

Pattern of surgical emergencies in a Nigerian tertiary hospital

Ndubuisi OC Onyemaechi¹, Sunday U Urube², Sebastian O Ekenze³

1. Department of Surgery College of Medicine University of Nigeria, Ituku-Ozalla Enugu, Nigeria. ndubuisi.onyemaechi@unn.edu.ng. +234-8035504767
2. Department of Surgery Federal Medical Center Makurdi Benue State Nigeria. urubesu2@yahoo.com
3. Department of Surgery College of Medicine University of Nigeria Ituku-Ozalla Enugu Nigeria. sebastian.ekenze@unn.edu.ng

Abstract

Background: Surgical emergencies account for a major part of the surgeon's workload. Evaluation of pattern of surgical emergencies will assist in developing concrete proposals for improved care. The aim was to assess the pattern of surgical emergencies in our center.

Methods: We undertook one-year prospective study of all the emergency surgical admissions at Federal Medical Centre Makurdi from January to December 2011.

Results: There were 575 surgical emergencies which constituted 56.8% of surgical admission, and 27.2% of allemergency hospital admissions. The commonest trauma cases were soft tissue injuries (30.3%), while the commonest non-trauma case was acute abdomen (41.6%). The mean age of the patients was 33.7 ± 17.2 years. Multiple injuries and traumatic brain injuries requiring intensive care monitoring, and malignancies were associated with higher mortality rates ($p = 0.001$). The 1-year mortality rate was 7.8% and the preventable death rate (PDR) for the trauma-related emergencies was 71.4%.

Conclusion: There is a wide spectrum of surgical emergencies in our setting with trauma accounting for a substantial proportion of cases. Improved trauma care, neurosurgical services and intensive care facilities may improve the outcome of surgical emergencies in our environment.

Keywords: Surgical emergencies; Pattern; tertiary hospital; Nigeria.

DOI: <https://dx.doi.org/10.4314/ahs.v19i1.53>

Cite as: Onyemaechi NOC, Urube SU, SO E. Pattern of surgical emergencies in a Nigerian tertiary hospital. *Afri Health Sci.* 2019;19(1). 1768-1777. <https://dx.doi.org/10.4314/ahs.v19i1.53>

Introduction

Surgical diseases contribute significantly to global health burden¹. Many of these conditions present as either life or limb-threatening surgical emergencies. Surgical emergencies have been shown to account for over 50% of all surgical admissions and represent a major part of the surgeon's workload in most parts of the world².

There are indications that emergency surgical admissions

have been on the increase in the recent years^{3,4}. This increasing burden of surgical emergencies places considerable strain on health care facilities and personnel, particularly in resource-poor countries³. In low and middle income countries (LMICs) with limited resources and access to surgical care, delays before treatment of surgical emergencies may have profound impact on potential disability and chance of survival^{5,6}.

Globally, trauma and acute abdominal pain are the leading causes of emergency surgical admissions in many countries^{7,8,9}. Acute appendicitis, acute intestinal obstruction and acute urinary retention are the leading causes of non-trauma surgical emergencies^{10,11}. On the other hand, road traffic injuries (RTI), gunshot injuries (GSI), burns and falls are the most common traumatic causes of emergency surgical admissions^{7,11}.

Corresponding author:

Ndubuisi OC Onyemaechi,
Department of Surgery, College of Medicine
University of Nigeria Ituku-Ozalla, Enugu, Nigeria.
Tel: +234-8035504767
Email: ndubuisi.onyemaechi@unn.edu.ng

The pattern of surgical emergencies may be influenced by geographical, socio-demographic and environmental factors¹⁰. The various patterns of surgical emergencies have implications for surgical training, workforce planning and provision of adequate healthcare services. There is paucity of reports on the spectrum and burden of surgical emergencies in our environment. This knowledge may be useful to hospital administrators and public health experts in planning for a more adequate and appropriate emergency care and ultimately improve outcome. The aim of this study was to describe the spectrum and pattern of presentation of surgical emergencies in our environment.

Methods

A one year prospective cohort study of all emergency surgical admissions at the accident and emergency (A&E) department of Federal Medical Centre Makurdi, Nigeria from January to December 2011 was conducted. A study questionnaire was designed for data collection. The questionnaire was pre-tested for reliability and validity. Federal Medical Centre Makurdi is a referral tertiary hospital in North-Central Nigeria. It is a 350-bed hospital that has three functional theatres and a three-bed intensive care unit (ICU), and serves a population of over five million people.

The research and ethics committee of the hospital approved the study protocol and written informed consent was obtained from all the patients. Only patients admitted as emergencies into the following specialties of the department of Surgery were included in the study: general surgery, urology, orthopaedic/trauma surgery, paediatric surgery, neurosurgery, plastic and reconstructive surgery, ophthalmology and cardiothoracic surgery. Patients with and obstetric and gynaecological emergencies were excluded from the study.

Patients with emergency surgical conditions are received at the accident and emergency unit of the hospital where the initial resuscitation is done. Those with minor conditions requiring emergency surgical procedure are taken to the emergency theatre and may be discharged home from the A & E unit. Others are admitted to the surgical

wards for either pre-operative work up or non-operative treatment from where they are discharged home. After discharge, all patients were seen at the surgical out-patient clinic for follow up care for at least one year.

Data such as patients' demographics, diagnosis at presentation, aetiology, injury-arrival interval for trauma cases, duration of symptoms for non-trauma cases and co morbidity were collected at presentation. While data on treatment given, duration of hospital stay and outcome of treatment were collected after treatment from patients' medical records. For each trauma patient, the injury severity score (ISS) and trauma injury severity score (TRISS) were calculated using the trauma score parameters from the case notes. Permanent disability in this study refers to a sequela of a disease or injury which impairs the physical and/or mental ability of a person to perform his/her normal work or non-occupational activities such as loss of limb, loss of vision, paralysis etc.

Data collection and analysis was done using SPSS version 20.0 (SPSS Inc. Chicago IL USA). For descriptive statistics we used frequencies, means and standard deviations, ranges and 95% confidence interval (CI) where appropriate. Test of significance was done using chisquare. Comparison of means was done with independent t-test. Statistical significance was set at p value < 0.05 .

Results

There were a total of 2115 emergency hospital admissions and 1012 surgical admissions within the study period. Of the surgical admissions, 575 were emergency admissions. Therefore, surgical emergencies constituted 56.8% of all surgical admissions and 27.2% of all emergency hospital admissions. Majority (337, 58.6%) were trauma patients while 238 (41.4%) were non-trauma patients. The age of the patients ranged from 2 weeks to 90 years with a mean of 33.7 ± 17.2 years. Males were 383 (66.6%) while females were 192 (33.4%), giving a male to female ratio of 2:1. The mean ages of the trauma and non-trauma patients were 30.3 ± 8.2 years and 40.1 ± 10.5 years respectively. Table 1 shows the age distribution of the patients.

Table 1: Age distribution of the patients

Age group (years)	Trauma	Non-trauma	Total (%)
0-10	31	12	43 (7.5)
11-20	39	43	82 (14.3)
21-30	109	40	149 (25.9)
31-40	84	13	97 (16.9)
41-50	46	43	89 (15.5)
51-60	15	34	49 (8.5)
61-70	6	42	48 (8.3)
71-80	6	7	13 (2.3)
> 80	1	4	5 (0.9)
Total	337	238	575 (100)

The spectrum of non-trauma surgical emergencies is shown in table 2. Acute abdomen (99,41.6%) was the most common non-trauma surgical emergency. This was followed by acute urinary retention (57, 23.9%). Acute appendicitis (46), acute intestinal obstruction (31), colicky abdominal pain (12) and typhoid peritonitis (10) were the causes of acute abdomen amongst our patients.

Altogether, 472 injuries were recorded amongst the 337 trauma patients. A total of 82 (24.3%) patients sustained multiple injuries. Soft tissue injuries such as bruises, lacerations and abrasions (143,30.3%), long bone fractures (92,19.5%) and traumatic brain injury (TBI) (69, 14.6%) were the most common traumatic injuries as shown in table 3.

Table 2: Distribution of non-trauma surgical emergencies

Non-trauma emergencies	No	%
*Acute abdomen	99	41.6
Acute urinary retention	57	23.9
Enterocutaneous fistula	8	3.4
Acute testicular torsion	5	2.1
Acute low back pain	12	5.0
Limb gangrene	20	8.4
Malignancy	22	9.2
Upper GI bleeding	5	2.1
Others	10	4.2
Total	238	100

*Acute appendicitis = 46, Acute intestinal obstruction = 31, Colicky abdominal pain = 12, Typhoid peritonitis = 10; GI = Gastrointestinal

Table 3: Distribution of injuries

Injury	No	%
Traumatic brain injury	69	14.6
Burns/Scald	18	3.8
Spine injury	18	3.8
Pelvic fractures	14	3.0
Long bone fractures	92	19.5
Soft tissue injuries	143	30.3
Hip fractures	17	3.6
Dislocations	8	1.7
Chest injuries	28	5.9
Abdominal injuries	34	7.2
Crush injuries	6	1.3
Sprain	13	2.8
Facial injuries	7	1.5
Ophthalmic injuries	5	1.1
Total	472	100

The injury severity score (ISS) of the trauma patients ranged from 1 to 24 with a mean of 8.4. Seventy patients (20.8%) presented with ISS of greater than 15.

Certain diagnoses were significantly associated with certain age groups of the patients. Traumatic injuries (193, 57.3%) were common amongst young adults, 21-40 years (95% CI, 1.07-3.32; $p = 0.02$); diabetic foot gangrene with sepsis (15, 75%) was predominantly seen amongst middle aged patients, 41-60 years (95% CI, 2.16-18.27; $p = 0.001$). Acute urinary retention (50, 87.7%) was common amongst middle-aged and elderly men 51-70 years (95% CI, 1.70-6.87; $p = 0.001$). Hip fractures and haematuria secondary to prostate cancer (25, 83.3%) were common amongst elderly patients 61-80 years (95% CI, 2.63-21.78; $p = 0.001$).

The aetiology of injuries is shown in table 4. Motor-vehicular accident (138, 41%) was the leading cause of traumatic injuries followed by motor-bike accidents (66, 19.6%) and falls (44, 13.1%). There was a significant correlation

between aetiology of injuries and the age of the patients (95% CI, 1.02-4.54; $p = 0.001$). While fall was predominantly seen in the first decade of life and amongst elderly patients; road traffic injuries and gunshot injuries were common amongst young adults. The injury-arrival interval of trauma patients ranged from 1 hour to 10 days with a mean of 1.2 ± 0.7 days while the duration of symptoms prior to presentation of non-trauma patients ranged from 1 hour to 2 weeks with a mean of 2.3 ± 1.2 days. The difference in mean injury-arrival interval was significant ($p = 0.01$).

Of all the emergency surgical admissions, 254 (44.2%) patients required operative intervention, while 321 (55.8%) patients were treated non-operatively. Only 121 (35.9%) of the trauma patients were treated operatively, while more than half (133, 55.9%) of the non-trauma surgical emergency admissions required operative intervention. The most common surgical procedures were primary wound closure (80, 31.5%), appendectomy (42, 16.5%) and laparotomy (39, 15.4%).

Table 4: Aetiology of injuries

Aetiology	No	%
Burns	18	5.3
RTA		
Motor vehicular accident	138	41.0
Motorbike	66	19.6
Pedestrian	23	6.8
Gunshot	11	3.3
Fall	44	13.1
Assault	19	5.6
Industrial	10	2.9
Sports	8	2.4
Total	337	100

The length of hospital stay ranged from 1 day to 90 days with a mean of 15.2 ± 10.5 days. The mean length of hospital stay for the trauma patients was $12.7 + 4.2$ days while that of non-trauma patients was $21.5 + 8.6$ days ($p = 0.001$). The mean durations of hospitalization of patients who had surgical intervention and those that were treated conservatively were $16.9 + 6.7$ days and $12.1 + 3.8$ days respectively. The difference in the duration of hospitalization between the two groups was not significant ($p=0.41$).

Majority of the patients (383, 66.6%) were treated and discharged home without any permanent disability; while

54(9.4%) were discharged home with permanent disabilities. Twenty two (3.8%) patients were referred to other hospitals while, 71 (12.3%) patients left against medical advice. Forty five patients died during the study period, giving a 1-year mortality rate of 7.8% (table 5). The patients who died were predominantly those with multiple injuries, TBI and malignancies ($p = 0.001$); while discharge against medical advice was common amongst patients with long bone fractures ($p = 0.001$).

Among the 28 patients with trauma-related deaths, 20 had a greater than 50% probability of survival, using the trauma injury severity score (TRISS) giving a preventable death rate (PDR) of 71.4%.

Table 5: Outcome of treatment

Outcome	Trauma	Non-trauma	Total (%)
Died	28	17	45 (7.8)
Discharged home without disability	203	180	383 (9.4)
Discharged home with permanent disability	44	10	54 (9.4)
Left against medical advice	50	21	71 (3.8)
Referred	12	10	22 (3.8)
Total	337	238	575 (100)

Discussion

Emergency surgical admissions in our study were 56.8% of all surgical admissions and 27.2% of all emergency hospital admissions. A study in Northern Nigeria by Agbo et al.¹² reported that emergency surgical admissions constituted 11% of all emergency hospital admissions. In Ethiopia, Belaynew et al noted that surgical emergencies constituted 24.1% of all emergency admissions in a hospital-based study¹³. Armon et al in Nottingham UK reported that emergency surgical admissions represented 69% of emergency room admissions amongst children aged 0-15 years¹⁴. A retrospective study of emergency surgical admissions in Bangladesh reported a prevalence of 36.8%¹⁵ while Gale et al in a nationwide 10-year analysis in United States reported a prevalence of 7.1% of non-trauma surgical emergencies¹⁶. The variations noted in these studies support previous reports that the pattern and prevalence of surgical emergencies may be affected by geographical, socio-demographic and environmental factors¹⁰.

Majority of our patients were in the 3rd and 4th decade of life. This is usually the most active and productive age group in most societies and may result in huge economic losses. Similar trend has been observed in most published series^{12,17,18}. The peak age incidence of the trauma-related emergencies was in the 3rd decade while the non-trauma emergencies had a double peak incidence in the 2nd and 5th decades. This pattern is in consonance with earlier reports on the incidence of trauma-related^{7,11} and non-trauma^{10,11} surgical emergencies. The mean age in our study was 33.7 ± 17.2 years. This is similar to other Nigerian

studies by Ekere et al.¹⁷ and Akinpelu et al.¹⁸ who reported 33 years and 32 years respectively. However, in the reports by Campbell et al.¹⁹ in UK and Gale et al.¹⁶ in US the mean ages were 47.9 years and 58.7 years respectively. The predominance of non-trauma surgical emergencies in the latter studies may explain the higher mean ages of the patients. There was a significant difference in the mean ages of trauma and non-trauma patients. Trauma patients were predominantly young adults, while non-trauma patients were mostly either middle aged and elderly. There was a predominance of trauma-related emergencies in our series. This may be due to the rising incidence of road traffic injuries reported globally^{17,20,21}. Solagberu et al.⁹ and Verma et al.⁸ also reported a similar pattern in their studies. However, reports by some authors showed a predominance of non-trauma surgical emergencies^{2,12,16,17,18}. This may be due to the setting in some tertiary hospitals where there is a dedicated trauma centre that caters for traumatic emergencies, thus taking a large chunk of surgical emergencies from the emergency room. Overall, soft tissue injuries (lacerations, bruises and abrasions) were the commonest surgical emergencies which was followed by acute abdomen. Verma et al.⁸ and Solagberu et al.⁹ reported a similar findings. However, this is in contrast to reports by Davies et al.²³ and Agbo et al.¹² who noted that acute abdomen and traumatic brain injury were the commonest emergencies in their studies. The hospital setting as well as the pattern of surgical diseases at study locations may be responsible for this difference. Amongst, the trauma patients, soft tissue injuries, long bone fractures and traumatic brain injury (TBI) were the

most common injuries. While acute abdomen and acute urinary retention were the most common non-trauma conditions. Our study corroborates other series that reported acute abdomen as the most common non-trauma surgical emergency^{10,11,17,22}. Urological emergencies such as acute urinary retention was second to acute abdomen in our study and in many other reports^{6,9,11}. This may be attributed to our ageing population with increasing incidence of benign prostatic hyperplasia, a common cause of acute urinary retention²². These findings provide useful information for workforce planning, surgical training and provision of healthcare services.

Road traffic accidents were the leading cause of injuries in our study. This may be due to rising incidence of road traffic injuries reported globally^{21,24}. This pattern has been reported in earlier studies^{17,18,20}. Motor-vehicular and motorbike accidents were the leading causes of road traffic injuries. Lack of adherence to traffic rules and the use of motorbikes as a common means of transportation in the study location may explain this observation. The injury-arrival interval of trauma patients was significantly shorter than the duration of symptoms in non-trauma patients. The urgent need for pain relief, wound care and fluid resuscitation in many trauma patients usually make them present to hospital earlier than the non-trauma patients. The causes of limb gangrene in this study were mainly diabetic foot and peripheral vascular disease. This observation corroborates earlier studies in Nigeria where diabetic gangrene overtook trauma as a major cause of limb gangrene^{25,26}. However, two patients who had crush injuries of the lower limbs on admission subsequently developed limb gangrene in the course of the treatment and were offered amputation.

The emergency operation rate (44.2%) was similar to 43.5% reported by Mai-Phan et al;² and much higher compared to 30.3% reported in other studies²⁷. This could be due to the higher proportion of trauma patients in our study and the referral status of our hospital. More than half (52.4%) of emergency operations carried out during the study period were for non-trauma conditions although there were more trauma-related admissions. This shows that majority of non-trauma surgical emergencies are only amenable to operative intervention, a trend which has been reported by same authors¹⁰.

Primary wound closure (31.5%) was the most common emergency surgical procedure. This was followed by ap-

pendectomy (16.5%) and laparotomy (15.4%). Our findings differ from the previous studies in which appendectomy was the most common emergency procedure^{11,23}. Laparotomy was the most common emergency surgical procedure reported by Verma et al⁸, while incision and drainage of abscess was reported by Mai-Phan et al². Our finding may be due to the preponderance of soft tissue injuries among our patients as well as differences in the patterns of presentation in the various studies.

The length of hospital stay was significantly shorter amongst trauma patients than non-trauma patients. Most traumatic injuries are usually acute in nature and have quick resolution unlike non-trauma emergencies that may have a chronic background and thus will require longer hospitalization. Mai-Phan et al.² also made a similar observation. Patients with non-trauma surgical emergencies were significantly older compared to the trauma patients and the presence of co morbidities may also explain the longer hospital stay amongst these patients. The mortality rate of emergency surgical admission in this study was 7.8%. About 62.2% of the deaths were from trauma-related conditions. The mortality rate is higher than 6.3% and 6% reported by Masiira-Mukasa et al.²⁸ in Kenya and Ahmed³ in Zaria Nigeria respectively. Multiple injuries, traumatic brain injury and malignancy were associated with high mortality rates. The poor state of neurosurgical services and intensive care facilities in our hospital may have contributed to the higher mortality rate.

Limitations of the study

Data collection for this study ended in 2011 and there may have been significant changes within the last 6 years. This is therefore, a limitation to our study. The obstetric and gynaecological surgical emergencies were excluded from this study. We think that their inclusion will bring in confounding variables since they are received and managed by the gynaecologists using a different departmental protocol in our hospital.

Conclusion

Majority of surgical admissions in our centre were emergency admissions with a predominance of trauma-related surgical emergencies. Road traffic injuries contributed significantly to the total volume of surgical emergencies seen in our hospital. Multiple injuries, traumatic brain injury and malignancies were associated with high mortality

rates. The 1-year mortality rate of emergency surgical admissions in our study was 7.8%. The preventable death rate (PDR) of the trauma-related emergencies is high. Provision of improved neurosurgical services and intensive care facilities will improve the outcome of trauma-related surgical emergencies in our environment. Early detection of cancers and improved oncology services may reduce the mortality arising from non-trauma surgical emergencies. The results of our study may be helpful in the planning and provision of better emergency surgical services to improve outcomes.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval

The study was approved by the research and ethics committee of Federal Medical Center Makurdi.

Conflict of interest

The authors declare no conflict of interest.

References

1. Farmer PE, Kim JY. Surgery and global health: A view from Beyond the OR. *World J Surg.* 2008; 32(4):533-536.
2. Mai-Phan TA, Patel B, Walsh M, Abraham AT, Kocher HM: Emergency room surgical workload in an inner city UK teaching hospital. *World J Emerg Surg.* 2008;3:19.
3. Ahmed A. Trends in emergency surgical Admissions in a Tertiary Health Centre in Nigeria. *West Afr J Med.* 2009; 28(2):106-9.
4. Capewell S. The continuing rise in emergency admissions. *BMJ.* 1996; 312 (7037):991-2.
5. Funk LM, Weiser TG, Berry WR, Lipsitz SR, Merry AF, Enright AC et al. Global operating theatre distribution and pulse oximetry supply: an estimation from reported data. *Lancet.* 2010; 376:1055-1061.
6. Mofikoya BO, Enweluzo GO, Tijani KH, Ogunleye EO, Kanu OO. Emergency surgical services in a Sub-Saharan African country: Can we meet the needs? *Eur J.Sci Res.* 2010; 43:265-271.
7. Ahmed M, Ali Shah M, Luby S, Drago-Johnson P, Wali S. Survey of surgical emergencies in a rural population in the Northern Areas of Pakistan. *Tropical Med Int Health.* 1999; 4 (12):846-857.

8. Verma A, Verma S, Garg P, Godara R, Karwasra RK, Verma N. Surgical Emergencies in a Tertiary Care Hospital: A Brief overview. *Int J Contemp Med Research.* 2016; 3 (3): 648-651.
9. Solagberu BA, Duze AT, Kuranga SA, Adekanye AO, Ofoegbu CK, Odelowo EO. Surgical Emergencies in a Nigerian University Hospital. *Niger Postgrad Med J.* 2003; 10 (3):140-3.
10. Ibrahim NA, Oludara MA, Mustafa I et al. Non-trauma surgical emergencies in adults: Spectrum, challenges and outcome of care. *Annals of Medicine and Surgery.* 2015; 4: 325-330.
11. Chianakwanam GU, Ihegihu CC, Okafor PI, Anyanwu SN, Mbonu OO. Adult surgical emergencies in a developing country: The experience of Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State Nigeria. *World J Surg.* 2005; 29: 804-808.
12. Agbo PS, Oboirien M. A one year retrospective review of admissions into the accident and emergency department of Usman Dan Fodiyo University Teaching Hospital, Sokoto, Nigeria. *Int Res J of Basic and Clin Studies.* 2014; 2 (5): 46-52.
13. Belaynew WT, Mensur OY, Zemene TK. Quality of emergency medical care in Gondar University Referral Hospital, Northwest Ethiopia: a survey of patients' perspectives. *BMC Emerg. Med.* 2014; 14: 2. doi:10.1186/1471-227X-14-2
14. Armon K, Stephenson T, Gabriel V, MacFaul R, Eccleston P, Werneke U, Smith S. Determining the common medical presenting problems to an accident and emergency department. *Arch Dis Child.* 2001; 84 (5): 390-392.
15. Karim MZ, Hansen EL, Ahmed BU, Lahiri IS. A retrospective study of illness and admission pattern of emergency patients utilizing a corporate Hospital in Dhaka Bangladesh. *Orion Medical J.* 2009; 33 (2): 650-53.
16. Gale SC, Shafi S, Dombrovskiy VY, Arumugam D, Crystal JS. The public health burden of emergency general surgery in the United States: A 10-year analysis of the Nationwide Inpatient Sample--2001 to 2010. *J Trauma Acute Care Surg.* 2014;77(2):202-8.
17. Ekere AU, Yellow BE, Umune S. Mortality patterns in the accident and emergency department of an urban hospital and emergency department of an urban hospital in Nigeria. *Niger J. Clin. Pract.* 2005; 8 (1): 14-18.
18. Akinpelu VO, Oladele OA, Amusa BY, Ogundipe KO, Adeolu AA, Komolafe OE. Review of road traffic accident admissions in a Nigerian tertiary hospital. *East and Central Afr J. Surg.* 2006;12 (1): 63-67.

19. Campbell WB, Lee EJK, Van de Sijpe K, Gooding J, Cooper MJ. A 25-year study of emergency surgical admissions. *Ann R Coll Surg Engl.* 2002; 84: 273-277
20. Solagberu BA, Adekanye AO, Ojogbu CP, Udoffa US, Abdur-Rahman LO, Taiwo JO. Epidemiology of trauma deaths. *West Afr. J. Med.* 2003; 22 (2): 177-81.
21. Krug EG, Sharma GK, Lozano R. The global burden of injuries. *Am J Pub Health.* 2000; 90 523 - 6.
22. Stewart B, Khanduri P, McCord C, et la. Global disease burden of conditions requiring emergency surgery *Br J. Surg.* 2014; 101:e9-22.
23. Davies MG, Shine MF, Lenno F. Surgical emergencies in Ireland. An audit of the emergency surgical caseload of an Irish district general hospital. *Ir J Med Sci.* 1990; 160 (10): 303-6.
24. Onyemaechi NO, Ofoma UR. The public Health threat of road traffic accidents in Nigeria: A call to action. *Ann Med Health Sci Res.* 2016; 6: 199-204.
25. Onyemaechi N.O.C, Oche IJ, Popoola S.O, Ahaotu FN, Elachi I.C. Aetiological Factors in Limb Amputation: The Changing Pattern! *Nig J Ortho and Trauma.* 2012; 11 (2): 79-83
26. Dada AA, Awoyomi BO. Is the trend of amputation in Nigeria changing: A review of 51 cases seen at Federal Medical Centre Ebute Metta Lagos, Nigeria. *Niger Med J.* 2010; 51(4): 167-169
27. Bain IM, Kirby RM, Cook AL, Oakley PA, Templeton J. Role of the general surgeon in a British trauma centre. *Br J surg.* 1996; (9):1248-1251
28. Masiira-Mukasa N, Ombito BR. Surgical admissions to the rift valley provincial general hospital Kenya. *East Afr.med J.* 2002; 79 (7): 373-378