

11. DISCUSSION

11a. Epidemiology of Limb Trauma (Tables 1-4)

Nairobi is a growing city with a growing population. This scenario is associated with an increasing number of trauma cases (1,5). The study period included the festive seasons of Christmas and New Year causing the high number of trauma patients (987).

The male preponderance and the fact that most patients were in the 16-40 year age group are possibly related to the increased general physical activity of males of this working age group. These findings concur with observations of workers elsewhere in Africa (Obembe 18, Muhammed 15).

Most people are right handed and in everyday life the upper limbs are involved in more physical activity than the lower limbs. This possibly explains why the right side was involved more than the left and the upper limbs more than the lower limbs.

The age range of 2 days to 80 years was related to Birth Trauma and Osteoporosis, among other factors. Whereas Birth Trauma has nearly ceased to exist in the developed world, it continues to cause problems in the developing countries largely due to poor staffing and lack of medical facilities (31,36). Osteoporotic fractures are seen in the elderly. With the current modernization in Kenya the number of the elderly is rising. Whereas few osteoporotic fractures were seen in this study, these will soon become a significant problem in Kenya.

11b. Aetiology of Limb Trauma (Tables 6,7)

Overall road traffic accidents accounted for the majority of the cases. This concurred with the trend nationwide (1,2) and worldwide (3,6). Increased traffic over Christmas and New Year holidays increased the role of automobile accidents in trauma causation in this study. Overloading and reckless driving

2. DECLARATION

Candidate

This dissertation is my original work and no part of it has been presented for a degree in any other university.

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This dissertation has been submitted for examination with my approval as University Supervisor

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5. SUMMARY

Limb trauma is common in Kenya especially in the city of Nairobi. From 1st December 1996 to 28th February 1997 a total of nine hundred and eighty seven patients presented with limb trauma at the Kenyatta National Hospital Casualty Department. The overall male:female ratio was 1.98:1 with an age range of 2 days to 80 years. Most patients were in the 16-40 age group.

The commonest cause was road traffic accident comprising 30.09% of the total. Sports and play injuries caused 17.93% of the total, assault 9.73%, occupational injuries 6.99% and domestic violence 4.25%. The remainder (31.00%) were due to a variety of causes including birth trauma, fall, twisting the foot while walking etc.

Alcohol was a contributing aetiological factor in 28.06% of cases. About 31.31% of the patients were unemployed and 72.64% lived in low-income areas. Kenyatta National Hospital serves the majority of the people in Nairobi especially those of low socio-economic status.

The initial radiological assessment involved use of plain films only. On average each limb was imaged in two views at right angles to each other. The films were read by the Casualty Officer on duty prior to reporting later or the following morning.

The right side was involved more frequently than the left (Rt 52.58% Lt 47.42%). The upper limbs were affected more frequently than the lower limbs (upper 78.82, lower 21.17%). About 28.47% of all patients imaged had negative radiological findings.

Hand injuries included fractures and dislocations. The male: female ratio was 1.32:1. Most patients were in the 16-40year age group (73.62%). Those over 40yrs and under 10yrs were rarely affected.

Wrist injuries included fractures, dislocations and epiphysial separations. The male:female ratio was 1.38:1. Most patients were in the 16-40yrs age group (31.81%). Epiphysial separations were particularly common in the 10-16yr age group and were mainly related to falls.

Forearm injuries included fractures often associated with proximal or distal radio-ulnar dislocation. The male:female ratio was 1.79:1. Most patients were in the 16-40yrs age group (59.76%). The commonest cause was a direct force related to road traffic accidents or a fall.

Elbow injuries included dislocations and fractures. These were generally uncommon forming a mere 3% of the total. The male:female ratio was 1.72:1. Most patients were in the 16-40yr age group. (40.00%). Sport and road traffic accidents were leading causes.

Supracondylar fractures were most common in the 5-10yr age group (46.66%). The commonest cause was a fall. Fractures of the rest of the humerus were uncommon (2%) and had a male:female ratio of 1.6:1. Most shoulder dislocations were anterior dislocations. The male:female ratio was 3.33:1 and they were most common in the 16-40yr age group. Sporting injury was the leading cause.

Injuries of the foot, ankle and leg included fractures and dislocations. No epiphysial separation was seen. Most patients were in the 16-40yr age group (48.98%) The male:female ratio was 1.76:1. Injury while walking and road traffic accidents were leading causes.

Knee injuries included fractures (patellar, tibial and femoral condyles) and dislocations. Patella fractures were usually caused by an anterior force on a seated passenger involved in a road traffic accident. Often posterior hip dislocation was associated with patella fracture. The male:female ratio of knee injuries was 2.71:1. Most patients were in the 16-40yr age group.

Femoral shaft injuries were due to road traffic accidents in adults mainly of 16-40yr age group and birth trauma in newborns. The male:female ratio was 1.36:1.

Femoral neck fractures were exclusively seen in those over 60 years of age with a male:female ratio of 0.29:1 and hip dislocation had a ratio of 0.83:1. Osteoporosis was probably a predisposing agent in fractures of the femoral neck in the elderly.

A total of eighty seven (87) of the study population (987) had associated injuries in other organs. The chest was mostly affected (4.86%).

Fractured clavicle, ribs and lung injury were the commonest findings. The abdomen and pelvis were involved in 1.01% of patients. Fractured pelvis, injuries to the urethra, bladder and uterus were observed. The head was imaged in 23.3% of the patients but only one patient had a skull fracture.

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6. INTRODUCTION AND LITERATURE REVIEW

6a. Epidemiology of Limb Trauma

Trauma to limbs is common in Kenya and the whole world (1,2,3,4). It is a major cause of absenteeism from school and work. It is also a major cause of hospital admissions and it accounts for much of the Health Care Budget.

In, Kenya, Raja (1) and Tole (2) reported limb trauma to constitute 56.4% of all radiological examination requests nationwide. Statistics on national morbidity and mortality rates from limb trauma in Kenya are not available (38). However limb trauma accounts for a significant proportion of admissions at Kenyatta National Hospital. Mortality is related to fat embolism and effects of other associated injuries notably bleeding from thoracic, abdominal and pelvic injuries.

There is a male preponderance in limb trauma (38). The male:female ratio varies with the type of injury (19, 20, 21, 22, 41). The right side is usually involved more commonly than the left and the upper limbs more commonly than the lower limbs (1, 8, 21, 41). Obembe (18) reported similar observations in road traffic accident victims at Kaduna in Nigeria.

6b. Aetiology of Limb Trauma

Road Traffic accidents are the leading cause of limb trauma in Kenya and the whole world (1, 2, 3, 4). Raja (1) ascribed to the overloading and reckless driving of the local passenger minibuses in Kenya (matatus). Makanjuola (4) reported that up to 80% of all limb injuries in rural Nigeria were due to road traffic accidents. Obembe and Fagbayi (18) reported similar results from Kaduna in Nigeria.

Assault, domestic violence, sports are also prominent causes of limb trauma. These are becoming increasingly significant in the growing city of Nairobi. Occupational injuries are also common in Nairobi. Hicks (8) reported that 24% of all workers at a Nairobi bus company experienced occupational injuries in 1987. Birth trauma still plays a role in limb trauma of newborns with clavicular and femoral shaft fractures predominating.

Alcohol abuse is commonly associated with trauma through a variety of ways like road traffic accident, assault, domestic violence and occupational injury. Hicks (8) reported that nearly all occupation injuries at a Nairobi bus company in 1987 were alcohol related. Drunk workers caused human errors by disregarding safety measures. Overwork, inadequate training and carelessness also contributed to occupational injuries.

Industrialization causes a rapid rise in the population before the infrastructure of a given area is expanded and improved far enough to support the high population. This causes an increase of the cases of limb trauma from almost all causes. Prinsloo (5) in South Africa, Obembe (18) in Nigeria and Raja (1) in Nairobi, Kenya all described rising limb trauma cases with growing industrialization.

Low socio-economic status is associated with a high incidence of limb trauma. Poor general education, precarious living and transport conditions and the problems of unemployment seem to take part in predisposing poor people to all sorts of limb trauma (1, 5).

Insufficiency fractures of limb are observed in the elderly especially because of osteoporotic weakening of the skeleton (31, 32). However the young also show insufficiency fractures when disease weakens their bones. Rickets is

a leading cause observed in Africa (39).

6c. Initial Radiological Assessment

The initial radiological assessment of limb trauma patients relies on the initial physical assessment. Both are of utmost importance since they decide the further management of the patient (31, 26). Prinsloo (5) in South Africa found that up to 50% of all trauma patients are discharged from casualty or admitted on the basis of initial radiographic findings.

Most of the time plain films suffice in this initial assessment (3, 4, 5). Any associated injuries are handled on their merits. In selected patients specialized radiological procedures like angiography and computed tomography are employed (15, 22).

6d. Hand Injuries

Hand injuries include fractures, dislocation, foreign bodies, lacerations etc. Most are due to road traffic accidents and occupation injuries in the working age group (16-40yrs). (8). The fractures of the scaphoid and perilunar dislocations were not observed in this study.

6e. Wrist Injuries

Wrist injuries include fractures, dislocations and epiphysial separations. Mbindyo (22) in 1979 observed that at Kenyatta National Hospital most wrist epiphysial separations were due to falls followed by road traffic accidents and baby battering. The patients were aged 1yr to 18yrs with a mean of 10.7yrs. The male:female ratio was 1.5:1.

Colles fracture is common between 16yrs and 40yrs and in the elderly. A fall

on the outstretched arm is a common cause with a contribution from osteoporosis in the elderly (31).

6f. Forearm, Elbow and Supracondylar Injuries

Forearm and elbow injuries are common in young patients of the 5 - 10 yrs age group. (31) The usual cause is a fall during play. Road traffic accidents cause a small proportion of these injuries.

Elbow injuries include dislocations and fractures involving the articular surfaces. Sports, play and road traffic accidents are major causes.

The elbow injuries need timely correction to avoid early osteoarthritis and joint malfunction (31, 82).

Atinga (41) in Machakos, Kenya, reported that supracondylar fractures were most common in children of 5 - 9 years of age. Boys were more commonly affected than girls. The commonest cause was a fall. Jeshrani (20, 22) reported similar findings in supracondylar fractures at Kenyatta National Hospital.

6g: Humeral Injuries (except supracondylar)

Other humeral injuries are not very common. They include fractures of the shaft and of the head of the humerus. Road traffic accidents, a fall and sports are the leading causes. Mulimba (19) observed that in humeral injuries at Kenyatta National Hospital in 1983 the male:female ratio was 2.25:1, and that most were due to a fall or a road traffic accident. Some were complicated by injury to the brachial nerve.

6h. Shoulder Injuries

Dislocation of the shoulder is a common injury. Most are anterior dislocations. In over 50% of the patients there is an associated injury to the humeral head and the glenoid fossa (31). Anterior dislocation can be habitual when combined humeral head and glenoid defects are formed (31)(36). The commonest cause is sports especially in the 16-40 yr age group.

6i. Foot, ankle and leg injuries

The injuries of the lower limbs are generally less common than those of the upper limb (31). Road traffic accidents, sports, assault and falls are the leading causes of these injuries. Tibial fractures are associated with fat embolism (31, 36).

6j. Knee Injuries

The major cause of knee injuries is road traffic accident when the subject is in a seated position. The injuries include patellar, tibial and femoral condylar fractures and dislocations. A force from the front on to the patella of a seated person may be responsible for patellar fractures, femoral and tibial fractures as well as posterior hip dislocation (36, 31). Knee dislocation may be associated with injury to the popliteal artery (31).

6k. Femoral Injuries (except those around knee)

Femoral shaft fractures are usually caused by high forces in road traffic accidents (10, 31, 36). Bleeding into the thigh and fat embolism are the major causes of morbidity and mortality in patients with femoral shaft fractures.

Birth trauma and bone diseases like rickets are some of aetiological factors responsible for femoral shaft fractures in infants and children (39). The elderly experience femoral neck fractures. Senile osteoporosis weakens the bones and the femoral neck of the elderly gets easily fractured. A fall is the usual history. In most cases it can not be clarified whether the fracture caused the fall or followed it (31, 36).

6l. Associated Injuries

The morbidity and mortality of limb trauma patients depend largely on the presence and severity of other associate injuries (10, 27). Multiple system failures are the usual cause of death (10). Therefore limb trauma patients should receive thorough evaluation of other organs.

Hemorrhage resulting from chest, abdominal and pelvic injury can be massive with subsequent hypoperfusion and death (40, 30, 36). Lung injury, pneumothorax, and flail chest can result in respiratory compromise. Skull fractures and signs of intracranial bleeds should also be well investigated since these cause more serious effects than most limb injuries (10, 31).

7. AIM

To find the causes and pattern of limb trauma in patients presenting to the Casualty Department at Kenyatta National Hospital. This information will be useful in suggesting ways of:

- a) Preventing or minimizing limb trauma,
- b) Improving the initial radiological assessment of patients with limb trauma.

8. OBJECTIVES

To describe:

- a) The causes of limb trauma,
- b) The pattern and distribution of radiological findings in limb and associated trauma in all patients presenting with limb trauma to the Casualty Department of Kenyatta National Hospital from 01-12-96 to 28-02-97.

9. MATERIALS AND METHODS

The study was carried out in the Casualty Department at Kenyatta National Hospital from 01-12-96 to 28-02-97.

All patients presenting with limb trauma constituted the study population. The initial radiological evaluation utilised plain radiographs done according to the findings of the initial physical assessment done by the Casualty Officer. The attending radiographer recorded the personal data of each patient and the cause of the injury according to guidelines given in

APPENDIX A.

This information was obtained by directly asking the patient or the guardian.

All radiographs were reserved for radiological interpretation by the researcher and one qualified radiologist early each morning. Patients requiring immediate admission had their ward number noted down by the radiographer for follow-up by the researcher every morning. The radiological findings were recorded according to the guidelines given in APPENDIX B.

10. RESULTS

The results are presented in tables (Table 1 - Table 9) and graphs (Graph 1 - Graph 13).

The age subgroups 0-5yrs, 5-10yrs, 10-16yrs, 16-40yrs and 40-80yrs were used because they have separate causative and morphological features of limb trauma. This approach is popular in the trauma literature (19,22,31,41).

Table 1. AGE FREQUENCY

AGE RANGE (YRS)	NO.	%
0-5	157	15.91
5-10	89	9.02
10-16	129	13.07
16-40	413	41.84
40-80	199	20.16
Total	987	100.00

Table 2. SEX FREQUENCY

SEX	NO.	%
M	656	66.46
F	331	33.54
TOTAL	987	100.00

Table 3. SIDE FREQUENCY

SIDE	NO.	%
RIGHT	519	52.58
LEFT	468	47.42
TOTAL	987	100.00

TABLE 4. FREQUENCY OF UPPER, LOWER LIMBS

UPPER/LOWER	NO.	%
UPPER	778	78.82
LOWER	209	21.17
TOTAL	987	100.00

TABLE 5. FREQUENCY OF NORMAL, ABNORMAL (RADIOLOGICAL) CASES

NORMAL/ABNORMAL	NO.	%
NORMAL	281	28.47
ABNORMAL	706	71.53
TOTAL	987	100.00

TABLE 6 FREQUENCY OF DIRECT AETIOLOGICAL FACTORS

CAUSE	NO	%
ROAD TRAFFIC ACCIDENTS	297	30.09
ASSAULT	96	9.73
SPORT/PLAY	177	17.93
DOMESTIC	42	4.25
OCCUPATIONAL	69	6.99
MISCELLANEOUS	306	31.00
TOTAL	987	100.00

TABLE 7 FREQUENCY OF INDIRECT AETIOLOGICAL FACTORS

FACTOR	NO.	%
ALCOHOL	277	28.06
UNEMPLOYMENT	309	31.31
LOW INCOME STATUS	717	72.64

N= 987

TABLE 8 ASPECTS OF THE INITIAL RADIOLOGICAL ASSESSMENT

IMAGING MODALITY	PLAIN RADIOGRAPHY
AVERAGE NO. OF FILMS PER INJURY	2
AVERAGE PROJECTIONS PER INJURY	2
INTERPRETER OF TRAUMA FILMS	CASUALTY OFFICER

TABLE 9 ASSOCIATED INJURIES

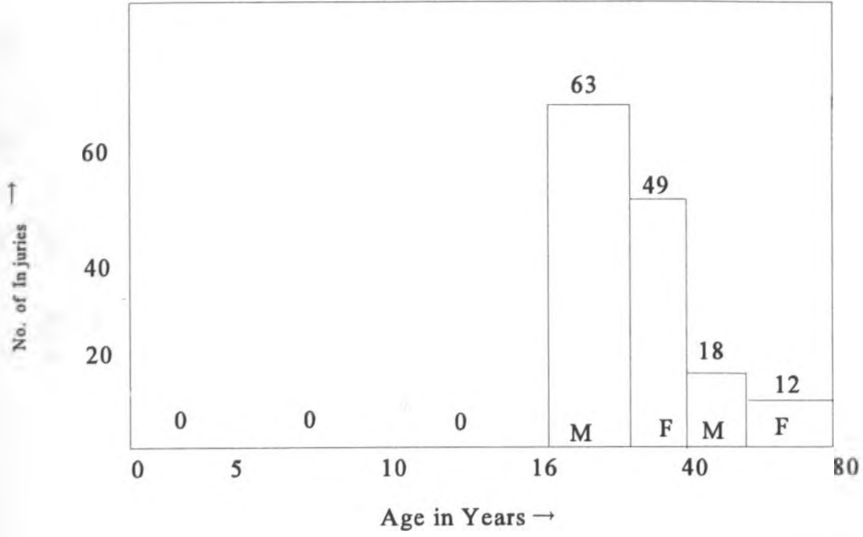
AREA	NO	FINDINGS
HEAD / NECK	23	Skull fracture, dislocation of cervical spine, etc.
SPINE (DORSAL LUMBAR, SACRAL)	6	Fracture, dislocation
CHEST	48	Clavicle fracture, rib fracture, lung and pleural changes, cardiovascular changes
ABDOMEN AND PELVIS	10	Ruptured viscera and hemorrhage, fractured pelvis, Bladder / urethral rupture etc.
Total	87	

Legend for graphs:

Females: F

Males: M

Graph 1: Hand Injuries



Graph 2: Wrist Injuries

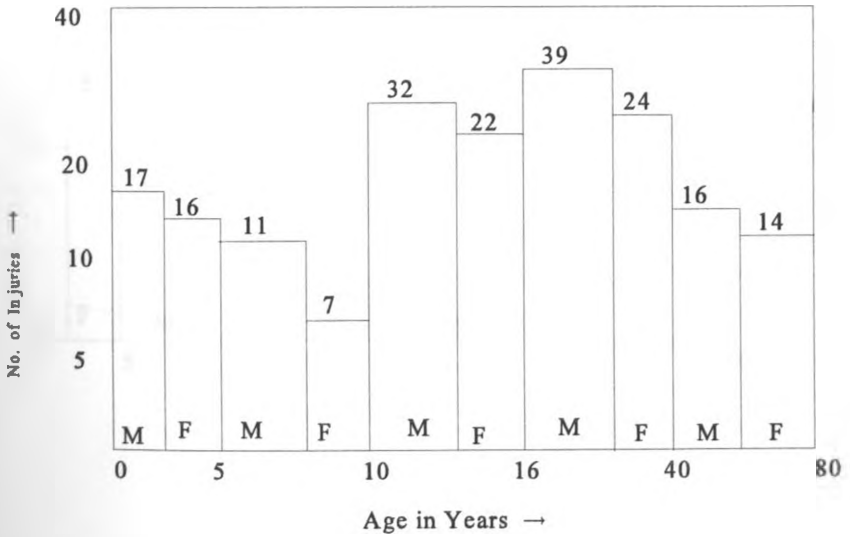
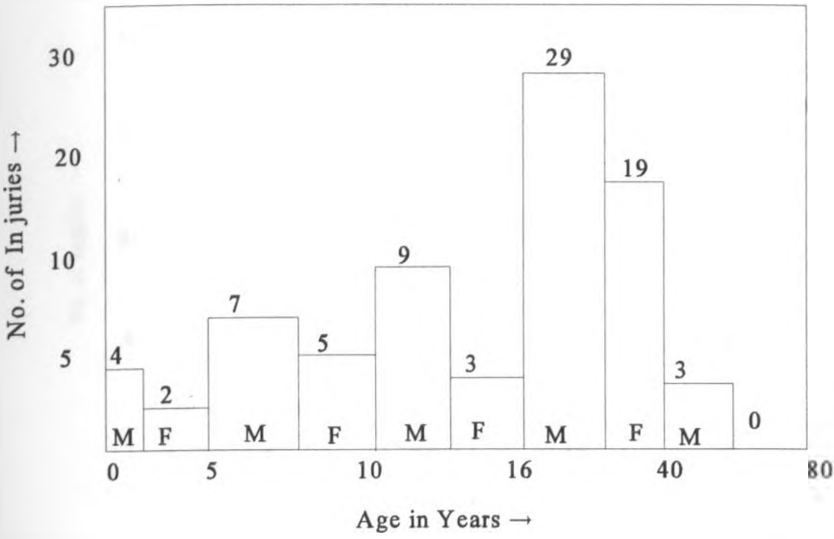
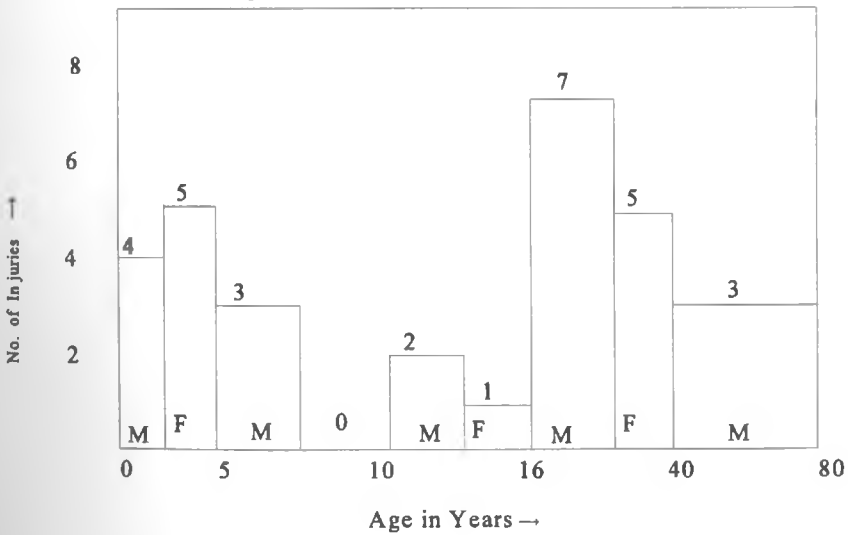


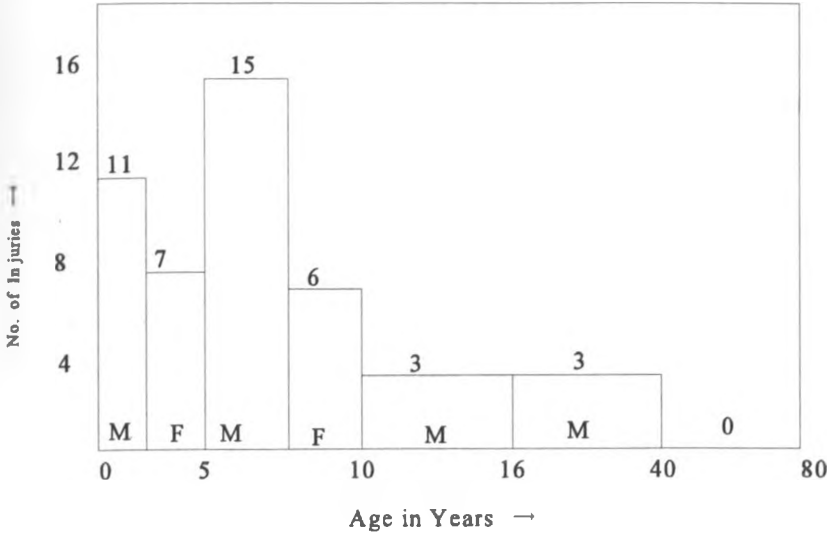
Figure 3: Forearm Injuries



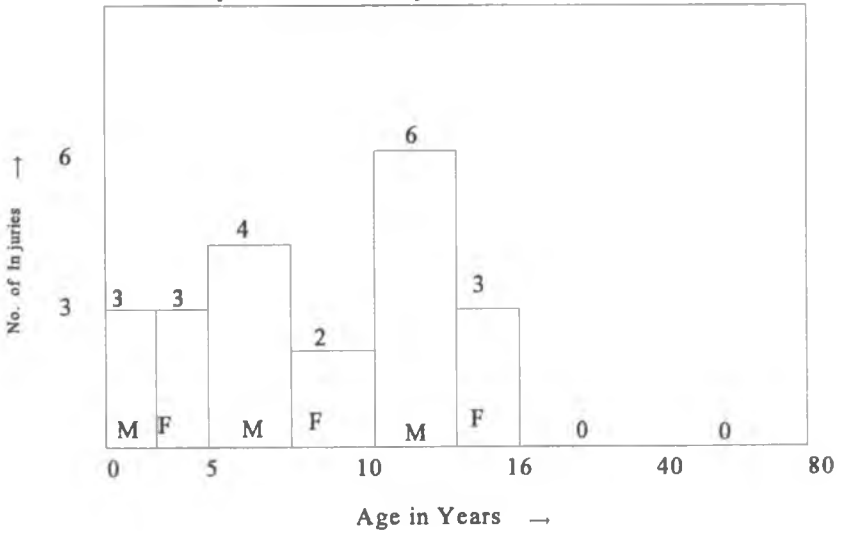
Graph 4: Elbow Injuries



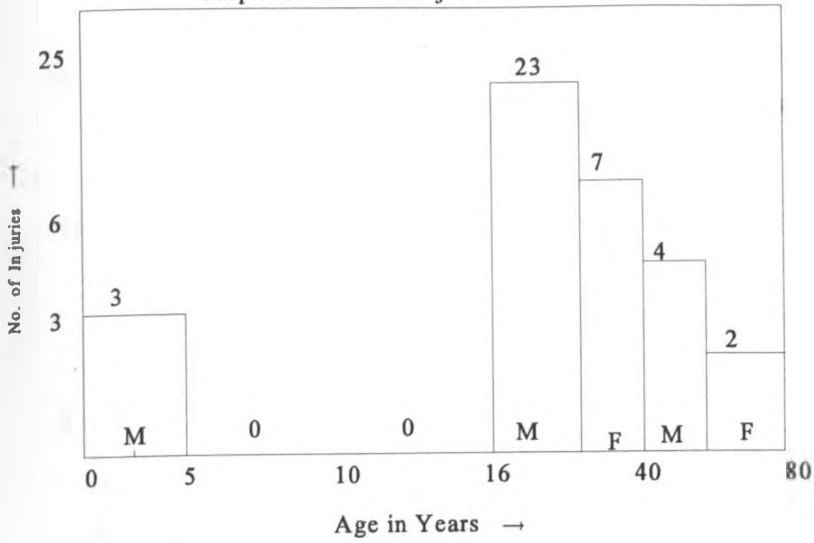
Graph 5: Supracondular Fractures



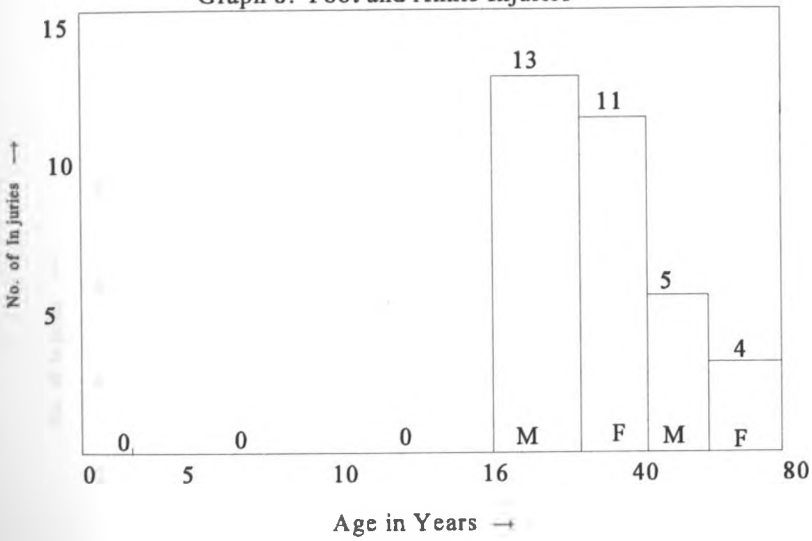
Graph 6: Humerus Injuries



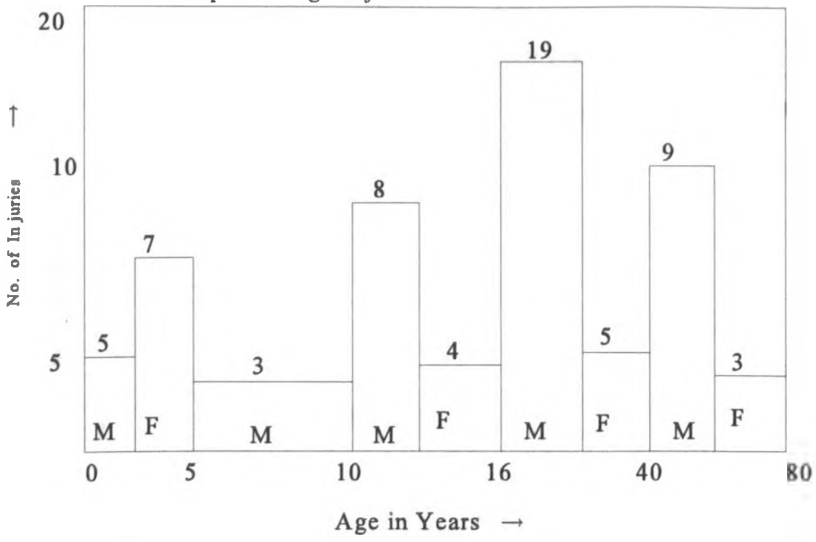
Graph 7: Shoulder Injuries



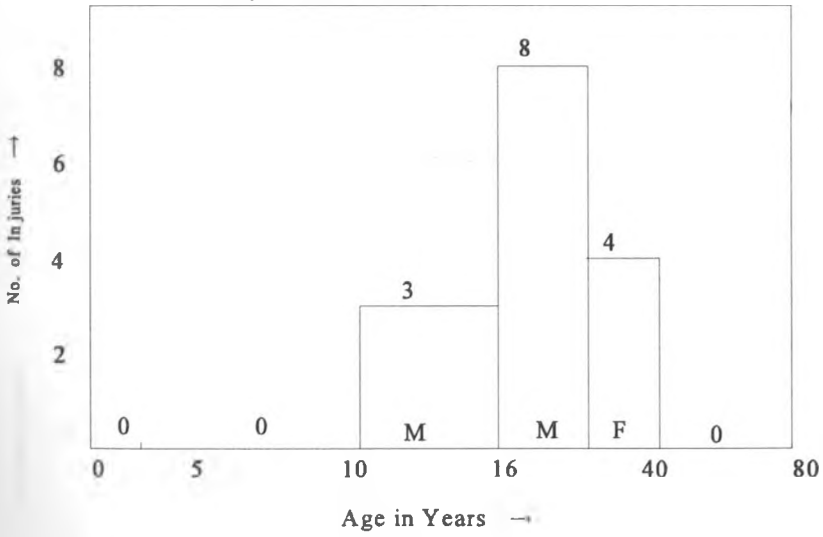
Graph 8: Foot and Ankle Injuries



Graph 9: Leg Injuries



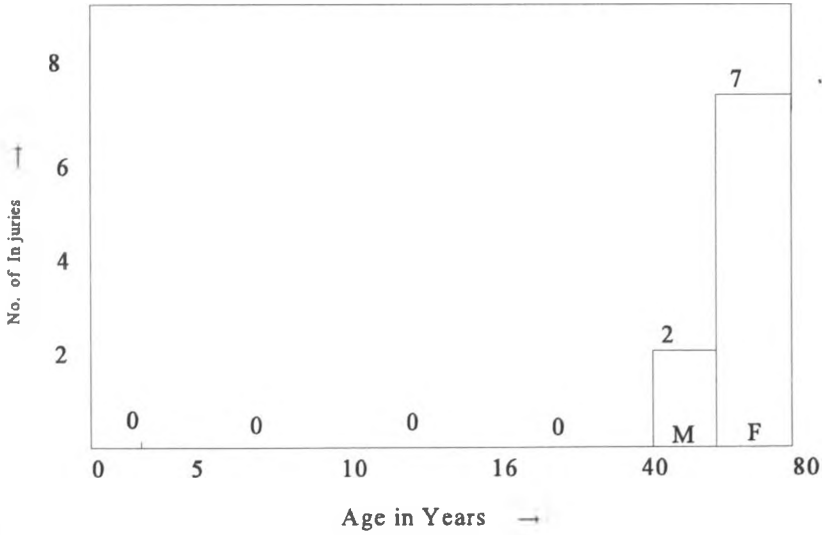
Graph 10: Knee Injuries



Graph 11:Femoral Shaft Fractures



Graph 12:Femoral Neck Fractures



Graph:: 13 Hip Injuries

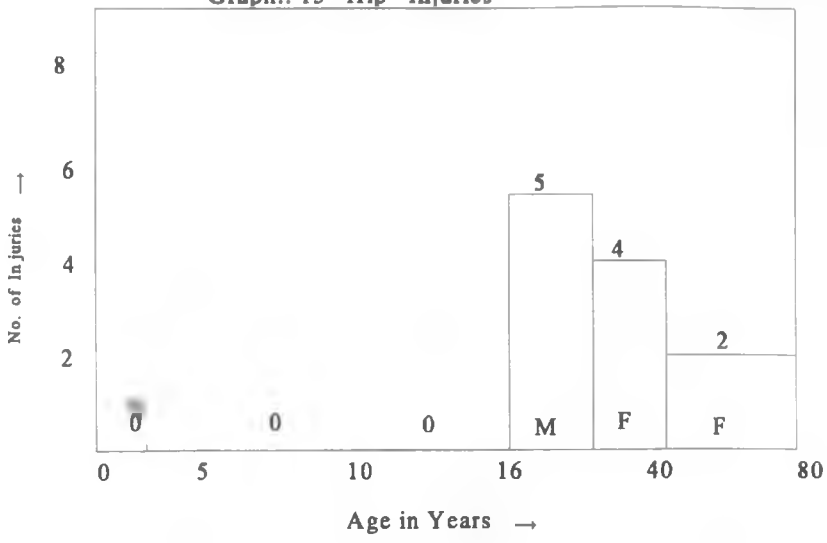




Figure 1. Smith Fracture. (Reverse Colles Fracture). There is a transverse distal radial fracture with ventral displacement of the distal fragment (garden spade deformity). This was a 21yr old man who fell on the back of his right hand.



Figure 2 Supracondylar Fracture. An 8yr old boy fell down while playing. There is a comminuted supracondylar fracture with medial angulation of the distal fragment.



Figure 3. Fracture of os calcis. A 20 yr old man fell from a height and sustained this fracture and a compression fracture of L2 vertebra (see Fig 4).



Fig 4. Compression fracture of L2. There is loss of height of L2 vertebra.
This was the same patient with an os calcis fracture in Fig 3.

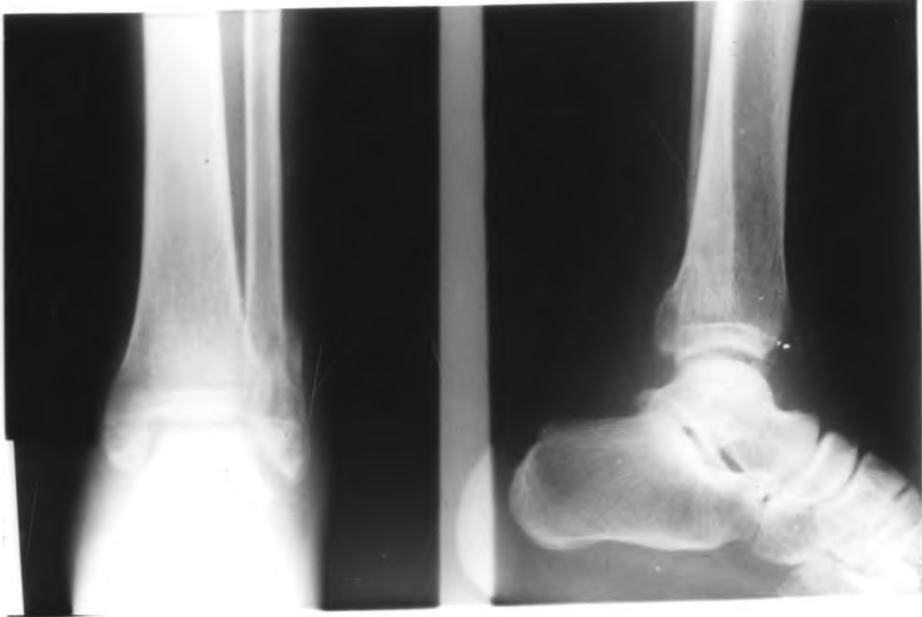


Fig 5 Ankle fracture. There are bimalleolar fractures shown in an adult man who incurred these injuries from sports.



Figure 6. Femoral shaft fracture. This was a 40 yr old man involved in an auto accident. There is a transverse, displaced, non-distracted fracture of the femoral shaft. Bone fragments show an element of comminution. Note the Thomas splint.



Fig.7 Femoral neck fracture. This was a 75 yr old man who fell down the stairs. There is a minimally displaced fracture of the Lt. femoral neck.

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Fig 8. Fractured pelvis. There are bilateral vertical fractures of both pubic rami in a 39 yr old auto accident victim.



Fig 9 Chest film of a 45 yr old auto accident victim. There are bilateral lung opacities notably in both upper zones. This was taken to represent contusion but previous fibrosis could be coexistent. Note the bilateral soft tissue emphysema in the shouders and neck.



Fig 10 Occlusion of the Rt popliteal artery is shown in a 20 yr old man who sustained posterior knee dislocation in an auto accident. A Rt femoral arteriogram was done after he lost sensation and pulses of the leg.

of the local passenger minibuses (matatus) are regarded as major contributory factors for these accidents (1). Indeed the national automobile accident rate in Kenya is among the highest in Africa (1,2,33). Raja (1) has estimated that it is 22 times more dangerous to drive in Kenya than in the U.S.A. With the increasing population, number of vehicles and traffic in Nairobi this trend will continue unless strict measures are put in place to stop the trend and reverse it.

The leading cause of specific injuries was variable although road traffic accidents were commonest overall. Supracondylar fractures were mostly due to a fall as were fractures of the femoral neck.

Alcohol contributed towards trauma of a significant third of the study population. Hicks (8) found that nearly all occupational injuries at a Nairobi bus company in 1987 were alcohol related. These findings show that alcohol abuse is a menace in the growing city of Nairobi. If not kept in check by specific measures the role of alcohol in trauma causation in Nairobi will rise.

Assault caused 9.73% of all the reported cases in this study. Most of these were alcohol related. A common association is facial injury particularly mandibular fractures (Chidzonga, 17).

Occupational injuries were responsible for 6.99% of the cases Hicks (8) reported that 24% of all workers of a Nairobi bus company experienced occupational injuries in 1987. His high figure could be related to his study population that included all the workers of the bus company. The relatively lower figure of this study on the other hand is related to the study population (age range 2 days to 80 years) and the study period that included two major holidays.

11c. Initial Radiological Assessment (Table 8)

The use of plain radiography for the initial radiological assessment of the limb trauma is widely accepted (1,2,3,4,5). Each affected limb is imaged in two projections at right angles to each other. This allows for a proper description of the injury.

The reading of trauma films by a casualty officer is a potential source of diagnostic problems. Since casualty officers are not trained radiologists they could be missing a greater fraction of injuries than trained radiologists would. Quantification of this problem can best be carried out with a study of the efficiency of the current system.

The initial radiological assessment should be as accurate as possible to ensure that the patient receives the correct management at the earliest possible time. Hicks (8) has also pointed out the importance of accuracy in the initial radiological evaluation for medical-legal reasons.

11d. Hand Injuries (Graph 1)

The high occurrence of hand injuries in the 16-40 year age group and the male preponderance reflect the increased physical activity normally associated with people in this category. Occupational injuries were a significant cause of hand injuries. Hicks (8) reported similar results on workers of a Nairobi bus company. Accordingly hand injuries were not reported in children under 10 years in this study. The absence of scaphoid fractures and perilunate dislocation in this study is due to the limited study population. However these remain important injuries of the hand.(31)

11e. Wrist Injuries (Graph 2)

The distal forearm was the most commonly injured site in this study (Fig. 1). Even in the developed world injury at this site is very common (31,36). A fall and road traffic accidents cause the majority of wrist injuries. However Mbindyo (22) noted that child battering was an additional significant cause of injury to the wrist in children in Nairobi.

The Colles fracture and epiphyseal separation are two very significant wrist injuries. Colles fractures are common in the 16-40 year age range (22,31,32). The epiphyseal separations affect the weak growth plate of the

pubertal growth spurt in the 10-16 year group. The male preponderance in wrist injuries also reflect increased physical activity in males.

11f. Forearm, Elbow and Supracondylar Injuries (Graphs 3,4,5)

Forearm injuries were usually due to a direct force on to the forearm mostly related to an automobile accident. The 16-40 year age range was mostly affected with a male preponderance. There is dislocation of the proximal or distal radioulnar joint associated with fractures of shafts of the radius and ulna. This calls for the inclusion of the joints when imaging injuries (31,32).

Elbow injuries including supracondylar fractures (fig. 2) are commonly due to a fall and they peak in the 5-10 year age group. These are very common injuries in Kenya and world wide (31,32,41). Atinga (41) studied supracondylar fractures in Machakos, Kenya. Like the findings in the study the commonest cause was a fall and the peak age range was 5-9 years. Satisfactory management of these injuries requires good imaging and surgical care to avoid residual deficits (20,41).

11g. Other Humeral Injuries (Graph 6)

The injuries of the humeral shaft, neck and head are relatively uncommon (31,32,36). There is a male preponderance demonstrated in this study and elsewhere (19,31). Although not observed in this study humeral shaft fractures may be complicated by injury to the radial artery and the brachial nerve (19,31). Automobile accidents and falls are the usual causes.

11h. Shoulder Injuries (Graph 7)

As shown in this study and by other workers (31) sports and

automobile accidents are the leading causes of shoulder injuries mostly anterior dislocation. The 16-40 year age group is most commonly affected (31,36). Habitual anterior dislocation of the shoulder is associated with defects of the humeral head and the rim of the glenoid fossa allowing easy slippage of the humeral head anteriorly. Although a single frontal view may be used to make the diagnosis of anterior dislocation an additional axial view should be obtained to ensure that the diagnosis is not in doubt. A post-reduction anterior-posterior view is part of the diagnostic workup of shoulder dislocation since it may show a defect on the head of the humerus.

11i. Foot, Ankle and Leg Injuries (Graph 8,9)

Injuries of the lower limbs in general are less common than those of the upper limbs. The usual causes of injuries of the foot, ankle and leg are fall usually in sports or automobile accidents (Fig 5). Calcaneal fractures due to a fall from a height are associated with a compression fracture of the L2 vertebral body (Fig 3 and Fig 4). Therefore imaging the thoracolumbar spine in patients with calcaneal fractures is recommended (31)(36).

11j. Knee Injuries (Graph 10)

The knee is the most commonly imaged joint of the lower limbs. Whereas automobile accidents are the leading cause, sporting injuries account for an increasing proportion of these injuries especially in the developed world. Most patients are aged 16 years to 40 years.

Knee injuries occurring in automobile passengers in a seated position may be associated with posterior hip dislocation. This association should be kept in mind when carrying out the initial assessment to avoid missing the associated hip injury (7,31).

Posterior knee dislocation may cause vascular injury in the popliteal

fossa. This may necessitate use of Doppler ultrasound or angiography apart from plain film to evaluate such patients well..(Fig 10)

11k. Femoral and Hip Injuries (Graphs 11,12,13)

Fractures of the femoral shaft are commonly due to automobile accidents and most occur in the 16-40 years of age group. A fracture of the femoral shaft (Fig.6) may be associated with fat embolism to the chest occurring 24 hours to 5 days after the injury. Therefore a chest film at the appropriate time interval should be part of the radiological evaluation of the patients.

In newborns birth trauma is the usual cause of fractures of the femoral shaft. In this study all such cases were from Pumwani Maternity Clinic. The imbalance of the high work load and the low staffing levels have been cited as the cause of compromised care at this clinic. As a leading centre in serving the majority of Nairobi residents of Pumwani Maternity Clinic should have its constraints evaluated so that the necessary corrective measures are instituted.

Femoral neck fractures (Fig. 7) were seen in this study only in elderly patients. Other workers have reported that senile osteoporosis predisposes this type of insufficiency fracture (31,36). The usual history is that of a fall. However in most patients it is not possible to establish whether the fall caused the fracture or followed it.

Hip dislocations are commonly posterior dislocations and are associated with fracture of the posterior acetabular rim. For most cases plain radiography suffices to image these injuries. However axial computed tomography is recommended when attempted reduction fails since loose intra-articular bone fragments are well shown this way.

11l. Associated Injuries (Table 9)

Limb trauma per se does not cause as much morbidity and mortality as

certain associated injuries. Therefore the thorough evaluation of the entire patient is crucial.

The chest (Fig. 9) is commonly affected in limb trauma especially if due to automobile accidents. In this study it was the mostly affected region. Injuries to the bony cage, lung parenchyma, the heart and the great vessels may occur with fatal consequences (31,36,40). Bleeding and interference with respiratory mechanics are the usual causes of cardio-respiratory compromise in these patients (10,51).

Abdominal injuries and pelvic injuries are potential sources of excessive hemorrhage that deserve accurate imaging and management. The history of the causative force and the findings of the initial physical assessment decide further imaging. Apart from plain films ultrasound and computed tomography are of great help in patients with severe injury and positive abdominal findings. However when the patient is alert after blunt abdominal trauma the finding of no abdominal signs at physical assessment suggests that imaging even with plain films may not be required (26).

Pelvic fractures (Fig 8) are particularly associated with bladder and uterine injuries. Apart from plain films special technique including ascending urethrography and micturating cystourethrography are very helpful. Attempted blind catheterization of the injured urethra is dangerous as it is likely to worsen posterial urethral tears.

In this study only one skull fracture was detected in plain films of the skull. In the presence of computed tomography there is no place for plain skull films in trauma patients. Severely injured patients with neurological signs should get computed tomography done on them. A review of the policy on skull films in trauma patients at Kenyatta National Hospital is recommended.

12. CONCLUSIONS AND RECOMMENDATIONS

The major conclusions from this study and their respective recommendations are as follows:

1. Road traffic accidents were the commonest cause of limb trauma at Kenyatta National Hospital.

All efforts should be made to ensure that road safety rules are adhered to. Members of the public should be discouraged from boarding overloaded buses. Road Safety Rules should be comprehensive and enforced strictly.

2. Alcohol was a major indirect aetiological factor in a third of cases.

Employees should be discouraged from working while drunk. If possible legislation against alcohol at work should be established or enforced strictly if already present.

3. Birth Trauma was a significant cause of fractures of the clavicle and femoral shaft in newborns. The fact that all cases were from Pumwani Maternity Centre may be due to statistical bias. However, a study is recommended to evaluate the constraints facing Pumwani Maternity Centre so that the appropriate corrective steps are initiated.

4. Currently, trauma films at Kenyatta National Hospital are initially read by casualty officers. These casualty officers have not received training as radiologists.

A study is recommended to find out how efficient the current system is regarding the initial radiological assessment of trauma patients.

5. Certain injuries are common in some age groups e.g. Supracondylar fractures: 5-10 years, Epiphyseal separations: 10-16 years and Femoral neck fractures: 60 years +.

When a patient with a history of trauma presents with pain in an area that is commonly injured for his/her age group a high index of suspicion for injury should prevail. The initial physical and radiological evaluations should be tailored accordingly.

6. Associated injuries in other areas are common in limb trauma patients.

The initial physical and radiological assessment should be complete and thorough to minimize missed or delayed diagnosis.

7. Skull films have a very low yield in trauma patients.

With the presence of computed tomography at Kenyatta National Hospital the role of skull films in trauma patients should be revised.

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14. APPENDICES

APPENDIX A

GENERAL PATIENT INFORMATION

(tick wherever applicable, fill in exact age and name of residential area)

SEX: F M

AGE: MONTHS YEARS

EMPLOYED: YES NO

RESIDENTIAL AREA:

NAME:

POPULATION DENSITY: LOW HIGH

CAUSE OF TRAUMA

(tick wherever applicable)

ROAD TRAFFIC ACCIDENT

OCCUPATIONAL INJURY

ASSAULT

SPORTS INJURY

DOMESTIC INJURY

MISCELLANEOUS: FALL

ALCOHOL RELATED:

APPENDIX B

A. NUMBER AND VIEWS OF RADIOGRAPHS TAKEN

B. RADIOLOGICAL FINDINGS IN LIMBS

SITE

 NO YES

FRACTURE:

TYPE: 1.
2.

OTHER LOCAL FINDINGS:

1.
2.

 NO YES

DISLOCATION: TYPE: 1.
2.

OTHER LOCAL FINDINGS

1.
2.

C. RADIOLOGICAL FINDINGS IN OTHER ORGANS

AREA	FINDINGS
HEAD / NECK	
SPINE	
CHEST	
ABDOMEN	
PELVIS	

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