Significant abdominal injury requiring admission to the general surgical wards.

(ii). Patients fit for either conservative or operative modes of management.

(iii). Patients granting informed consent.

The exclusion criteria were: -

(i). Patients with injury to abdomen but managed as outpatients.

(ii). Patients deemed mentally unfit to grant informed consent in the period of the study.

(iii). Any patient who declined to participate in the study.

4.10 Methods and Materials

The eighty patients were recruited into the study by the investigator at any point from time of admission to discharge/death as long as the patient was in a position to and granted permission to participate. Data was collected according to the designed questionnaire (see appendix) to establish the demography, type of injury and its cause, duration prior to admission, state at time of admission, associated injuries, mode of management instituted, duration prior to surgery, complications, admission to ICU, use of blood, duration of stay in hospital and the final outcome as to whether discharged or deceased. Recruited patients were followed up during their stay in the hospital. Change in mode of management, findings on operation and complications that arose during the hospitalisation were noted during the follow-up period.

The duration of stay was taken as the period from admission to when the attending firm decided to discharge the patient. Some patients stayed in the wards after this while waiting to clear hospital bills and the extra days were not included in the study.

The collected data was entered on the questionnaire and preserved in readiness for analysis.

4.11 Data analysis

The gathered data was analysed using a computer package (SPSS) and the results presented in text, histograms and tables. Correlates were identified for the various parameters in the study findings.

5.0 RESULTS

The study involved 80 patients; 74 males and 6 females. The male: female ratio was 12.3:1. The youngest patient was 15 years while the oldest was 56 years. Mean age was 28.2 years. Majority of the patients (53.8%) were in the third decade of life as shown in Table 1 below.

Table 1: Age and sex distribution of patients with abdominal injuries

Age	Male	Female	Total	Percentage
10 – 20	12	01	13	16.3
21 – 30	41	02	43	53.8
31 – 40	15	03	18	22.5
41 – 50	03	00	03	3.7
51 – 60	03	00	03	3.7
Total	**74**	**06**	**80**	**100.0**

Fifty-three patients had penetrating abdominal injuries while 27 had blunt abdominal injuries. The causes of abdominal injuries are as shown in Table 2 below.

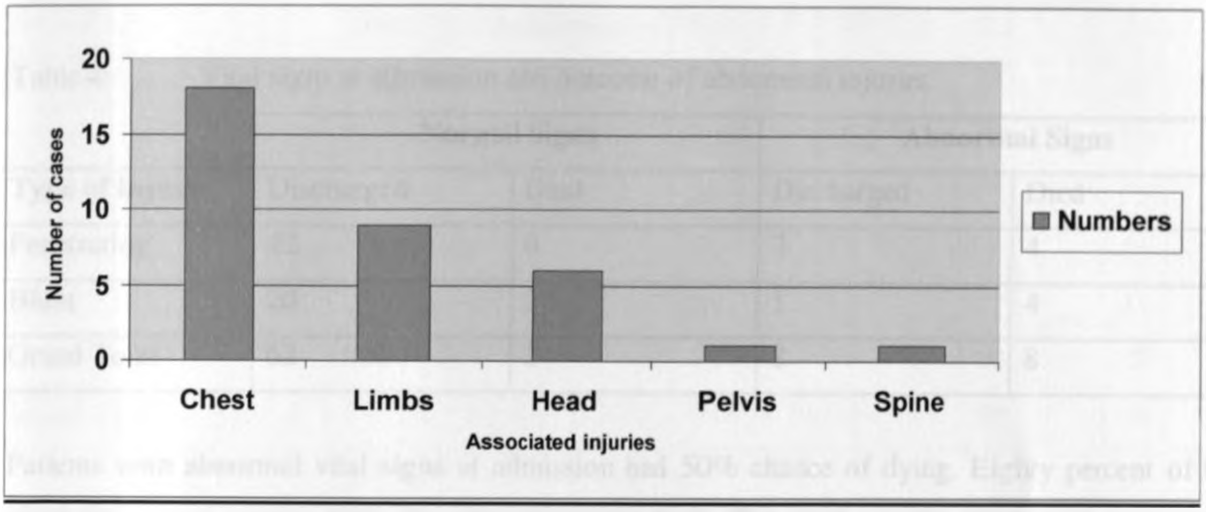
Table 2: Causes of abdominal injuries

Penetrating			Blunt		
Cause of injury	**No.**	**Percentage**	**Cause of injury**	**No.**	**Percentage**
Stab wound	34	64.2	Road Traffic Accident (RTA)	12	44.4
Gunshot wound	17	32.1	Assault	10	37.0
Arrow wound	02	03.7	Fall from height	04	14.8
Total	**53**	**100.0**	Industrial accident	01	3.8
				27	**100**

The leading causes of abdominal injuries, on the whole, are stab wounds (42.5%), GSW 21.3%) and RTAs (15%).

Fifty-two patients had isolated abdominal injuries while the remaining 28 had associated extra-abdominal injuries. Seven patients had more than one extra-abdominal injury. The extra-abdominal injuries are presented in Figure I below.

Figure I: Associated extraabdominal injuries in 28 patients



There was no significant difference between type of abdominal injuries and the occurrence of associated extraabdominal injuries even though they were more in blunt (15) than penetrating injuries (13).

The duration prior to presentation to hospital depended on the severity of the injury. The severer the injury, the faster the presentation and vice-versa. The shortest was one hour with the longest being one week. This is tabulated below: -

Table 3: Duration from injury to presentation to hospital

Duration in hours	**Penetrating**	**Blunt**	**Total**
≤ 6hrs	43	17	60
7 – 12	01	01	02
13 – 18	01	00	01
19 – 24	05	04	09
>24	03	05	08
Total	**53**	**27**	**80**

Sixty patients (75%) presented within the first six hours of the injury. There was no significant difference between types of injuries and duration prior to presentation to hospital.

As of the time of presentation, 64 patients had normal vital signs (80%) while 16 others had deranged vital signs exhibited in hypotension, tachycardia, tachypnoea and abnormal temperature.

Table 4: Vital signs at admission and outcome of abdominal injuries

	Normal Signs		**Abnormal Signs**	
Type of injury	Discharged	Died	Discharged	Died
Penetrating	42	0	7	4
Blunt	20	2	1	4
Grand Total	62	2	8	8

Patients with abnormal vital signs at admission had 50% chance of dying. Eighty percent of the blunt abdominal injuries with abnormal vital signs died. The death rate for those with penetrating abdominal injuries and similar vital signs was less than 40% (36.4%). This suggests better interventional outcome in penetrating than blunt abdominal injuries.

Fifty-six patients were operated on while 24 were managed conservatively. Six of the operated on were initially conserved, giving a 20% change in mode of management. Five of the six were blunt abdominal injuries and four of them were positive on laparotomy. The one penetrating injury initially managed conservatively was positive on laparotomy. A higher proportion of blunt injuries were subjected to conservative management as shown below.

Table 5: Management of abdominal injuries

	Type of injury			
	Penetrating injury		**Blunt injury**	
Mode of management	**No.**	**Percentage**	**No.**	**Percentage**
Operated	40	75.5	16	59.3
Conserved	13	24.5	11	40.7

The mode of management varied with admitting wards (firms). The operation rates ranged from 56.7% (5B) to 95% (5D) of the patients admitted to the respective wards. Ward 5B accounted for

54.2% of all patients managed conservatively. The admissions, type of injury and mode of management for the respective wards is as shown in Table 6.

Table 6: Admission and mode of management according to firms

		Firms			
Type of injury	**Mode of Management**	**5A**	**5B**	**5D**	**Total**
Penetrating	Operated	14	11	15	**40**
	Conserved	06	06	01	**13**
	Sub total	**20**	**17**	**16**	**53**
Blunt	Operated	06	06	04	**16**
	Conserved	04	07	00	**11**
	Sub total	**10**	**13**	**04**	**27**
Grand Total		**30**	**30**	**20**	**80**

The overall rate of operation was 70%. Of the operated patients, nine had no intra-abdominal problem in need of surgical correction, giving a negative laparotomy of 16.1%.

The duration prior to surgery varied according to severity of condition and whether or not it was primary decision to operate. Those that were initially conserved took longer to be operated on, particularly if blunt injury as shown in Table 7 below.

Table 7: Duration of stay prior to surgery

(a) Primary surgery				**(b) Surgery after initial conservation**		
Duration prior to surgery	**Number of patients per injury**			**Type of injury**		
Number of hours	**Penetrating**	**Blunt**	**Total**		**Penetrating**	**Blunt**
≤ 6	18	05	23	Duration in hours	24	14,20,48, 120,120
7 – 12	11	04	15	Average duration in hours	24	64.4
13 – 18	08	01	09			
19 - 24	02	01	03			
> 24	00	00	00			
Grand Total	**39**	**11**	**50**			

Forty-six percent of the primarily operated patients had surgery within six hours of admission. Seventy-six percent had surgery within the first 12 hours of admission. It took almost three times the duration of penetrating for the initially conserved blunt abdominal injuries to be operated on.

Seven out of the nine negative laparotomies had normal vital signs. The deranged two had associated extra-abdominal injuries. A third of the patients had omental extrusion. On the whole, negative laparotomy patients took an average 14.3 hours prior to surgery, almost double the average 7.5 hours for the positive laparotomies. The features, therefore, found to correlate with possible negative laparotomies were omental extrusion, stable patients who remain so to allow delayed surgery and hypotension that may be accounted for by extra-abdominal injuries.

Forty-seven patients had positive findings on laparotomy. The injured structures/organs are as shown in the Table 8 below.

Table 8: Type of abdominal injury and injured structures/organs on laparotomy

Penetrating		**Blunt**	
Small intestine	20	Small intestine	06
Colon	11	Urinary bladder	04
Stomach	07	Spleen	03
Mesentery	07	Liver	03
Diaphragm	05	Kidney	01
Kidney	02		
Liver	06		
Spleen	02		
Gall bladder	01		

Penetrating abdominal injuries had a greater variety of possible intra-operative findings. While penetrating injuries had affected the GIT and related structures most, the sum of injuries to solid viscera (liver, spleen and kidneys) and urinary bladder was more than injuries to the intestines in blunt abdominal injuries.

Ten patients developed complications, giving 12.5% complication rate. Between them, there were 14 complications as shown in Table 9.

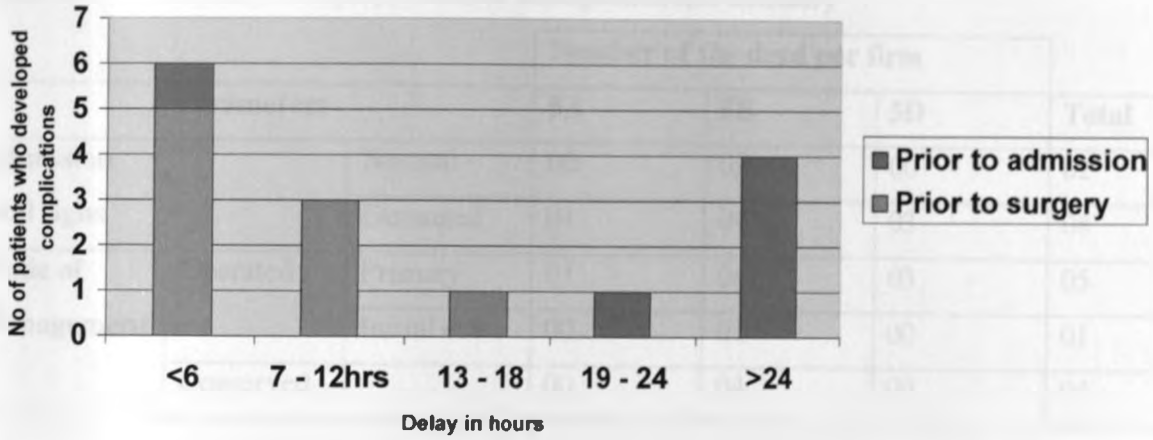
Table 9: Type of injury, injured organ and complications in abdominal injury

Type of injury	Cause	Injured organ	Complications
Penetrating	Stab	Ileum	Sepsis
Penetrating	GSW	Conserved	Sepsis
Penetrating	Stab	Ileum, mesentery	ECF, sepsis
Blunt	Industrial accident	Ileum	ECF, sepsis
Penetrating	GSW	Ileum, colon, stomach	Sepsis
Penetrating	Stab	Colon, mesentery, Diaphragm	Rebleed
Penetrating	GSW	Liver, Gall bladder, colon, kidney	Sepsis
Penetrating	Stab	Jejunum	Sepsis
Penetrating	Stab	Colon, stomach	Sepsis, gaugrene
Penetrating	GSW	Ileum, colon	Sepsis

Ninety percent of the complications arose in penetrating injuries, 90% had laparotomy and 90% had injury to the gut either singly or multiply.

The relationship between duration prior to admission and surgery and complications is shown in the Figure II below: -

Figure II: Number of complications with relation to delays in admission and surgery



The complications were high in the first half of the first day of injury, declined in the second half and then started picking up again in the second day particularly with delay in admission time as shown in the bar graph in Figure II above.

Eight patients were admitted to ICU, five of whom died, giving a 62.5% mortality rate. Table 10 shows the relationship between type of injury, ICU admission and outcome.

Table 10: Type of injury, ICU admission and outcome

Type of injury	No. of patients admitted to ICU	Discharged	Died
Penetrating	4	02	02
Blunt	4	01	03

There was no difference between type of injury and need for ICU admission. Blunt abdominal injury, however, had a higher mortality rate than that for penetrating (75% vs 50%).

Twenty-three patients (28.8%) - fifteen penetrating and eight blunt - had blood transfusion. Twenty-one of these were operated on while two were conserved; there were 19 positive and 2 negative laparotomies. The multiplicity of injured organs in the penetrating injuries, which stood higher chance of surgery than blunt injuries, could account for use of blood in these patients.

Ten patients (six blunt and four penetrating) succumbed to their injuries: five RTA victims, three GSW and one each stab wound and fall from height. From the analysis below, mortality depended on severity of injury and the mode of management.

Table 11: Severity of injury, mode of management and mortality

			Number of the dead per firm			
Parameters			**5A**	**5B**	**5D**	**Total**
Admission vital signs		Normal	00	02	00	02
		Deranged	01	04	03	08
Mode of Management	Operated	Primary	01	01	03	05
		Initial cons.	00	01	00	01
	Conserved		00	04	00	04

Ward 5B was the only ward that had deaths in patients who had presented in stable state. This was due to making conservative management their preferred mode of management as previously seen in Table 6. It was the only ward with a striking number of patients dying under this mode of management. Interestingly, these patients were conserved for days, the longest being six days! Inordinate duration of conservative management in patients who are not improving is a major cause of mortality. Stripped of conservative management, mortality in 5B would not be any different from the rest.

Eighty percent of the deaths occurred in patients with associated extraabdominal injuries. The other correlates with mortality were duration prior to surgery, duration prior to admission, admission to ICU and use of blood in the management. This is shown in Table 12 below.

Table 12: Indicators of mortality in abdominal injuries

	Deaths with relation to duration prior to Admission			**Deaths with relation to duration prior to Surgery**		
Duration in hours	**Total**	**No. admitted to ICU**	**No. Transfused**	**Total**	**No. admitted to ICU**	**No. Transfused**
≤ 6	8	5	7	4	2	4
7 – 12	1	0	1	2	2	2
13 – 18	0	0	0	0	0	0
19 – 24	0	0	0	0	0	0
> 24	1	0	0	1	1	1

Eighty percent of the dead presented within the first six hours of injury. Deaths occurred in the extremes of time: too early or too late, leaving a death-free second half of the first day of injury. Of those who died after surgery, 57.1% had been operated on within six hours of admission. This can be accounted for by the state of patient and inadequate time for resuscitation prior to surgery.

Eighty percent of those who died required blood transfusion. All those who died after surgery had blood transfusion, 71.4% of whom had ICU admission.

The foregoing suggests that severely injured patients presented early, were subjected to surgery early, required blood transfusion and ICU admission as part of the management and succumbed to the injuries, making these factors strong indicators of mortality in abdominal injuries.

Majority of patients stayed up to five days; 88.6% were discharged within 10 days as shown in Table 13.

Table 13: Type of injury and the duration of stay for discharged patients

Days	Penetrating	Blunt	Total
≤ 5	20	12	32
6 – 10	24	06	30
11 – 15	03	02	05
16 - 20	01	01	02
> 20	01	00	01
Total	**49**	**21**	**70**

The duration of stay was predicated on whether or not there were associated extraabdominal injuries or complications as evident in Table 14 below: -

Table 14: Variants of abdominal injuries and duration of stay

		Nature of Injury/Days Stayed		
Type of injury	**Variants of injury**	**Isolated injury**	**Associated with extra-abdominal injury**	**Overall**
Penetrating	Without complications	5.0	7.6	5.5
	With Complications	13.4	10.5	12.8
Blunt	Without complications	5.8	5.5	5.6
	With Complications	20.0	0.0	20.0

There was no significant difference between the type of injury and duration of stay for the uncomplicated, isolated injuries. For the abdominal injuries with complications, the duration of stay in blunt was longer than in the penetrating injuries. On the whole, the average duration of stay for all the abdominal injuries was 6.4 days; the penetrating stayed an average 6.8 days and the blunt averaged 6.2 days.

6.0 DISCUSSION

Trauma has remained a leading cause of morbidity and mortality the world over. Abdomin injuries on the other hand have remained a challenge to surgeons with an ever-present desire t improve on the outcome of the management. This study went into great depths to understand ou present level of practice and outcome with reference to abdominal injuries.

Eighty patients were recruited and as in other studies elsewhere, the male predominance was striking. The male to female ratio was 12.3:1 and this compared well with other studies. Edino ST in Kano, Nigeria[38] in his study on pattern of abdominal injuries had a sample of 67 males with no females. Mc Farlane in Kingston, Jamaica found a ratio of 10:1 male to female[5]. Closer home, two previous studies conducted in Kenyatta National Hospital (Kibosia[1] and Githaiga[33]) had male to female ratio of 11.5:1 and 12.7:1 respectively. While the actual ratios may vary from study to study, male dominance stands out and studies conducted in similar environmental setting and closer in time have ratios that are the same as evidenced by Githaiga's 12.7:1 and this study's 12.3:1 in the same setting and a difference of nine years.

Fifty-three patients had penetrating abdominal injuries, making penetrating to blunt abdominal injuries almost 2:1. Most of the studies reviewed have been done on specific types of abdominal injuries (either blunt or penetrating separately). Edino[38] in his study on pattern of abdominal injuries found penetrating to be more than blunt. His 53.7% for penetrating compares well with my 66.3%. Exadaktylos[36] in South Africa found the two injuries to be 80% penetrating and 20% blunt.

The causes of abdominal injuries vary from place to place and have also been noted to change with time. Within a decade, gunshot wounds increased by 800% while admissions remained unchanged in a study done in South Africa[12]. Adesanya et al in a study on civilian gunshot wounds in Lagos noted a ten-fold increase in a decade[28]. In our setup, Kibosia in 1990 undertook a study on stab wounds only and so had no mention of gunshot wounds to the abdomen. Fourteen years later, this study had 17 Gunshot Wounds (GSWs), accounting for 21.3% of the abdominal injuries. This is in keeping with societal advancement that has yielded violent crimes and social conflicts[38]. Sixteen of these GSW were crime-related and the remaining one was an attempt at suicide. Stab, gunshot and arrow wounds were the causes of penetrating abdominal injuries while Road Traffic Accidents (RTAs), assault and fall from height were responsible for blunt injuries. On the whole, the leading

causes of abdominal injuries in our setup today are stab, GSW and RTAs. It would be interesting to see how these causes change in the future.

Thirty-five percent of the abdominal injuries had associated extraabdominal injuries as well. They were found to be more in blunt than penetrating abdominal injuries. This can be accounted for by the causes of injury; RTAs and assault as the leading causes of blunt injuries have a higher likelihood of there being other injuries elsewhere than stab and GSW to the abdomen.

Presentation to hospital after injury depended on the severity. The shortest was one hour and the longest one week. There was no difference between the type of injury and the time taken prior to presentation, emphasising the fact that degree of injury was more important than the type. Seventy-five percent of the patients presented within six hours of the injury. Kibosia had the same findings (75%) over ten years ago[1]. This may be a testimony to the dramatic events surrounding abdominal injuries and the need to seek medical attention in most cases. From the medical perspective, this tells us that there is ample time for effective management of these patients who present early.

Twenty percent of the patients had abnormal vital signs, principally manifest as hypotension at admission. A striking finding is the 80% mortality in patients with abdominal injury and attendant derangement of vital signs. Penetrating abdominal injuries with deranged vital signs fared better than blunt. The morbidity and mortality exhibited in patients taken for surgery after early presentation may be explained by the severity of condition and risk of surgery in patients who are yet to be adequately resuscitated. This study brings to the fore the risk of rushed surgical intervention in a patient not fully stabilised after trauma.

The management of abdominal injuries has, over the years, undergone tremendous refinement; swinging from a state of despair, through mandatory laparotomy to selective interventions. This has been as a result of findings that put to question the various modes of management and sought to make the outcome of management better every time. It is now known that: -

(i). Timely, appropriate interventions save lives.

(ii). Unnecessary, negative laparotomies contribute significantly to morbidity and mortality in abdominal injuries.

(iii). Conservative management has been successfully implemented even in patients with injury to spleen, liver and gunshot wounds to the abdomen.

(iv). Delay in arrival to hospital and surgery contribute to a rise in morbidity and mortality in abdominal injuries.

There is no room for dogma in the management of abdominal injuries. Findings that were scientifically sound in a given study have been found unacceptable in others. While McFarlane in his paper on management of penetrating abdominal injuries espoused a policy of mandatory explorative laparotomy in GSW[5], three other studies in review concluded that it is possible to manage GSW to abdomen conservatively[6,7,8]. This was found to be true in my study where a number of GSW were managed conservatively and one was subjected to a negative laparotomy. Negative laparotomies in GSW had also been noted by Adesanya et al in Lagos[28] six years ago. Ivatury et al[8] in a study on missile wounds of the abdomen successfully managed 60% of them conservatively.

Kibosia[1] had included positive paracentesis and omental evisceration as indicators for laparotomy. While Nagy et al[26] found up to 75% of patients with evisceration, regardless of what eviscerated, required laparotomy, a third of the patients in our study with negative laparotomy had omental extrusion. Nagy et al[22] in another study found that aspiration of blood in abdominal injury need not necessarily lead to laparotomy. This I found true in my study since the two patients with positive paracentesis for blood but stable were successfully managed conservatively.

From the foregoing, it becomes evident that management of abdominal injuries requires a protocol taking constant appraisal of the patients' condition into consideration[19]. To aid in decision-making, laparascopy and diagnostic peritoneal lavage (DPL) have been put into use. Ultrasound, plain abdominal x-rays. CT scan and contrast studies have also been employed to aid in diagnosis. DPL has been found to be superior to radiology[18,22,23] but like laparascopy[24] requires stable patients and so has limited application. CT Scan in stable patients is increasingly gaining currency in decision making especially where previous abdominal surgery excludes use of DPL in patient assessment.

Githaiga and Adwok in our setup found DPL to be easy to perform, cheap and highly effective in diagnosing the injured abdomen in need of laparotomy. The standard indications for laparotomy from previous studies remain haemodynamic instability, peritonitis, free air under the diaphragm or fresh blood on rectal exam or in nasogastric tube. My study identified the following as possible indicators of a likely negative laparotomy: isolated omental extrusion, a stable patient who remains

so up to and including the time of a relatively delayed laparotomy and hypotension that can be explained on the basis of blood loss from extraabdominal injuries.

The overall operative rate was 70%. Eighty percent of those started on conservative management benefited. The mode of management varied from ward to ward, signalling the varied approaches to abdominal injuries. One ward had a 95% rate of operation while another accounted for 54.2% of all patients managed conservatively in three wards! This is a pointer to how daunting a task it is to effectively manage abdominal injuries as noted the world over.

A rate of 16.1% for negative laparotomies is quite impressive not only because of the varied approaches to management in the admitting wards but also because of its being an indication of progress in better management compared to previous studies in KNH. Kibosia had noted a 50.8% rate of negative laparotomies before his 26.1%. This has been knocked down by 10% in a period of 14 years. In a study to assess how effective DPL is in the management of abdominal injuries, Githaiga and Adwok realised a 6.9% rate of negative laparotomies. This means there is more room for improvement on whom and when to operate in patients with abdominal injuries. Elsewhere, the rates vary from 7% to 40% [5,10,14,17].

There was greater variety of intraoperative findings in penetrating injuries. This is on account of depth of penetration and injured structures in the trajectory path, particularly in cases where GSW was the cause of injury. The findings in this study are in keeping with previous studies elsewhere that confirmed that the gastrointestinal tract is injured more in penetrating than blunt[9,18,38]. Injury to the gut in blunt abdominal injury is uncommon[11,1421] but not a rarity. In this study, six out of seventeen intraabdominal findings were injury to the small intestine. When seen in the light of injuries to solid organs and urinary bladder, gut injury after blunt trauma to abdomen remains of a smaller proportion as previously found in other studies conducted elsewhere.

There was a complication rate of 12.5%, comparing impressively with other studies. Stewart et al[18] had a complication rate of 16%. The reviewed studies show that complications depend on type of injury, organ injured and duration prior to surgery. In this study, 90% of the complications arose in penetrating abdominal injuries, 90% arose after laparotomy and 90% had intestinal injury either singly or multiply. The complications were noted to be more in those subjected to early and late surgeries, showing the degree of trauma and effect of delayed surgery in complications after

abdominal trauma. The more severely injured patient stood a higher chance of early surgical intervention, hence this peak. The other peak could be accounted for in terms of effects of delay after intra-abdominal injuries to the gut and viscera with ensuing peritonitis and wound contamination during laparotomy. Frequent observations and examination in those with subtle abdominal injuries would identify the patient unlikely to benefit from conservative management. This would ensure surgery in good time where indicated and thus reduce morbidity and mortality arising from delays in intervention.

Mortality in this study was 12.5%. Sixty percent of this was accounted for by blunt abdominal injury. Mortality was found to correlate with type of injury (blunt>penetrating), admission to ICU, blood transfusion, delays in appropriate intervention, time taken from injury to admission and from admission to surgery and the causative agent. Patients who were severely injured presented early, were subjected to surgery in a hurried way, needed blood transfusion and ICU admission and tended to succumb to their injuries, particularly if presenting in shock. Delayed presentation to hospital and delayed surgery in excess of 24 hours was also noted to contribute to mortality. While other studies have mentioned the contribution of time prior to admission and surgery to mortality, this study draws our attention to the deleterious effect of rushed surgery in trauma patients. Attempts should be made to correct the physiological changes before or during surgery to optimise the outcome.

The overall duration of stay in this study was 6.4 days. There was no difference in this duration for simple, uncomplicated injuries to abdomen whether penetrating or blunt. For the complicated ones, blunt injuries stayed almost twice the duration taken by penetrating injuries. This study compares, favourably with the one done by Githaiga and Adwok[33] that showed an average 6.5 days prior to discharge. This would suggest a uniform policy on indications for discharge across the three wards with reference to patients.

7.0 CONCLUSIONS

The following conclusions can be derived from this study: -

1. The study was able to not only compare favourably with other studies done elsewhere but also to answer the study question. Abdominal injuries have different rates of morbidity and mortality and the outcome of management is dependent on whether the injury is blunt or penetrating.
2. Penetrating abdominal injuries are more frequent than blunt in almost a ratio of 2:1.
3. Blunt abdominal injuries with hypotension fare worse than penetrating injuries with similar vital signs.
4. The aetiology of abdominal injuries in our setting has been altered by societal changes. Gunshot wounds have become significant in penetrating abdominal injuries and are related to crime.
5. Blunt abdominal injuries have higher rates of: -
   (i). Associated extra-abdominal injuries.
   (ii). Being subjected to conservative management.
   (iii). Failed conservative management.
   (iv). Delayed surgical intervention.
   (v). Mortality.
6. Penetrating injuries have higher rates of: -
   (i). Surgical intervention.
   (ii). Intra-operative findings of injured structures or organs.
   (iii). Complications.
7. Laparotomy is an important factor in the resultant complications in abdominal injuries with 90% of the complications arising after laparotomy.
8. Morbidity and mortality in abdominal injuries is a product of time and both are worse in the extremes: too early and too late in the chronology of time as either prior to admission or prior to surgery.
9. Presentation to hospital depended on severity of injury; early presentation was an indicator of greater injury and vice-versa.
10. A negative laparotomy patient is likely to have: -
    (i). Isolated omental evisceration in stable patients.
    (ii). Lack of new abdominal findings despite delayed surgical intervention.
    (iii). Haemodynamic changes that can either be corrected by fluid and/or blood therapy or can be ascribed to extra-abdominal injuries.

11. The mode of management for abdominal injuries varies from surgeon to surgeon and this is especially so in the patient with subtle symptoms.
12. The rate of negative laparotomies in our setup has come down tremendously over time, currently standing at 16.1% but with a potential for 6.9%.
13. The complications and mortality rates were 12.5% and were comparable to international rates for the same.
14. The duration of stay in the ward was not different for the types of injuries if not associated with extra-abdominal injuries or having attendant complications.
15. Findings of eighty percent seem to stand out in this study. Eighty percent of: -
    i) the patients presented with normal vital signs
    ii) blunt abdominal injuries and associated abnormal vital signs died
    iii) those on conservative management benefited
    iv) blunt abdominal injuries not improving on conservative management had positive laparotomy findings on operation
    v) those who died had associated extra-abdominal injuries
    vi) those who died presented within six hours of injury
    vii) the dead had blood transfusion therapy

8.0 RECOMMENDATIONS

On the strength of the study findings, I would like to make the following recommendations.

1. Given the difficulties encountered in the management of abdominal injuries, KNH requires a standard protocol of management. For a start, the study's findings and those in our setting can be publicised to promote effective management of abdominal injuries. I suggest that: -

(a) For both injuries: -

i) Aggressive resuscitation of the unstable patient must be undertaken. Unless patient has exanguinating intra-abdominal injury, stabilise prior to taking to theatre.

ii) Regular examination (hourly initially for at least 3 hours then 4 hourly if improving) of the patient on conservative management should be mandatory.

iii) The non-improving patient should be subjected to further investigations with a view to surgical interventions after the first 24 hours if this is not indicated by the follow up earlier than that time.

iv) Haemodynamic instability, peritonism or overt gut injury appearing outside or on peritoneal aspirate for the blunt injuries require laparotomy.

(b) For blunt injuries: -

i) Aspiration of blood on paracentesis should not by itself lead to laparotomy if patient is stable. Regular monitoring should determine need for surgery.

ii) Low threshold for surgery should be maintained for the patient with subtle injury but not improving on conservative management.

(c) For penetrating injuries: -

i) Local exploration of injury tracts would determine level of penetration. If no peritonism exists, debride wound and monitor patient.

ii) Eviscerated, non-traumatised gut and omentum can be cleaned and returned into abdomen without laparotomy if clinical assessment shows stable patient with no peritoneal contamination.

iii) Low velocity gunshot wound not perpendicular to abdominal wall or with a tract not breaching peritoneum in a patient who is stable and no major extra-

abdominal injury can be managed conservatively. Debride the injured tissues.

iv) All penetrating injuries require tetanus toxoid prophylaxis.

2. Patients with abdominal injuries require stabilisation of the deranged physiology prior to surgery. Resuscitation process in these patients is a pillar to good outcome and should never be overlooked no matter the temptation to rush to theatre unless the patient's instability can be corrected surgically as in ongoing intra-abdominal blood loss.

3. The hospital should endeavour to make reliable and cheap investigative procedures like DPL part of evaluation of patients who are equivocal in the clinical findings to avoid unnecessary laparotomies. This would help to bring the negative laparotomy rate even lower than the current 16.1%. CT Scan evaluation could also be made available if resources allow.

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Code .....

Ward.....

APPENDIX I

QUESTIONNAIRE

1. Patient's: Name..... Age ..... Sex..... IP.No.....
2. Type of injury: Blunt ☐ Penetrating ☐
3. Cause of injury: RTA ☐ Assault ☐ Fall ☐ Stab ☐ GSW ☐
4. Duration prior to presentation.....
5. Findings at presentation: Vital signs: BP..... PR..... RR..... T.....

   Abdomen: Distension ☐ Guarding ☐ No sounds ☐
6. Other associated injuries (List) .....
7. Managed: Conservatively ☐ Operated ☐
8. Duration from presentation to operation .....
9. If conserved, was operation done later: Yes ☐ No ☐
10. Findings on operations: Positive ☐ Negative ☐
11. If positive, injury to: Gut ☐ Mesentery ☐ Spleen ☐ Liver ☐

    Others.....
12. Transfused? Yes ☐ No ☐
13. If transfused: Preop ☐ Postop ☐ Both ☐
14. Complications: Sepsis ☐ Dehiscence ☐ Burst abdomen ☐ Fistula ☐

    Formation ☐ Abscess ☐ Others .....
15. Hospital stay from admission to outcome .....
16. Outcome: Discharged ☐ Deceased ☐

APPENDIX II

A (ENGLISH VERSION)

CONSENT TO PARTICIPATE IN PATTERN AND OUTCOME OF ABDOMINAL INJURIES STUDY

My name is Dr. Musau, a postgraduate student undertaking a study on the Pattern and Outcome of Abdominal Injuries in KNH. This is a non-interventional study whose objectives is to establish our practice on the care of abdominal injuries and their outcome.
It will involve the observation of modes of management and their morbidity and mortality.

I ..... of .....after adequate explanation and knowing my right of choice with regard to the study on outcome of abdominal injuries hereby consent to participate. I understand the study is non-interventional and the management of my condition remains with the respective doctors in the ward I am admitted to.

I am also aware that I can withdraw any time without affecting my medical care and that my participation is not motivated by any form of reward or inducement.

Signed ..... Date .....
(Interviewee)

Signed ..... Date.....
(Investigator)

APPENDIX II

B (KISWAHILI VERSION)

KIBALI CHA KUHUSIKA KATIKA UCHUNGUZI JUU YA MATIBABU YA KUUMIA KWA TUMBO

Jina langu ni Daktari Musau, mwanafunzi wa masomo ya udaktari ya ziada anayechunguza kuhusu matibabu tunayowapa wagonjwa wanaopata ajali ya tumbo Uchunguzi huu hauhitilafiani na matibabu unaopata kutoka kwa madaktari wanaokuhudumia kwa wodi na ni uchunguzi utakaosaidia hospitali kuhudumia wagonjwa kama wewe kwa njia muhafaka kwa siku za usoni.

Mimi.....Kutoka.....baada ya kuelezewa juu ya uchunguzi unaondelea nakubali kuhusika katika huo uchunguzi. Naelewa kuwa matibabu yangu ni kulingana na uamuzi wa madaktari wanaonitibu katika wodi.

Nimeelewa vilevile kuwa naweza kujiondoa kutoka kwa uchunguzi huu wakati wowote niamuapo bila kuhatarisha matibabu yangu. Hakuna kishawishi nilochoahidiwa na sitarajihi kutunukiwa chochote kwa kuhusika kwangu kwa huu uchunguzi.

Sahihi..... Tarehe.....
(Mgonjwa)

Sahihi ..... Tarehe.....
(Mchunguzi)

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Ref: KNH-ERC/01/2427 **Date: 3rd November 2004**

Dr. Pius Musau
Department of Surgery
University of Nairobi

Dear Dr. Musau,

RESEARCH PROPOSAL "PATTERN AND OUTCOME OF ABDOMINAL INJURIES IN KENYATTA NATIONAL HOSPITAL" (P90/7/2004)

This is to inform you that the Kenyatta National Hospital Ethics and Research Committee has reviewed and **approved** the revised version of your above cited research proposal for the period 3rd November 2004 – 2nd November 2005. You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given.

On behalf of the Committee, I wish you fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of database that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely,

PROF. A. N. GUANTAI
SECRETARY, KNH-ERC

Cc Prof. K Bhatt, Chairperson, KNH-ERC
The Deputy Director (C/S), KNH
The Dean, Faculty of Medicine, UON
The Chairman, Dept. of Surgery, UON
CMRO
Supervisors: Prof. Pankaj G. Jani, Dept.of Surgery, UON
Mr. F. A. Owillah