

Patterns of surgical admissions among geriatric patients admitted to Bugando Medical Centre, Mwanza, Tanzania

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Abstract

Background: Surgery in geriatric patients constitutes a major but neglected public health problem. It hence poses a great challenge to surgeons and general practitioners practising in a resource-limited setting. Geriatric patients are increasingly hospitalized in surgical wards in Tanzania and little information is currently available on this group of patients. This study aimed to determine the pattern of diseases and clinical outcomes among geriatric surgical patients at Bugando Medical Centre and to identify the predictors of outcomes among these patients in our local setting.

Methods and Patients: It was a cross-sectional study of geriatric surgical patients admitted to BMC from June 2017 to April 2018.

Results: Out of 304 geriatric surgical patients enrolled, males outnumbered females by a male to female ratio of 3.1: 1. The majority of patients were in the 7th decade of life. Associated medical comorbidities were reported in 107 (35.2%) patients. Urology speciality had the highest number of geriatric patients (101; 60.2%) admitted to BMC followed by general surgery in 70 (23.0%) patients. Gynaecology and Neurosurgery had the least number of geriatric patients with 4(1.3%) and 1(0.3%) patients admitted respectively. The majority of geriatric surgical patients, 286(94.1%) were treated surgically. A total of 168 patients (58.7%) developed postoperative complications. The mortality rate was 15.2% and it was significantly associated with long duration of illness, high American Society of Anesthesiologist class, operation under general anaesthesia and prolonged duration of the operation.

Conclusion: This study demonstrated that surgeries among geriatric patients are commonly performed at BMC and are associated with unacceptably high morbidity and mortality. Factors responsible for the high morbidity and mortality in our geriatric surgical patients should be addressed to improve the surgical outcomes in this group of patients.

Keywords: Geriatric surgical patients, disease patterns, clinical outcomes, Tanzania

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Introduction

Surgery in geriatric patients constitutes a major but neglected public health problem and poses a great challenge to surgeons and general practitioners practising in developing countries (Clausenet *et al.*, 2000; Onwuchekwa & Asekomeh., 2008; Iaria *et al.*, 2009; Wonget *et al.*, 2015). The developing world is experiencing an ageing population with its attendant increase in the burden of chronic diseases like

cancers, cardiac, renal and hepatic diseases (Onwuchekwa & Asekomeh., 2008; McVeigh et al., 2013; Wenjuan et al., 2014; Wong et al., 2015).

It is projected that the geriatric population will double in sub-Saharan Africa between 2000 and 2030 (Onwuchekwa & Asekomeh., 2008; Wong et al., 2015). With the rapid growth of the geriatric population, along with increased co-morbidities and greater life expectancy, geriatric surgery has become more frequent and requires careful tailoring of anesthesia techniques (Ahamat., 2012; Griffiths et al., 2014). The ageing process produces physiological, anatomical, and cognitive changes within the body's major organ systems. Such changes significantly impact perioperative outcomes (Etzion et al., 2003; Tosato et al., 2007). The rising demand for surgical interventions among geriatric patients necessitates accurate preoperative risk stratification techniques that apply to these patients (Turrentine et al., 2006; Bettelli., 2011; Mistry et al., 2017).

Geriatric surgical patients constitute a large part of overall surgical admissions in many centres in developing countries and consume tremendous health care resources; having a cost of almost three times that of young patients (Onwuchekwa & Asekomeh., 2008; Wong et al., 2015). One of the major tasks that face researchers in the field of geriatrics is the determination of appropriate outcome measures for elderly patients (Liu & Leung., 2000; Hamel et al., 2005). It is well established that outcomes after geriatric surgery are significantly worse than in younger patients, resulting in disproportionate healthcare costs, increased mortality, and long-term morbidity (Jacobs, 2003; Stevens et al., 2006). The poor outcome in geriatric surgical patients can be ascribed to comorbid medical illnesses as well as to a poor physiological reserve resulting from ageing process (McVeigh et al., 2013; Wenjuan et al., 2014; Wong et al., 2015).

Even though surgery in the geriatric patients consumes a significant proportion of healthcare resources, many surgical types of research in developing countries like Tanzania have focused on the pediatric and young adult populations (Onwuchekwa & Asekomeh., 2008; Wong et al., 2015). At present geriatrics has not been fully established as a specialty in Tanzania and there is little information about the disease pattern of the elderly to form the basis of any meaningful plan of action to reduce mortality and morbidity in this group. Furthermore, there is a paucity of published clinical studies regarding the disease pattern of the elderly in Tanzania. Hospital-based data from local settings are required for effective planning of health services for the rapidly growing elderly population. Therefore, this study aimed to determine the pattern of diseases and clinical outcomes among geriatric surgical patients admitted to Bugando Medical Centre and to identify the predictors of outcomes among these patients in our local setting. The study provides local data that can help in the management of geriatric surgical patients in our setting.

Methods and Patients

Study design and setting

This was an analytical, cross-sectional study to determine the disease patterns and clinical outcomes of geriatric surgical patients admitted to Bugando Medical Centre from June 2017 to April 2018. The study was conducted in the surgical, urology, orthopedic, neurosurgery, ENT and gynecological wards of Bugando Medical Centre (BMC). BMC is a consultant, tertiary care and teaching hospital for the Catholic University of Health and Allied Sciences-Bugando (CUHAS-Bugando) and has 890 beds. The hospital is located in Mwanza City, in north-western Tanzania and serves as a referral centre for tertiary specialist care for a catchment population of approximately 17 million people from neighbouring regions which are Mara, Kagera, Mwanza, Geita, Shinyanga, Simiyu, Tabora and Kigoma. It is attending more than 19000 geriatric patients yearly.

Study population

The study population included all patients aged 60 years and more admitted to the surgical, urology, orthopaedic, neurosurgery, ENT and gynaecological wards of Bugando Medical Centre during the period of study. Patients who failed to give proper history and those without next of kin to consent for the study were excluded from the study. Recruitment of patients was done in the surgical, urology, orthopaedic, ENT, neurosurgery and gynaecological wards of Bugando Medical Centre and thereafter followed up at the surgical outpatient clinic. Patients who met the inclusion criteria were consecutively enrolled in the study after an informed written consent was sought from the patient or next of kin. A geriatric surgical patient was defined as a surgical patient aged 60 years and above.

In all patients, assessment was done by a detailed history, physical examination and relevant investigations. Relevant routine preoperative investigations included samples for bacterial culture, hemoglobin levels, packed cell volume, serum electrolytes, urea and creatinine, blood grouping and cross matching and ESR. Radiological investigations included chest X-ray, abdominal x-ray, abdominal Ultrasonography, Doppler Ultrasound, CT scan, mammography etc. Other investigations such as endoscopic investigations were performed only on some patients as required. Intraoperative tissue biopsy was taken for histopathological studies in selected cases.

All patients were treated either surgically or non-surgically according to the disease patterns. Patients scheduled to undergo emergency surgery were admitted through the emergency department (EMD) after thorough resuscitation. Patients scheduled for elective surgery were admitted a day before surgery through the respective surgical clinics. Pre-operatively, all patients were assessed for fitness for surgery and anesthesia. Each patient was classified according to the physical status scale of the American Society of Anesthesiologists (ASA class), which assigns a risk level for surgery and anesthesia. The operations were performed either by a consultant surgeon or a senior resident under the direct supervision of a consultant surgeon. Operative findings were noted. Postoperatively all patients were managed as per BMC protocol. Daycare patients were discharged home on the day of operation after full recovery from anesthesia. Inpatients were discharged two to seven days after surgery depending on their physiological status of the patients. Patients were followed till discharge or death.

Data collection

Data on each patient were collected and entered into a pretested coded questionnaire prepared for the study. They included demographic profiles, diagnosis, associated pre-existing illness, clinical presentation, the treatment offered, and other operative characteristics.

Statistical data analysis

Data collected were cleaned and analyzed using STATA version 13. Continuous data were summarized using median with interquartile range. Categorical data were summarized using proportional and frequency tables. Odds ratio and 95% confidence interval were computed, and factors with *p-value* < 0.05 were considered statistically significant. To determine the predictors of mortality we used univariate followed by multivariate logistic regression. Factors with a *p-value* < 0.05 on univariate logistic regression were taken to the multivariate regression model. Multivariate logistic regression analysis was used to determine predictor variables that predict mortality.

Ethical considerations

Ethical approval to conduct the study was sought from the Joint CUHAS/BMC Research Ethics and Review Committee (CREC/209/2017). Permission to carry out the study was obtained from the hospital authority. Patients had the right to decide whether to participate or not and were assured of strict confidentiality.

Results

Socio-demographic and clinical characteristics

A total of 304 patients with geriatric surgical conditions were enrolled. Of these, 230 (75.7%) were males and 74 (24.3%) were females with a male to female ratio of 3.1: 1. This gender difference was found to be statistically significant (75.7% versus 24.3%; $p= 0.013$). The age at presentation ranged from 60 years to 97 years with the median age of 70 [IQR 64 – 77] years. The majority of patients were aged between 60 – 70 years accounting for 164 (54.0%) cases. One hundred sixty (52.6%) patients were from rural areas.

Associated medical co-morbidities were reported in 107 (35.2%) patients, of which, 67 (62.6%) had hypertension, 14 (13.1%) had Diabetes mellitus and the rest of the patients, 26 (24.3%) had other co-morbidities namely asthma, congestive heart failure, deep vein thrombosis, epilepsy, peptic ulcer disease and pulmonary tuberculosis. Generally, the duration of illness before admission in this study varied from 2 days to 4 years with a median of 6 [IQR, 4 -10] months. The majority of patients, 167(54.9%) had symptoms of less than 6 months duration at the time of presentation. Table 1 below summarizes the distribution of socio-demographic and clinical characteristics among geriatric surgical patients enrolled in the study.

Table 1: Socio-demographic and clinical characteristics among geriatric surgical patients treated at BMC

Patient's characteristics	Number of patients	Percentages
Gender		
Male	230	75.7
Female	74	24.3
Age (years)		
60-70	164	54.0
71-80	94	30.9
81-90	42	13.8
>90	4	1.3
Area of residence		
Rural	160	52.6
Urban	144	47.4
Comorbid medical illness		
Yes	107	35.2
No	197	64.8
Duration of illness (months)		
0-6	167	54.9
7-12	76	25.0
>12	61	20.1

Surgical specialties among geriatric surgical patients admitted to BMC

Urology specialty had the highest number of geriatric surgical patients (60.2%) admitted to BMC followed by general surgery in 23.0% of patients. Gynecology and Neurosurgery had the least number of geriatric patients with 1.3% and 0.3% of patients admitted respectively (Figure1). Out of 183 geriatric urological patients, Benign prostate hyperplasia was the most frequent urological conditions accounting for 79 (43,2%) cases as shown in Figure 2 below.

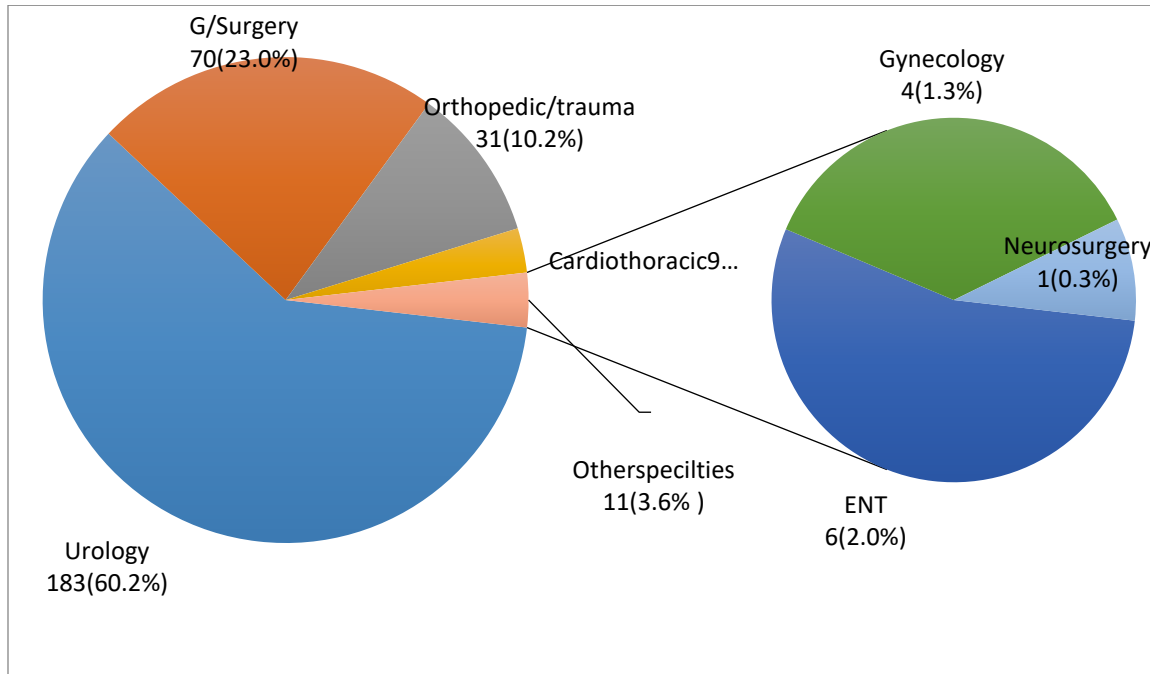


Figure 1: Distribution of geriatric surgical patients according to surgical specialties

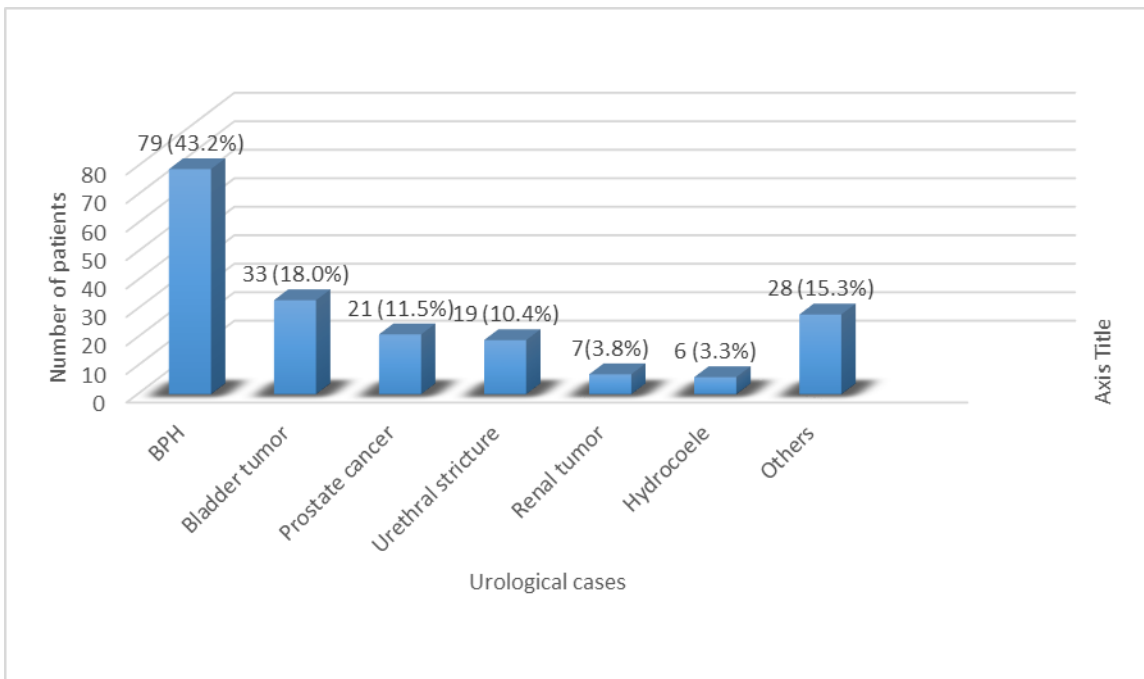


Figure 2: Distribution of geriatric surgical patients according to urological cases

Table 2: Distribution of surgical specialties according to diagnoses at admission among orthopedic and trauma, Cardiothoracic, ENT, Gynecology, and Neurosurgery geriatric surgical patients admitted to BMC

Surgical specialty	Diagnoses	Number of patients	Percent (%)
General surgery		70	23.0
	Chronic leg/diabetic foot ulcers	23	
	Breast cancer	18	
	Acute abdomen	10	
	Intra-abdominal masses	4	
	Gastric tumor	4	
	Colorectal cancer	3	
	Others	8	
Orthopedic/trauma		31	10.2
	Long bone fractures	27	
	Bone tumors	2	
	Dislocations	2	
Cardiothoracic		9	3.0
	Esophageal cancer	9	
ENT/Head & neck surgery		6	2.0
	Goiter	3	
	Nasopharyngeal tumor	1	
	Laryngeal tumor	1	
	Neck tumor	1	
Gynecology		4	1.3
	Cancer of the ovary	2	
	Cancer of the cervix	1	
	Cancer vulva	1	
Neurosurgery		1	0.3
	Traumatic brain injury	1	

Admission patterns, preoperative anesthetic assessment and treatment modalities

In this study, two hundred seventy-four (90.1%) geriatric surgical patients were admitted on elective basis and the remaining 30(9.9%) patients were admitted as emergency cases. All patients were assessed pre-operatively using the American Society of Anesthetists (ASA) pre-operative grading and the majority of them had ASA class I accounting for 48.4% of cases. Out of 304 geriatric surgical patients, 286(94.1%) were treated surgically and the remaining 18 (5.9%) were treated conservatively. The majority of surgical procedures, 214(74.8%) were performed by senior doctors (surgical specialists/consultants) and the remaining 72(25.2%) procedures were performed by junior doctors (registrars and surgical residents) under direct supervision of senior doctors. Most of patients, 197 (68.9%) underwent surgical procedures under spinal anesthesia. The duration of operation was less than 2 hours in the majority of patients (69.8%). Following surgery, the majority of patients, 269(94.0%) were admitted in their respective parent wards and the remaining 17 (6.0%) patients were admitted in the intensive care unit. Table 3 below shows distribution of geriatric surgical patients according to operative characteristics.

Table 3: Distribution of geriatric surgical patients according to operative characteristics

Operative characteristics	Number of patients	Percentages (%)
Nature of admission		
Emergency	30	9.9
Elective	274	90.1
Modality of Treatment		
Surgical	286	94.1
None surgical	18	5.9
Rank of a surgeon		
Junior	72	25.2
Senior	214	74.8
ASA Score		
I	147	48.4
II	121	39.8
III	36	11.8
Type of anesthesia		
Spinal	197	68.9
General	87	30.4
Others	2	0.7
Duration of operation		
<2hours	199	69.8
>2hours	87	30.2
Disposal of patient after operation		
Parent ward	269	94.0
ICU	17	6.0

Treatment outcome among geriatric surgical patients at BMC post-operative complications

Out of 286 geriatric surgical patients who underwent surgical treatment, 168 (58.7%) developed postoperative complications (Table 4)

Table 4: Distribution of geriatric surgical patients according to postoperative complications (N= 168)

Surgical specialty	Post-operative complications	Frequency	Percent (%)
Urology (n=101; 60.0%)	Poor urinary stream	33	32.7
	Urethral bleeding	27	26.7
	Urine retention	8	7.9
	Urine incontinence	6	5.9
	Surgical site infection	4	4.0
	Others	23	22.8
General surgery (n=38; 22.8%)	enterocutaneous fistula	7	18.4
	Septic amputation stump	6	15.2
	Surgical site infection	5	13.2
	Burst abdomen	4	10.5

	Non-healing ulcer	2	5.3
	Others	14	36.8
Orthopedic/trauma (n=14; 8.3%)	Non-union	3	21.4
	Shortening	3	21.4
	Surgical site infection	2	14.3
	Osteomyelitis	2	14.3
	Others	4	28.6
Cardiothoracic (n=11, 6.5%)	Dysphagia	10	90.9
	Tracheal injury	1	9.1
Ear Nose and Throat (n=2; 1.2%)	Dislodged tracheostomy tube	1	50.0
	Bleeding	1	50.0
Gynecology (n=2; 1.2%)	Vesico-vaginal fistula	1	50.0
	Urinary bladder injury	1	50.0

Mortality

In this study, forty-six geriatric surgical patients died giving a mortality rate of 15.2%. Table 5 below summarizes the predictors of mortality among geriatric surgical patients according to univariate and multivariate analyses.

Table 5: Predictors of mortality among geriatric surgical patients according to univariate and multivariate analyses

Predictor	Outcome		Univariate		Multivariate	
	Died n (%)	Survived n (%)	OR [95% CI]	p-value	OR [95% CI]	p-value
<i>Patient age group</i>						
60 – 70 years	24 (14.6)	140 (85.4)	1.0			
71 – 80 years	12 (12.8)	82 (87.2)	0.9[0.4-1.8]	0.677	-	-
81 - 99 years	10 (21.7)	36 (78.3)	1.6[0.7-3.8]	0.251	-	-
<i>Sex</i>						
Male	35 (15.2)	194 (84.8)	1.0			
Female	11 (14.9)	63 (85.1)	1.0[0.5-2.0]	0.941	-	-
<i>Residence</i>						
Rural	25 (15.6)	135 (84.4)	1.0			
Urban	21 (14.6)	123 (85.4)	0.9[0.5-1.7]	0.800	-	-
<i>Duration of illness</i>						
0-6 months	29 (17.4)	138 (82.6)	1.0			
7-12 months	12 (15.8)	64 (84.2)	0.9[0.4-1.9]	0.761	0.7[0.1-3.4]	0.016
> 12 months	5 (8.3)	56 (91.8)	0.4[0.2-1.2]	0.094	0.5[0.1-4.0]	0.531
<i>Nature of admission</i>						
Emergency	8 (26.7)	22 (73.3)	1.0			
Elective	38 (13.9)	236 (86.1)	0.4[0.2-1.1]	0.069	0.7[0.2-2.0]	0.464
<i>ASA class</i>						
1	14 (9.5)	133 (90.5)	1.0		1.0	
2	21 (17.4)	100 (82.6)	2.0[1.0-4.2]	0.062	1.7[0.7-4.0]	0.205
≥3	11 (30.6)	25 (19.4)	4.2[1.7-10.3]	0.002	3.3[1.1-10.0]	0.027
<i>Rank of surgeon</i>						
Junior	12 (13.3)	78 (86.7)	1.0			

Specialist	34 (15.9)	180 (84.1)	1.2 [0.6-2.5]	0.561	-	-
<i>Type of anesthesia</i>						
Spinal	18 (9.1)	180(90.9)	1.0		1.0	
General	23 (28.1)	64 (71.9)	3.6[1.0-7.1]	<0.001	1.5[1.1-43.0]	0.000
Local/Regional	2 (40.0)	3 (60.0)	6.87[1.0-42.6]	0.045	2.7[0.4-4.2]	0.633
<i>Modality of treatment</i>						
Surgical	43 (15.0)	243 (85.0)	1.0		-	-
Non-surgical	3 (16.7)	15 (83.3)	1.1[0.3-4.1]	0.856	-	-
<i>Duration of operation</i>						
< 2 hours	19 (9.6)	179 (90.4)	1.0		1.0	
>2 hours	24(27.9)	62 (72.1)	3.7[1.8-7.1]	<0.001	3.1[1.2-7.7]	0.018
<i>Surgical cases</i>						
Urology	21 (11.5)	161 (88.5)	1.0			
General surgery	17 (24.3)	53 (75.7)	2.5[1.2-5.0]	0.012	1.0[0.4-2.6]	0.938
Orthopedic	3 (9.7)	15 (90.3)	0.8[0.2-3.0]	0.720	0.7[0.1-3.8]	0.701
Others	5 (25.0)	15(75.0)	2.6[0.8-7.8]	0.095	1.8[0.5-7.2]	0.394

Others = ENT, Neurosurgery, Gynecology and Cardiothoracic

Disposal of the geriatric surgical patients

Out of the 258 survivors, 202 (78.5%) patients were discharged well, 26 (10.1%) were discharged with a permanent disability, 26 (10.1) were discharged for terminal care and 4 (1.5%) were discharged against medical advice.

Discussion

In this study, the highest age incidence of the patients at presentation was in the seventh decade of age and tended to affect more males than females, an observation which is by the results of other workers (Redondo-Sendino *et al.*, 2006; Onwuchekwa&Asekomeh., 2008; Wong *et al.*, 2015). The male predominance in this study could be explained by the fact that more than half of the patients in this study were urological patients and urological conditions affect more males than females.

In agreement with other studies (Onwuchekwa&Asekomeh., 2008; Wong *et al.*, 2015; Ilohet *al.*, 2015), in this study more than half of geriatric surgical patients came from rural areas. This observation has an implication for accessibility to health care facilities and awareness of the disease. In this study, associated medical co-morbidities were reported in more than one-third of patients; an observation which is in keeping with other studies (Ilohet *al.*, 2015; Mistry *et al.*, 2017). It has been shown in several studies that associated co-existing medical diseases is a major predictor of surgical outcomes among geriatric surgical patients (Hamel *et al.*, 2005; Chung *et al.*, 2014; Mistry *et al.*, 2017).

In the present study, urology specialty had the highest number of geriatric surgical patients, of which benign prostate hyperplasia, bladder tumor and urethral stricture were the most frequent geriatric urological conditions. This disease pattern agrees with a study done in Turkey (Brodak *et al.*, 2015). Findings from this study could be attributed to the fact that benign prostatic hyperplasia and bladder tumors are diseases of ageing and therefore they are more prevalent in the geriatric population.

General surgery was the second most prevalent surgical specialty in our study comprising mainly of chronic leg/diabetic foot ulcers, breast cancer, intra-abdominal malignancies/tumors and acute abdomen. Similar disease pattern was also reported in a study done in Malaysia (Lim., 1997). We could not establish the reason for the high number of diabetic foot ulcers, breast cancer, intra-abdominal malignancies/tumors and acute abdomen in our study.

Orthopedic and trauma ranked third of all geriatric surgical patients, of which long bone fractures were the most common orthopedic conditions. This finding agrees with what was found in the study

by Grecula *et al*(2005). The high incidence of long bone fractures among the geriatric orthopedic patients in this study could be attributed to their fragile bones due to osteoporosis. In this study, esophageal cancer was the most frequent geriatric cardiothoracic condition; an observation which is not surprising as it tallies with other studies, which showed high prevalence of esophageal cancer among the elders compared to the younger population(Zenget *al.*, 2018). The predominance of esophageal cancer among the geriatric cardiothoracic patients in this study could be explained by the fact that one of the risk factors in cancer of esophagus is eating smoked fish, which is commonly consumed around Lake Zone where this study was conducted. Therefore, eventually with increasing age might develop into cancer.

It has long been recognized that advanced age carries an increased risk of post-operative complications as a result of aging process which produces physiological, anatomical, and cognitive changes within the major organ systems of the body (Etzioniet *al.*, 2003; Mistryet *al.*, 2017). In this study, the complication rate following surgery among geriatric surgical patients was found to be 58.7%, a figure which is higher than 35.0% that was reported by Klug *et al*(1959). In the present study, poor urinary stream and urethral bleeding were the most frequent post-operative complications among geriatric urological patients. This observation is in keeping with another study which was done by Noon *et al* (2015). The poor urinary stream and urethral bleeding in our series can be explained by the fact that during resection of prostate their small blood vessels which keep on oozing even after cauterization, and swelling of urethra which reduces the force of urine during micturition.

In general surgery, enterocutaneous fistula, septic amputation stump and surgical site infection were the most common post-operative complications among geriatric surgical patients in this study. Similar complication pattern was also reported by others (Su *et al.*, 2009; Wu *et al.*, 2014; Deineret *al.*, 2014; Søreideet *al.*, 2015). This can be explained by the fact that ageing is associated with decrease in immunity, which impairs healing of surgical wounds and enterocutaneous fistula may be a result of complication of abdominal surgery. In diabetic patients with amputated feet, poor control of sugar provides good environment for colonization by bacteria and thus can become a source of surgical site infection in patient with septic amputation stump.

In this study, the overall mortality rate of 15.2% was found to be significantly higher than that reported by other authors (Klug *et al.*, 1959; Chung *et al.*, 2014; Brodaket *el.*, 2015). High mortality rate in our study was attributed to long duration of illness, high ASA class, operation under general anesthesia and prolonged duration of operation. Despite the high rate of mortality and morbidity among geriatric surgical patients in this study, the final outcome of survivors were good as more than three quarters of survivors were discharged well and only 10.1% and 1.5% of them were discharged with permanent disability and against medical advice, respectively. Discharge against medical advice is a recognized problem in our setting. In most Tanzanian hospitals, discharged against medical advice is a peculiar phenomenon. By this is meant that the patient leaves the hospital against medical advice. We could not establish the reasons for discharged against medical advice in our study. This observation calls for a need for further study on this.

In conclusion, this study has demonstrated that surgeries among geriatric patients are commonly performed at Bugando Medical Centre and are associated with unacceptably high morbidity and mortality. Long duration of illness, high ASA class, operation under general anesthesia and prolonged duration of operation were the main predictors of mortality. Addressing these factors responsible for high mortality in our geriatric surgical patients is mandatory to be able to reduce mortality associated with surgery in this group of patients.

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