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ORIGINAL ARTICLE

REFERRAL OF EMERGENCY SURGICAL PATIENTS IN A TERTIARY HOSPITAL, ADDIS ABABA, ETHIOPIA

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ABSTRACT

Introduction*: Referral is part of patient care when done appropriately. Common reasons for referral include seeking expert advice, technical examination and/or intervention, care beyond the facility's capacity.*
Objectives*: Determine the rate, reason for and type of cases referred among patients seen at surgical Emergency Room of SPHMMC during May to July 2015.*
Patients and Methods: *Cross sectional study was done at St. Paul's Hospital Millennium Medical College Emergency Room, including all surgical patients seen in three months period. Data was collected from the individual patient's medical records, records of the ER and the liaison office and Interns morning reporting book. Data was analyzed with SPSS version 20.*
Results: *Total of 2,492 patients were seen. The mean number of patients seen per day was 27.7 with a range from 13 to 51. Trauma made 70% (1746) of all cases seen. Cases that needed admission made 30.1% (755), but only 49.5 % (374) of them were admitted. The overall referral rate was 15.3%. The referral rate in patients who needed admission was 50.5 % (381). Trauma made 77.4% (295) of the referrals, mainly orthopedic, 54.6% (161) and neuro-traumas, 38% (112). Among non trauma cases acute abdominal conditions tops, 75% (56). Lack of inpatient beds was the main reason for referral 65.6% (250). Specialist care need was the reason for referral in 34.5% (131) of cases. Among patients referred only 14.4% (55) left the hospital at the time of referrals. Four percent (13) of the kept patients died in the ER waiting for referrals.*
Conclusions: T*he rate of referral from St. Paul's Hospital Millennium Medical College Emergency Room is high. It is higher in trauma cases, specifically orthopedic and neuro-traumas. Main reason for referrals was lack of bed. The capacity of the hospital and other hospitals in AA in absorbing traumas, specifically orthopedic and neuro-traumas need to be evaluated and necessary policy adjustments should be implemented. Further study at each hospital and the whole city gives better picture of referrals among hospitals in Addis Ababa.*

Key Word: referrals, emergency , inpatient beds

INTRODUCTION

Referral is a process by which a health worker/ facility transfers the responsibility of care to another health worker/facility or social worker (1). It is considered to be a two way process and ensures continuum of care. Referral can be vertical, horizontal or diagonal. It can happen between any of the following sectors; public, private, community based, traditional and alternative medicine practitioners (1). Implementation of a functional and well managed referral system leads to good health care quality. (2). It occurs in all fields of medicine. (2-5)

Referral doesn't occur only between health facilities but it can happen between nations (4). It occurs in all part of the world, developing and developed nations. In Ethiopia there is a very high rate of specialized care demand referral (both physician initiated and self referrals) within the country and abroad. (2-5)
Ethiopian health tier system is a three level care system starting with Primary level health care then secondary health care and the highest level, tertiary health care. The highest system is based on Specialized Hospital care and is expected to serve 3.5–5.0 million people. This includes St. Paul's hospital where this study was done.

According to the Ethiopian Federal Minster of Health (FMOH), reasons for referral may include: looking

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for expert advice, seeking technical examination and or intervention, care beyond the facility's capability, unavailability of resources or even patient preference (1).

Referral can demand significant cost to the individual patient in terms of transport and hospital cost (4-6). Referral rates from a tertiary care center should be close to zero. When one talk about referral it is both under referral and over referral. Under referral can result in significant mismanagement resulting in significant morbidity, mortality and cost. Over referral can also result in suffering of patients, increased mortality and reluctance of physicians and institute to improve .When appropriate referral can result improved patient outcome and decrease cost of care (6).

Much work has been done on reasons for referral to tertiary level hospital or abroad (2-5). There are also literatures showing the patterns of emergency admission, presentations and related issues (7). However, there is little in the literatures that show rate and pattern of referral from a tertiary level hospital to other centers. We conducted this study to identify why patients are referred from St. Paul's hospital Millennium Medical College (SPHMMC) and specifically to (i) determine the rate and reasons for referral of surgical patients from the emergency room (ER), (ii) determine the diagnoses of patients who were referred. To the best of our knowledge there are no similar studies in Ethiopia. Therefore, the result will be helpful for the hospital and other concerned bodies in understanding the situation and design appropriate actions.

PATIENTS AND METHODS

Study site: The Study was conducted at St. Paul's Hospital Millennium Medical College (SPHMMC) adult Emergency Room (ER). The ER gives service for all kinds of emergency medical and surgical cases and has 12 beds half of which are surgical. The surgical ER is run by a team of 03 surgical residents, 02 interns and an on call general surgeon. The pediatrics and Gyn/Obs ER are at different locations.
Totally there are 110 inpatient surgical beds, 18 for orthopedics, 12 for urology and the rest for general surgery. Inpatient beds are shared by both emergency and elective cases. The inpatient activity of the department of surgery is mainly general surgery, orthopedics and Urology. There is no neurosurgery, cardiothoracic or plastic and reconstructive inpatient care. During the study period there were 8 general surgeons, 03 orthopedic surgeons and 02 urologists.

Study design: A cross-sectional study was conducted at SPHMMC ER including all patients seen at ER from 1st of May to 31st of July 2015. By a lottery method a month (May) chosen and three months decided by the volume of patient flow seen at the ER. The source population for the study was all emergency patients seen at the adult ER of SPHMMC. Patients with emergency surgical conditions and need inpatient care were the study populations. Non surgical patients, patients who didn't need inpatient care or those admitted were excluded from the study. Patient was considered referred if he/she has a condition that needed an inpatient care but for whatever reason is not admitted at the time of presentation.

Data collection: Data was collected from the individual patient medical records, records of the OPD & the liaison office, and intern's morning report book which record the number of patients seen, their diagnosis, whether admitted or referred and the reason for referral when referred. Data was collected in two separate formats. The first format assessed the 24hours surgical activity of the ER i.e. total number of patients seen, category of diagnosis, how many were admitted and referred. The second format assessed individual refereed patient's specific diagnosis and the reason. Data was collected by a trained surgical resident who was not the treating physician. The process was supervised by investigators.

Data analysis: Collected data was checked for completeness, cleaned coded and entered in into SPSS version 20. The reasons and the type of diagnosis of referred patients were described with tables, graphs and level of significance assessed with a Chi square test. A confidence level of 95% & a P-value of <0.05 was considered significant. Ethical clearance was obtained from SPHMMC IRB. Data about individual patients records is used only for the study purpose and confidentiality maintained throughout the study .

RESULTS

General activity: During the three months 2492 patients were seen at the ER. Number of surgical patients seen per day ranged from 13 to 51 with an average of 27.7. In 72.2% of the days the number of cases seen ranged between 20 and 30. Trauma made 70% (1746) of the cases seen. Patients who needed inpatient care made 30.1 %(755) i.e. 8.4 patients per day. Among these only 374(49.5%) were admitted, number of admissions ranged from zero to 10 cases per day with a mean of 4.2 patients. Though trauma

made the majority of cases who needed admission, 52.8% (399), only 27.8 %(104) of trauma patients were admitted. The odds that a trauma patient will be referred were 8.9. There were 10 deaths on arrival; all of them were trauma patients.

Referrals: There were a total of 381 referrals making the overall referral rate 15.3% and referral rate among patients who needed admission 50.5%. Males made 76.4% (291) of the referral. The age of patients referred ranged from 14 to 80 years and averages at 37.3 years. Trauma made 77.4% of the referrals; orthopedic, neuro-trauma and burn were the main referrals accounting 54.5%(161), 38.0%(112) and 2.4% (7) of the referrals respectively. (Table 1)

Non trauma referral made 22.6 % (86) of the referrals. Acute abdominal conditions made 74.4% (66) of the non trauma referrals. Large bowel obstructions 29.7%(19), small bowel obstruction 20.3%(13), acute cholecystitis 17.2 %(11) and acute appendicitis 14.1%(9) were the most common conditions referred. All non trauma referrals were due to lack of bed. Table 1

Orthopedics referrals: Orthopedic referrals made the most common conditions referred, 54.5% of all trauma referrals and 42.3 of all the referrals. Among orthopedics patients, fractures accounted 92.0 % (149) of the referrals, Lower limb being the commonest site of fracture 70.3% (111). Femoral fracture among lower limb and radioulnar fractures among upper limb fractures were the most common conditions referred accounting 42.7%(50) and 50%(21) respectively . Fifty nine (39.1 %) of the fractures were open.

Table1; Characteristics of emergency surgical patients referred from the Adult emergency rooms of St. Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, May to July 2015

		Male		Female		Total	
		No.	%	No.	%	No.	%
type of diagnosis	Trauma	244	83.8	51	56.7	295	77.4
	non trauma	47	16.2	39	43.3	86	22.6
type of non trauma diagnosis	acute abdomen	38	80.9	28	71.8	66	76.7
	non acute abdomen	9	19.1	11	28.2	20	23.3
type/site of trauma diagnosis	Orthopedics	126	51.6	35	68.6	161	54.6
	Neurosurgical	97	39.8	15	29.4	112	38.0
	Skin(Burns)	7	2.9	0	0	7	2.4
	Chest	4	1.6	0	o	4	1.4
	Urology	3	1.2	0	0	3	1.0
	poly trauma	2	0.8	1	2.0	3	1.0
	maxillofacial trauma	3	1.2	0	0	3	1.0
	Abdominal	1	0.4	0	0	1	.3
	Vascular	1	0.4	0	0	1	.3
Types of diagnosis in acute abdomen	large bowel obstructions	16	42.1	3	11.5	19	29.7
	small bowel obstruction	7	18.4	6	23.1	13	20.3
	acute cholecyttitis	3	7.9	8	30.8	11	17.2
	Appendicitis	7	18.4	2	7.7	9	14.1
	Cholangitis	4	10.5	3	11.5	7	10.9
	perforated pud	1	2.6	1	3.8	2	3.1
	Pancreatitis	0	1	1	3.8	1	1.6
	infected hydatid cyst	0	1	1	3.8	1	1.6
	perinephric abscess	0	1	1	3.8	1	1.6

Table 2. Details of patients referred with orthopedics trauma from adult emergency rooms of St. Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, May- June 2015

		Male		Female		Total	
		No.	%	No.	%	No.	%
type of orthopedics diagnosis	Fracture	123	96.3	26	74.3	149	92.0
	fracture dislocation	2	1.6	3	8.6	5	3.1
	soft tissue injuries	1	0.8	2	5.7	3	1.9
	ligament or tendon injury	1	0.8	1	2.9	2	1.2
	post traumatic gangrene	0	0	2	5.7	2	1.2
	traumatic amputations	0	0	1	2.9	1	0.6
Type of fracture	Closed	77	62.1	15	55.6	92	60.9
	Open	47	37.9	12	44.4	59	39.1
Fracture site	lower limb	87	70.2	24	70.6	111	70.3
	upper limb	30	24.2	8	23.5	38	24.1
	both upper and lower limb	7	5.6	2	5.9	9	5.7
Upper limb fracture sites	Radio-ulnar	17	47.2	4	66.7	21	50.0
	Humerus	14	38.9	1	16.7	15	35.7
	hand bone fractures	4	11.1	1	16.7	5	11.9
	Scapula	1	2.8	0	0	1	2.4
lower limb fracure site	Femur	42	44.7	8	34.8	50	42.7
	Tibiofibular	41	43.6	7	30.4	48	41.0
	Pelvis	3	3.2	3	13.0	6	5.1
	Malleolar	3	3.2	3	13.0	6	5.1
	femur & tibiofibular	3	3.2	0	0	3	2.6
	Patella	1	1.1	1	4.3	2	1.7
	Metatarsal	1	1.1	1	4.3	2	1.7

Neuro-traumas: Neuro-traumas made 38.0% (112) of the trauma referrals and 29.4% of all the referrals. Head injuries were the predominant condition referred 89.2% (99). Among head injury patients traumatic brain injury (TBI), 24.3% (25), depressed skull fractures, 20.4 %(21) and epidural hematomas 18.4 %(19) were the most common diagnosis at referral. Among spinal cord injury quadriplegia and paraplegia each made 50% (6) of the referrals. (Table 3)

Reasons for referrals: Lack of inpatient bed was the main reason for referral, 65.6% (250) while the need for specialist care was the reason in 34.4% (131). In trauma patients lack of inpatient bed accounted for 165 (55.9%) of the referrals. In non trauma patients lack of bed made 85 (98.8%) of the referrals. All neuro-trauma patients were referred for specialty care. In orthopedic conditions the main reason for referral was lack of bed, 156 (96.9%) while only 5 (3.1%) patients were referred for specialties care. The type of diagnosis was significantly associated with the reason for referral (X2=54.3 p=0.000). Among the referred patients only 14.4% (55) of the patients left the hospital at the time of the referral , the rest were kept until they get chance to be transferred or admitted 24 hours or later. Thirteen trauma patients died while waiting for referral.

Table 3. Details of patients referred with neuro-trauma from adult emergency rooms of St. Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, May- June 2015

		Male		Female		Total	
		No.	%	No.	%	No.	%
Type neurologic diagnosis	Head injury	85	87.6	14	100	99	89.2
	Spinal cord injury	12	12.4	0	0	12	10.8
Type of head injuries	TBI	21	23.9	4	26.7	25	24.3
	Depressed fracture	19	21.6	2	13.3	21	20.4
	Epidural hematoma	15	17.0	4	26.7	19	18.4
	Intra-cerebral hemorrhage	15	17.0	1	6.7	16	15.5
	Basal skull fracture	10	11.4	1	6.7	11	10.7
	Subdural hematoma	8	9.1	2	13.3	10	9.7
	Subarachnoid hemorrhage	0	0	1	6.7	1	1.0
Type of spinal cord injury	Paraplegia	6	50.0	0	0	6	50.0
	Quadriplegia	6	50.0	0	0	6	50.0

DISCUSSION

The result of our study showed St. Paul's ER to be relatively busy in accepting traumatic and non-traumatic emergency surgical conditions as shown by an average of 28 patients per day Trauma being the major work load. The rate of major emergency surgical conditions that needed inpatient care was also high. The relatively high trauma cases seen are consistent with The Global disease burden estimates which showed traumas to have significant share of the global disease burden, 38%. Which was also shown in Ethiopian and other developing nations studies (8-10). Taye et al. from Gondar showed in the general emergency OPD injury to be the main diagnosis among patients seen at Gondar University Hospital ER accounting for 14.5% of all the cases (surgical and non surgical conditions (11). The age and sex distribution of patients presented after injury is similar to other literatures in Ethiopia and outside; males and those between 20 and 40 years are the most commonly affected group. This group of the society is the most economically active and productive age group. (12) Hence the consequence to the individual patient, his/her family and the nation at large can easily be understood (13,14).

The study showed how the inpatient care capacity of St. Paul's is challenged. Only half of the patients who deserve inpatient care were admitted at the time of presentation, the time that is very critical to reduce both morbidity and mortality. When it comes to trauma the admission rate deteriorates even further. A similar finding was shown from Tikur Anbessa Hospital (TAH), AA by Elias and Tezera. On their analysis of orthopedics and major limb traumas at that hospital, only 740 (31.2%) of patients were admitted to TAH out of 2372 whose condition required urgent inpatient care (15). This indicates our hospitals are not well prepared despite growing rate of traumas (13).

Literatures assessing rate and pattern of emergency referrals are scarce. In the USA, approximately 4.5 % of all outpatient visits result in referral (16,17). Though there is no standard for minimum rate of referral from a tertiary hospital, the case in SPHMMC revealed a high overall referral rate (15.3%) and a 50% referral rate among patients who needed admission . We couldn't find literature from Ethiopia or other part of the world that shows the rate and magnitude of emergency surgical referrals to compare. The referral rate in trauma was even worse (77.4%). As there is no neuro-trauma and plastic surgery care, all of the cases with neuro-traumas and PLR injuries were referred. Though orthopedic injury care is there, due to high rate of extremity injury

which is beyond the capacity of the department, lack of adequate space, supplies & orthopedic surgeons the rate of orthopedic referral was high. The rate of non trauma emergency referral, though very low compared to trauma referrals, it also needs attention by the hospitals and responsible offices. The relatively high admission rate for non trauma cases is probably due to the hospital's better experience and organization with general surgical care. It should be underlined that referral when indicated is important but inappropriate or over referral can cost the individual patient a lot and the hospital can lose public trust. Hence the hospital needs to look into the appropriateness of these referrals by analyzing the individual data and its capacity.

The finding that orthopedic referrals made the most common conditions referred, 54.5% of all trauma referrals and 42.3 of all referrals, tells the hospitals capacity in handling such conditions is not in good shape. The details of the patient showed mainly open fractures which needed immediate debridement, femoral and radio-ulnar fractures which almost always need open reduction and internal fixation to be the main referrals. Fracture as most common major injury and lower limb injury the main site was also reported by others. A report from Tikur anbessa hospital showed the leg was the commonest limb site injured 1602 (22.2%), followed by the forearm 1399 (19.6%) (15). Similarly a study from India revealed that the most common presentation of injuries to be fractures 68.6% (762) and the most common site was lower limbs, 48.16 % (367) (18).

Neuro-traumas were the second most common reason for referrals; head injury being the main condition. Both head injury and spinal cord injury have a very high mortality and morbidities even when attended. The reported rate of mortality following head injuries is high. A study in Jimma showed a mortality rate of 21% among those treated in the hospital (19). Biluts from TAH showed among patients with trauma isolated head injury was major cause of death, 59.2%. (20). Considering these facts the morbidity and mortality of patients seen at SPHMMC ER would be worse due to delay in transporting and getting definitive treatment .

Though no standard for the number of beds that should be available per 1000 populations, hospital beds are used to indicate the availability of inpatient services. Hospital beds include inpatient beds available in public, private, general, and specialized hospitals and rehabilitation centers. Experiences form practicing surgeons outside Addis Ababa indicates that the lack of beds is not a reason for referral from a hospital, because there are reasonably enough beds to admit patients or they will be admitted in any space available in the hospital. The world bank report also support this idea , according to the world bank Ethiopia had 6.3 beds per 1000 persons in 2011, which is a relatively high compared to most African and non African developing nations and even comparable to some European nations (21,22).

Even if the figure says there are fairly good number of beds, this study showed the main reason for referral from SPMMC was lack of beds. This indicates the inadequacy of the infrastructure in this hospital and other hospitals in Addis Ababa and its surroundings. It's not a surprise to understand this, because the population of Ethiopia and Addis Ababa has increased while no new public hospital or major expansion of existing public hospital in AA happened in the last 3 to 4 decades. The functioning hospitals are overburdened by case loads, understaffed and poorly equipped. Poor infrastructures in sub-Saharan African countries were also shown. (23,24). Renee Y. et al. showed only 50% of hospitals have a capacity to provide 24 hours emergency service. (25). Galukande, in their study on essential surgery status in three east African countries, reported there was significant lack of service, and despite an increase in the population size no expansion of existing hospitals (22).

From a tertiary level specialized hospital referring patients for specialist care is expected to be very low but that was not the case at SPHMMC. Our study showed among referred patients 35% of them were referred for specialist care mainly neuro-trauma and complicated orthopedics injuries. Trauma patients were also more likely to be referred due to lack of bed compared to non traumic surgical conditions. These finding suggest that the hospital need to increase its capacity in absorbing such conditions by opening new services like neuro-trauma and expand/ improve the existing orthopedic care. The non traumatic surgical care was reasonably acceptable.

It should be understood that not only St. Paul's but other hospitals in AA have inadequate infrastructure to absorb all or most emergencies; it is evident by the fact that among the referred patients only 14.4% (55) of the patients left the hospital at the time of the referral. One can easily see how much the ER can be crowded. Poor infrastructure development and in adequate capacity of health facilities in low and middle income countries was also shown by Adam and et al (10). As this is only a single center short study

based on hospitals documentations/records the full picture of the problem may not be shown.

***Conclusion and recommendations*:** The overall referral rate from the ER in SPHMMC is high which is worse in trauma patients. The main conditions referred were Orthopedic and neuro traumas patients. Dedicating emergency trauma and non trauma beds in the ER and increasing the overall inpatient bed can reduce referral rate and the attending morbidity and mortality. Equipping the ER and the OR better can also help in increasing patient turnover. The capacity of the hospital and other hospitals in AA in absorbing traumas, specifically orthopedic and neuro-traumas need to evaluated and necessary policy adjustments should be implemented. Further study at each hospital and the whole city gives better picture of referrals among hospitals.

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REFERENCES

1. Ethiopian Federal Minster of Health. Patient referral implementation guideline. 2010
2. Abate B, Enquselassie F. Information use in patients' referral system at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. Ethiop Med J. 2010;48(2):123-35.
3. Kitilla T. Reasons for referrals and time spent from referring sites to arrival at Tikur Anbessa Hospital in emergency obstetric: A prospective study. Ethiop. J. Health Dev. 2001;15(1):17-23
4. Bezabih B. Wamisho B. Referrals of Ethiopian Orthopedic Patients for Treatment Abroad. East Cent. Afr. J. surg. 2013;18(1):3-9
5. Teffera E, Lemma B, Wamisho B. Referral of Surgical Patients Abroad: A 5-years Review from a Tertiary Teaching Hospital in Addis Ababa Ethiopia. East Cent. Afr J Surg 2010;15(2):47-51
6. Martin T. Donohoe, Richard L. Kravitz, David B. Wheeler, et al. Reasons for Outpatient Referrals from Generalist to Specialists. J Gen Intern Med 1999;14:281-6
7. Tadesse B, Tekilu S, Nega B, Seyoum N. Pattern of Injury and Associated Variables as Seen in the Emergency Department at Tikur Anbessa Specialized Referral Hospital, Addis Ababa, Ethiopia. East Cent. Afr. J. surg. 2014;19 (1): 73-82
8. Wolde A, Abdella K, Ahmed E, Tsegaye F, Babaniyi O, Kobusingye O, Bartolomeos K. Pattern of Injuries in Addis Ababa, Ethiopia: A One-year Descriptive Study. East Cent. Afr. J. surg. 2008;13(2)14-22
9. Woldemichael K, Berhanu N. Magnitude and Pattern of Injury in Jimma University Specialized Hospital, South West Ethiopia. Ethiop J Health Sci. 2011;21(3): 155-65.
10. Kushner A, CherianM, Noel L, Spiegel D, Groth S, Etienne C. Addressing the Millennium Development Goals From a Surgical Perspective. Surgery and Anesthesia in 8 Low- and Middle-Income Countries. Arch Surg. 2010;145(2):154-60
11. Wassie B, Taye T. Quality of emergency medical care in Gondar University Referral Hospital, Northwest Ethiopia: a survey of patients' perspectives. BMC Emergency Medicine 2014;14:2.
12. Mathers CD, Lopez AD, Murray CJL (eds): The Burden of Disease and Mortality by Condition: Data, Methods, and Results for 2001. 2006. Global Burden of Disease and Risk Factors, New York: Oxford University Press, pp45–93.
13. A. Azaj, N. Seyoum, and B. Nega. Trauma in Ethiopia Revisited: A systematic Review. East Cent. Afr.J surg. July/August 2013;18(2): 108-18
14. Tsegaye F, Abdella K, Ahmed E Tadesse T. Bartolomeos K. Pattern of Fatal Injuries in Addis Ababa, Ethiopia: A One-year Audit. East and Central African Journal of Surgery 2010;15(2):10-17
15. Elias A, Tezera C. Orthopedic and Major Limb Trauma at the Tikur Anbessa University Hospital, Addis Ababa - Ethiopia. East Cent. Afr. j Surg. 2005 ;10(2):43-50
16. Franks P, Clancy CM. Referrals of adult patients from primary care: demographic disparities and their relationship to HMO insurance. J Fam Pract. 1997;45:47-53.
17. Cortazzo JM, Guertler AT, Rice MM. Consultation and referral patterns from a teaching hospital emergency department. Am J Emerg Med 1993;11(5):456-9.
18. Huda N, Gupta P, Pant A et al. Pattern of Orthopaedic injuries among patients attending the emergency de-

partment in a tertiary care hospital – An analytical study. Acta Medica International 2014;1(1):10-14
19. Aenderl I, Gashaw T, Siebeck T, Mutschle W. Head Injury A Neglected Public Health Problem: A Four Month Prospective Study At Jimma University Specialized Hospital, Ethiopia. Ethiop J Health Sci. 2014; 24 (1):27-34
20. Biluts H, Bekele A, Kottiso B, Enqueselassie F, Munie T. In-patient surgical mortality in Tikur Anbessa Hospital: a five-year review. Ethiop Med J. 2009 Jan;47(2):135-42.
21. World development indicators, Table 2.15. 2015. http://data.worldbank.org/indicator/SH.MED.BEDS.ZS
22. Galukande M, von Schreeb J, Wladis A, Mbembati N, de Miranda H, et al. (2010) Essential Surgery at the District Hospital: A Retrospective Descriptive Analysis in Three African Countries. PLoS Med 7(3): e1000243. doi:10.1371/journal.pmed.1000243
23. Debas H, Gosselin R, McCord C, Thind A. Surgery. In: Jamison D, ed. 1. Disease control priorities in developing countries. 2nd edn. New York: Oxford University Press; 2006.
24. Ozgediz D, Jamison D, Cherianc M, McQueend K. The burden of surgical conditions and access to surgical care in low- and middle-income countries. Bull WHO. 2008,86 (8)
25. Hsia R, Mbembati N, Macfarlane S, Kruk M. Access to emergency and surgical care in sub-Saharan Africa: the infrastructure gap Health Policy and Planning 2012;27:234–244