IN-HOSPITAL MORTALITIES IN GENERAL SURGERY UNIT, KORLE BU TEACHING HOSPITAL

Dakubo JCB & Naaeder SB
Department of Surgery , University of Ghana Medical School, Korle Bu. Accra.

Abstract

Background: In-hospital mortality data is an invaluable resource that has been employed over the years to assess the quality of care provided to patients.

Materials and Methods

A retrospective study was carried out from January 1999 to December 2012. Data was collected from the information sheets provided by the Department of Surgery for the monthly morbidity and mortality meetings. Information extracted included the total number of admissions and deaths, the demography of the deaths, duration of admission, diagnosis and cause of death.

Results

Total admissions were 37,034 with 2033 deaths giving a mean crude mortality rate of 5.5%. Detailed analysis in this study was based on 2011 cases whose complete data was available. Males accounted for 1074 (53.4%) and females 937 (46.6%). Their mean age was 53.8 ±18.6 years. Malignancies were 890 (44.3%) whilst non-malignant conditions were 1121 (55.7%). Of the non-malignant cases 1007 (89.9%) were emergency or urgent. The most frequent malignant conditions were breast cancer 204 (22.9%), colorectal cancer 144 (16.2%), pancreatic cancer 133 (14.9%) and gastric cancer 130 (14.6%); while that for the non-malignant conditions were diabetic septic conditions 219 (19.5%), gastro-intestinal bleeding 136 (12.1%), typhoid perforation 76 (6.8%) and perforated peptic ulcer 75 (6.7%). The overall median length of stay was 7 days, Interquartile Range (IQR),was 2-16 days. Non-malignant cases stayed shorter compared with the malignant cases, 5 as against 9 days, z = -8.9, Asymp. Sig. (2-sided) of 0.0001. Septicaemia and septic shock combined were the commonest cause of death in 719 (35.8%) cases, followed by metastatic tumour - 629 (30%).

***Conclusion*:** Death was inevitable in a large proportion of the cases admitted to the General Surgery unit of Korle-Bu Teaching Hospital largely because of the nature of the surgical pathology at presentation.

Key Words: mortality rates, malignancies, diabetic septic conditions, breast cancer

Background

Death is a definite and an easily measurable end point. Mortality rates are therefore considered to be an accurate means of assessing the performance of a health institution. In-hospital mortality rates, either crude or standardized, have been employed over the years in determining the quality of care that individual hospitals offer to patients with hospitals ranked accordingly[1]. Even though genuine concerns have been raised with this use of mortality data, it still remains an invaluable tool that guides clinical practice. Health institutions are therefore required to continuously collect data on deaths to enable the evaluation of their performance since an alternative effective tool is yet to be defined[2].

Korle-Bu Teaching Hospital (KBTH) is a 2,000-bed capacity hospital with daily admissions of about 250 patients[3]. The surgical department is the largest of all the clinical departments of the hospital and currently has nine units: General Surgery, Plastic Surgery, Trauma and Orthopaedic Surgery, Urology, Neurosurgery, Cardiothoracic Surgery, Paediatric Surgery, Ophthalmology and, Ear, Nose and Throat Surgery.

There are four wards in the General Surgery unit each with 38 beds, making a total of 152 beds. The average daily bed occupancy is 60% and the mean length of hospital stay is 11.6 days [3,4]. Each ward of the unit is manned, on average, by two active consultant surgeons, one senior and two junior surgical residents, two house officers as well as an average of 24 nurses.

The department of surgery holds monthly morbidity and mortality meetings during which the deaths that occurred in the previous month are discussed in detail. There has, however, never been a study to evaluate the mortality trends in the different units of the department.

This study was undertaken to specifically examine the pattern of diseases that led to mortalities in the General Surgery unit of KBTH over the past 14 years and to determine the in-hospital mortality rates over the period. It is expected that the outcome of this study will indicate the quality of surgical service in this institution and it will form the basis for the department and the hospital to institute corrective measures where necessary. This study may also encourage health care

Author for Correspondence:
Dr Jonathan CB Dakubo
Department of Surgery
University of Ghana Medical School
Korle Bu.
E mail: jdakubo@yahoo.com
Conflict of interest: None declared

facilities in the country to evaluate their morbidity and mortality data with a view to improving their quality of care.

Materials and Methods

This is a retrospective study of mortalities that occurred among patients admitted to the General Surgery unit of KBTH from January 1999 to December 2012. The source of data was records from the monthly morbidity and mortality meetings held in the Department of Surgery. The information provided on the data sheets used for the monthly morbidity and mortality meetings included the number of admissions for the period as well as the mortalities. Additionally, the data sheets contained the patient's age, sex, admission duration, diagnosis, cause of death and autopsy finding (where this was performed). This information was extracted for this study. The overall death rate, the individual annual death rates and standard error were calculated. The mean age of the cases and standard deviation were determined. The median and inter-quartile ranges were determined for admission duration before death, and the Wilcoxon Ranked Sum test used to compare medians. Statistical analysis was performed with the IBM SPSS version 19 software.

Results.

Data for 157 (93.5%) out of the 168 months were available for the study. Also, complete data for 2011 (98.9%) out of the 2033 mortalities was available for analysis.

Table 1. Mean crude annual and overall mortality rates

Year	Admissions	Mortalities	Mortality rates (%)
1999	1801	86	4.8
2000	1368	66	4.8
2001	3088	168	5.4
2002	2938	159	5.4
2003	2325	132	5.7
2004	2167	113	5.2
2005	3095	173	5.6
2006	2122	133	6.3
2007	2725	154	5.7
2008	3396	198	5.8
2009	2269	124	5.5
2010	3347	179	5.4
2011	3205	164	5.1
2012	3188	184	5.8
Overall	**37034**	**2033**	**5.5, SE=0.1**

A total of 37,034 admissions were recorded out of which 2033 died giving an overall mean crude mortality rate of 5.5%, range 4.8% to 6.3% with a standard error of 0.1%.This mortality rate drops to 3.1% when deaths from malignant diseases are excluded. The mean annual crude mortality rates for each year of the 14 years are shown in Table 1. Of the 2011 mortalities males accounted for 1074 (53.4%) and females 937 (46.6%). The overall mean age was 53.8 years, ± 18.6 years, range 13 - 105 years.

Eight hundred and ninety (44.3%) of the cases died from malignant diseases whilst 1121 (55.7%) died from non-malignant conditions, mostly septic conditions. Of those who died from non-malignant conditions 1007 (89.9%) were emergency or urgent cases.

Table 2. Deaths from malignant conditions

Type of Malignancy	Number	(%)
Breast Cancer	204	22.9
Colon and rectal Cancer	144	16.2
Pancreatic Cancer	133	14.9
Gastric Cancer	130	14.6
Hepatic Cancer	65	7.3
Gallbladder Cancer	32	3.6
Lymphoid malignancies	28	3.2
Carcinomatosis Peritoniea	25	2.8
Thyroid Cancer	13	1.5
Oesophageal Cancer	13	1.5
Chlolangiocarcinoma	12	1.4
Cervical Cancer	12	1.4
Prostate Cancer	9	1.0
Retroperitoneal tumour	9	1.0
Ovarian Cancer	7	0.8
Anal Cancer	6	0.7
Endometrial Cancer	5	0.5
Fibrosarcoma	5	0.5
Rhabdomyosarcoma	5	0.5
Adrenal tumour	4	0.4
Periampullary Cancer	4	0.4
squamous Cell Cancer of Skin	4	0.4
Sarcoma	3	0.3
Lung Cancer	2	0.2
Malignant Melanoma	2	0.2
Nasopharyngeal Cancer	2	0.2
Pseudomyxoma Peritonei	2	0.2
Parotid Cancer	2	0.2
Urinary Bladder Cancer	2	0.2
Iliac bone tumour	1	0.1
Jejunal Tumour	1	0.1
Testicular Cancer	1	0.1
Tongue Cancer	1	0.1
Renal Cancer	1	0.1
Desmoid Tumour	1	0.1
Total	**890**	**100**

The most frequent malignant conditions, in decreasing order, were breast cancer 204 (22.9%), colorectal cancer 144 (16.2%), pancreatic cancer 133

(14.9%), gastric cancer 130 (14.6%) and primary liver cell carcinoma 65 (7.3%), Table 2.

There were 1121 (55.7%) patients who died from non-malignant conditions. The most frequent diagnosis patients presented with included diabetic foot; which included ulcers, cellulitis, abscesses, plantar fasciitis, gangrene and osteomyelitis of the foot
and leg; and other diabetic septic conditions such as ischiorectal and palma abscesses, necrotizing fasciitis and pyomyositis. These diabetic complications accounted for 219 (19.5%) cases and were followed by gastro-intestinal bleeding 136 (12.1%), typhoid ileal perforation 76 (6.8%), peptic ulcer perforations 75 (6.8%) and strangulated hernias 69 (6.1%), Table 3.

Table 3. Deaths from Non- Malignant Conditions

Disease	**No**	**(%)**
Diabetic Complications	219	19.5
Gastrointestinal Bleeding	136	12.1
Typhoid Perforation	76	6.8
Perforated Peptic Ulcer	75	6.7
Strangulated Hernias	69	6.2
Adhesive Intestinal Obstruction	68	6 .1
Obstructive Jaundice	52	4.6
Arterial Leg Gangrene	46	4.1
Intra-Abdominal Sepsis	45	4.0
Trauma	44	3.9
Appendicitis/Complications	43	3.8
Vovulus	29	2.6
Enterocutaneous Fistula	25	2.2
Other Intra-abdominal sepsis	17	1.5
Cellulitis	17	1.5
Necrotizing Fasciitis	17	1.5
Abscesses	15	1.3
Abdominal Tuberculosis	12	1.1
Hepatic Abscesses	11	1.0
Aneurysms	10	0.9
Goitre	9	0.8
Cholecysttis/cholelithiasis	7	0.6
Deep Vein Thrombosis	7	0.6
Enteric Fever	7	0.6
Cirrhosis	7	0.6
Gastric outlet Obstruction	6	0.5
Ischiorectal Abscess	6	0.5
Hypersplenism	5	0.4
Intussusception	4	0.4
Ischaemic ilial stricture	4	0.4
Others	33	2.9
Total	**1121**	**99.3**

Table 4 details the duration of stay of the patients before death. The overall median length of admission was 7 days (IQR = 1 - 131 days), with an inter-quartile range of 14 days (2-16 days). The median admissions were 9 and 5 days for malignant and non malignant cases respectively with a z score of -8.9 and Asymp. Sig. (2-sided) of 0.0001. As many as 75% of patients presenting with emergency intra-abdominal condition: volvulus, abdominal trauma, typhoid perforation, strangulated hernia, perforated peptic ulcer and other intra-abdominal septic conditions (ascending pelvic inflammatory disease, intra-abdominal abscesses, primary peritonitis, spontaneous bowel perforation and ischaemic gangrene of the bowel), and Gastrointestinal bleeding died within the first week of admission.

Table 4. Duration of admission

Non-Malignant	No	Median (Days)	IQR	(Days)
Volvulus	29	1	3.5,	1 – 4.5
Enteric fever	7	1	7.0,	1 - 8
Trauma	44	2	4.8,	1 – 5.8
Typhoid Perforation	76	2	6.5,	1 – 7.5
Strangulated Hernia	69	2.5	5.8,	1 – 6.8
Perforated Peptic Ulcer	75	2.5	8.3,	1 – 9.3
UGIB	104	3	5.8,	1 – 6.8
Peritonitis	45	3	6.5,	1 – 7.5
Hepatic Abscesses	11	3	8.0,	1 - 9
LGIB	32	3	9.0,	1 – 10
Goitre	9	4	4.5,	2.5 - 7
Appendicitis + Complications	43	4	6.0,	2 -8
Intestinal Obstruction	68	4	9.0,	1 - 10
Pancreatitis	17	4	11,	1 - 12
Cirrhosis	7	5	20,	2 - 22
Abscess, Pyo-myositis, NF	38	5.5	22,	2 - 24
Arterial foot gangrene	6	9	12,	3 - 15
Diabetic sepsis	45	10	15,	4 - 19
Hypersplenism	5	10	19,	4.5 – 23.5
Aneurysm	10	10.5	13,	6.5 – 19.5
Diabetic foot	174	11	15,	5 - 20
Cellulitis	17	11	30,	4 - 34
Cholecystitis/ Cholelithiasis	7	12	14.8,	2 -16.8
Abdominal Tuberculosis	12	12	17,	6 - 23
Deep Vein Thrombosis	7	12	20,	10 - 30
Obstructive Jaundice	52	12.5	19.5,	4.8 – 24.3
Enterocutaneous Fistula	25	14	21,	5.5 – 26.5
Gastric Outlet Obstruction	6	23	5.3,	12.3 - 7
Others	41	-	-	
Total	**1121**			

NF: Necrotising fasciitis

Septicaemia and septic shock combined were the commonest cause of death in 719 cases (35.8%), followed by metastatic tumour - 624 (31.0%), liver failure - 146 (7.3%) and severe anaemia - 133 (6.6%), Table 5. Other significant causes of death were heart

failure 93 (4.6%), hypovaleamic shock 90 (4.6%) and pulmonary embolism 88 (4.4%).
Autopsies were performed on 1086 (54.0%) of the mortalities to confirm the diagnosis, the remaining 925 (46.0%) did not undergo autopsy examination.

Table 5. Cause of Death.

Cause of death	Number	(%)
Septicaemia & Septic Shock	719	35.8
Metastatic Cancer	624	31.0
Liver Failure	146	7.3
Anaemia	133	6.6
Heart Failure	93	4.6
Hypovolaemic Shock	90	4.5
Pulmonary Embolism	88	4.4
Respiratory Failure	33	1.6
Renal Failure	26	1.3
Electrolyte Imbalance	16	0.8
Abdominal Tuberculosis	14	0.7
Cerebrovascular Accident	9	0.4
Malnutrition	7	0.3
Intra-cranial Haemorrhage	4	0.2
Suicide	2	0.1
Poisoning	2	0.1
Diabetic Ketoacidosis	2	0.1
Thyrotoxic Crisis	1	0.05
AIDS	1	0.05
Tetanus	1	0.05
Total	**2011**	**100**

Discussion

Mortality rates are being used increasingly to compare outcomes between individual surgeons, surgical units or hospitals, and to construct league tables of the quality of surgical care[5]. but this has currently been disputed. O'Lear DP et al have shown that there are confounding factors, such as socio-cultural and economic factors, outside the direct influence of hospital policy that influence mortality but which are hardly controlled for[6]. In this study septicaemia and septic shock accounted for most deaths followed by deaths from malignant disease. These patients were admitted with advanced stages of sepsis or malignancy due to late reporting largely because of socio-cultural beliefs and economic challenges, factors which the department could not have influenced.

Lilford R et al[2] have argued on the inferiority of using mortality rates to judge performance of hospitals to either reward or rebuke. They have particularly shown how errors of bias affect both the internal and external validity of the data as well as the analysis usually performed to determine the quality of care based on the mortality rates. From the forgoing it appears that the issue of how best to improve quality of care for a given surgical unit and how best to be accountable to the public, based on treatment outcomes, remains elusive and open to debate. Utilization of mortality data to inform both clinical practice and institutional policy remains invaluable, nonetheless.

With an average of seven doctors for each ward of the General Surgery unit at Korle Bu Teaching Hospital and a daily mean bed occupancy rate of 60%, a bed to doctor ratio of 5:1 and a daily patient to doctor ratio of 3:1 is what pertains currently in the surgical unit of the department. These ratios, however, have been variable over the years and this could reflect on the adequacy and effectiveness of the coverage of patients by doctors. The nursing complement of 24 nurses in a ward, which has also been variable over the years, is inadequate for effective nursing. Mortality has gone up by 1% in the 14 years under study. Education of the public to report early, etc could cut the over 30% mortality due to infections.

The absence of home-care and hospice services for the terminally ill in Accra means that patients with terminal cancer will continue to be treated in the busy acute care health facilities. Cancers accounted for as many as 44.3% of all the deaths that occurred in the period studied. These patients were admitted for palliative care only and hence their outcome cannot determine the quality of care provided by the hospital. When these are excluded the crude overall mortality rate drops to 3.1%.

Cancer is the third commonest cause of admission, after cardiovascular and accidents/poisoning, at KBTH[7] and breast cancer is the most frequent cancer diagnosed[8] in Ghana. It is also the leading cause of cancer deaths and accounted for as many as 17% of all cancer deaths reported from autopsy studies at KBTH[9]. Late reporting to hospital accounts for this. A disturbing 60% of patients with breast cancer in Accra report to hospital with stages III and IV tumours, and they report when significant symptoms have been noticed for about ten months[10,11]. Of those who reported late 12.8% absconded during treatment and another ten percent did not complete their treatment[11] for various reasons including financial, fear of mastectomy, anxiety, lack of knowledge of the disease and other psychosocial factors[12,13]. The result is that these patients are seen later again when they are about to die.

Cancers of the colon and rectum were the second commonest causes of death and was followed by pancreatic cancer for which virtually no active treatment of the tumour was instituted except for a biliary bypass that was commonly performed to relieve the obstructive jaundice. Adequate treatment for large bowel cancer is rarely achieved in many of the cases that are diagnosed at KBTH. Only 30% of rectal cancers are resected because patients refuse colostomy[14] and up to 25% of colon cancers present

with intestinal obstruction[15]. Overall 66% of patients with colon or rectal cancer present with stage III and IV disease in this hospital.[14] These patients have a grim prognosis and no treatment, however aggressive, is likely to have significant influence on the outcome of their management.

Pearse RM et al have reported wide variations of crude and standardized surgical mortality rates from 28 different countries in Europe in non-selected non-cardiac surgical patients[16]. The variations were attributed to cultural, demographic, socioeconomic and political differences between the nations. The affluent countries had lower crude mortality rates compared with the less endowed countries (1.2% vs 21.5%). These factors, undoubtedly, affect population health. The overall mortality rate in this study was 5.5% which dropped to 3.1 when deaths from terminal cancers were excluded, and given the political and economic state of the country over the past one and half decades this compares favourably with rates reported from many of the countries they studied.

The patients in this study were relatively young, mean age 53 years, which is a good prognostic index. The variety of cases treated at the General Surgery unit at KBTH was wide. This is an important factor with a potential influence on the mortality rate observed. Majority of the cases who presented with non-malignant conditions were emergencies, 89.9%; they presented late and required critical care in an intensive care unit or a high dependency unit. The former could hardly be offered to the patients. A well-resourced intensive care unit with unrestricted access at KBTH has the potential to reduce deaths of critically ill patients with septic intra-abdominal conditions who frequently have respiratory and cardiovascular challenges.

A greater proportion of the non-malignant cases presented with septic conditions. Diabetes and its complications were the commonest presentation. The management of diabetic foot infections and other diabetic septic conditions remains a challenge at KBTH for several reasons: financial difficulties for the patient who has to bear the cost of treatment, low level of education and inadequate information available to patients, serious psychosocial problems that make patients interrupt care and seek unorthodox therapy including spiritual help, lack of patient empowerment and lack of diabetes control programmes[17]. These factors militate against effective management of patients with diabetic septic complications which have been reported to have a high mortality rate of 14.3% in Accra[18]. Our finding of diabetic septic complications as the leading cause of death among the patients who presented with non-malignant conditions concurs with this earlier finding.

Disease severity and the physiological reserves of the patient at presentation determines outcome as defined by the Physiological and Operative Severity Score for the Enumeration of Morbidity and Mortality (POSSUM)[19]. This and other standard physiological and operative scoring systems (ASA and APACHE II)[20] confirm that those in whom death is inevitable are usually more ill than those in whom death rates might reflect the quality of surgical care. In this study a large proportion of the patients, mostly the emergencies, with non-malignant conditions were very ill. Those with diabetic septic complications, gastrointestinal bleeding, intra-abdominal sepsis including those with typhoid and peptic ulcer perforations, volvulus and adhesive intestinal obstruction were particularly very ill but could not receive care in an intensive care unit. Additionally, the perennial shortage of blood for transfusion accounted for the deaths due to gastrointestinal bleeding. All these patients died shortly after admission.

The overall median duration of admission was 7 days; malignant cases stayed longer than the non-malignant cases with median lengths of stay of 9 and 5 days respectively. A majority of the non-malignant cases were septic abdominal conditions or gastrointestinal bleeding who presented in decompensated states. Earlier studies in this setting have shown that patients with typhoid or peptic ulcer perforations have high case specific fatality rates (11.7% and 11% respectively)[21,22], largely because many of the patients presented late in moribund states. The very short median length of stay of 2 and 2.5 days, respectively, before their demise is a reflection of the parlous state of these patients at the time of admission.

Septicaemia and septic shock combined were the leading cause of death followed by metastatic tumour and severe anaemia. These conditions take a toll on the physiological, metabolic and immunological reserves of the patient, and in the decompensated patient death is frequently inevitable.

Deep vein thrombosis is difficult to diagnose and very ill patients could already be nursing venous thrombosis at the time of admission and venous thromboembolic prophylaxis is unlikely to influence the outcome. Sudden death from pulmonary embolism, which appears to be a frequent feature at mortality meetings, accounted for 88 (4.4%) deaths over the period, an average of 6.3 deaths per year despite an institutional policy of thromboembolic prophylaxis for all patients at risk. This could be an underestimate given that not all the cases had autopsy examination. Reports from autopsy studies have estimated pulmonary embolism as cause of death to be as high as 10% among hospital patients [23, 24].

Conclusion

A high proportion of all deaths in the General Surgery unit during the study period were inevitable, largely because of the nature of the surgical pathology at presentation. The current overall crude mortality rate of 5.5% has been contributed to significantly by patients with terminal cancers. Resource limitation,

inadequate numbers of various clinical care professionals and unavailability of unrestricted intensive care service to the critically ill, for the many cases that presented as emergencies, could have contributed to the mortalities in the patients with septic conditions who constituted the majority of the non-malignant cases.

References

1. DuBois RW, Rogers WH, Moxley JH, Draper D, Brook RH. Hospital in-patient mortality: is it a predictor of quality? *N Engl J Med*. 1987; 317:1674-1680
2. Lilford R, Pronovost P. Using hospital mortality rates to judge hospital performance: a bad idea that just won't go away. *Brit Med J*, May 2010; 340: 955-957
3. Korle-Bu Teaching Hospital Annual Report; 2010
4. Korle-Bu Teaching Hospital Annual Report; 2012
5. Fit For the future. Dr Foster Hospital Guide 2012. Available at http://download.drfosterintelligence.co.uk/Hospital_Guide_2012.pdf. Accessed on 21/2/2013
6. O'Leary DP, Hardwick RH, Cosford E, Knox AJS. Does hospital mortality rate reflect quality of care on surgical unit? *Ann R Coll Surg Engl*. 1997; 79: 46-48
7. Biritwum RB, Gulaid J, Amaning AO. Pattern of diseases or conditions leading to hospitalization at Korle-Bu Teaching Hospital. *Ghana Med J.* 2000; 34:197-205
8. Clegg-Lamptey JN, Baako BN, Badoe EA. The Breast. In: Badoe EA, Archampong EQ and da Rocha-Afodu JT (editors). Principles and Practice of surgery including pathology in the Tropics, 4th edition. Accra. 2009: 488-519
9. Wiredu EK, Armah HB Cancer mortality patterns in Ghana, a 10-year review of autopsies and hospital mortality. Available from: http://www.biomedcentral.com/1471-458/6/159. Accessed on 8/5/2007
10. Archampong EQ. Breast cancer. *Ghana Med*. J. 1977; 162: 63
11. Clegg-Lamptey JNA, Hodasi WM. A study of breast cancer in Korle-Bu Teaching Hospital: assessing the impact of health education. *Ghana Med J*. 2007; 41(2):72-77
12. Clegg-Lamptey JNA, Dakubo JCB, Attobra YN. Psychosocial aspects of breast cancer treatement in Accra. Ghana. *EAMJ*. Jul 2009; 86(7):348-352
13. Clegg-Lamptey J, Dakubo J, Attobra YN. Why do breast cancer patients report late or abscond during treatment in Ghana? A pilot study. *Ghana Med J*. Sept 2009; 43(3): 127-131
14. Dakubo JCB, Naaeder SB, Tettey Y, Gyasi RK. Colorectal carcinoma: An update of current trends in Accra. *West Afr Med J*. 2010; 29: 178-183
15. Naaeder SB, Archampong EQ. Cancer of the colon and rectum in Ghana: a 5-year prospective study. *Br. J. Surg*. 1994; 81:456-459
16. Pearse RM, Moerno RP, Beuer P, Pelosi P, et al. Mortality after surgery in Europe: a 7 day cohort study. *The Lancet*. 2012; 380:1059-1065
17. Gwen Fernandes. Challenges in foot care for people with diabetes in Ghana. Wounds International. Available from; http://www.wounds international.com/practice-development. Accessed on 21/2/2013
18. Asumanu E, Ametepi R, Koney CT. Audit of diabetes soft tissue infection and foot disease in Accra. *West Afr Med J*. March-April 2010; 29: 81-85
19. Copeland GP, Jones D, Walter M. POSSUM: a scoring system for surgical audit. *Br. J. Surg* 1991; 78: 356-360
20. Knuas WA, Drape EA, Wagner DP, et al. Apache II: a severity of disease classification system. *Crit Care Med.* 1985; 13: 818-829
21. Clegg-Lamptey JN, Hodasi WM, Dakubo JBC. Typhoid ileal perforation in Ghana: a five year retrospective study. *Tropical Doctor* 2007; 37: 31-233
22. Dakubo JBC, Naaeder SB, Clegg-Lamptey. Gastroduodenal peptic ulcer perforation. *East Afr Med J* 2009; 86: 417-426
23. Sandler DA, Martin JF. Autopsy proven polmunary embolism in hospital patients: are we detecting enough deep vein thrombosis. *J Roy Soc Med*. 1989; 82: 203-205
24. MacDougall DA, Feliu AL, Boccuzzi SJ, et al. Economic burden of deep-vein thrombosis, pulmonary embolism, and post-thrombotic syndrome. *Am J Health Syst Pharm* 2006; 63(Suppl. 6): S5-15.