

A Five-year Retrospective Study of the Pattern of General Surgical Procedures Performed at a Tertiary Health Institution in Nigeria

Abstract

Background: There is a paucity of documentation of the procedures performed by general surgeons in sub-Saharan Africa. **Aims and Objectives:** To describe the pattern of general surgical procedures performed at our institution. **Study Design:** A descriptive, retrospective study **Study Setting:** Divisions of general surgery, department of Surgery. **Materials and Methods:** All general surgical procedures performed in the department of surgery between 1st January 2007 and 31st December 2011 were obtained from the central theatre operation registers and registers of the three divisions of General Surgery – gastrointestinal, oncological, and endocrine surgery. Data was analyzed using version 25.0 of the Statistical Package for Social Sciences. **Results:** The records of 3,160 patients, 67% of which were complete, who underwent a total of 3,317 procedures, were obtained. Most of the patients were in the 25-44-year age range with a mean age of 41.4±16.8 years and a male-to-female ratio of 1.5:1. A total of 2,537 procedures (80.3%) were elective. There were 3,050 non-trauma-related procedures (96.5%) with only 110 procedures (3.5%) being trauma-related. Overall, the commonly performed surgical procedures included laparotomies, 997(30.06%), biopsies, 985(29.70%), herniorrhaphies, 378 (11.40%), mastectomies 270 (8.14%), appendicectomies, 213 (6.42%) and thyroidectomies, 161 (4.85%). The two most common procedures for emergency and elective cases were exploratory laparotomy and biopsy respectively. **Conclusion:** General surgeons at our institution perform a wide variety of mainly elective, non-trauma procedures, laparotomy being the commonest. Improved data collection system and periodic surgical audit would guide judicious allocation of meagre healthcare resources and ensure focused surgical training in the developing countries.

Keywords: General surgery, Nigeria, pattern, procedures

Introduction

Historically, a general surgeon used to perform a heterogeneous group of surgical procedures including those that have subsequently been performed by surgeons in newly evolved specialties.^[1] The current trend is that general surgeons now focus on interest areas such as colorectal, breast, thyroid, foregut, biliary and pancreatic surgeries.^[2] Yet, due to rising surgical workload and diminishing workforce, a general surgeon often has to perform a wide range of procedures, sometimes beyond his confines as a specialist.^[3] This scenario is notably true in African countries like Nigeria where surgeons are relatively few,^[3,4] and is worsened in recent times by a palpable anxiety about an impending disappearance of the general surgeon even in the developed world.^[5]

One may then posit that the practice pattern of a general surgeon depends on the location in which they train and practice and the

availability of other surgical and non-surgical specialists working in these areas.^[6]

Few studies in Nigeria have described the pattern of procedures carried out by surgeons generally.^[7,8] The aim of this study, therefore, was to describe the pattern of procedures performed in the general surgical sub-specialties of a tertiary health institution in Nigeria, their indications and the distribution of the cadre of surgeons performing them.

Materials and Methods

This was a descriptive retrospective study of the procedures performed in the gastrointestinal, oncological and endocrine surgery divisions of general surgery from 1st January 2007 to 31st December 2011. There were eight consultants, seven senior registrars, and a variable number of registrars and house surgeons in general surgery during the period. The ethical approval to conduct the study was obtained from our institutional ethical review committee.

How to cite this article: Afolabi AO, Ulasi IB, Ladipo JK. A five-year retrospective study of the pattern of general surgical procedures performed at a tertiary health institution in Nigeria. *J West Afr Coll Surg* 2020;10:19-29.

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Received: 07-Oct-2021

Accepted: 15-Mar-2022

Published: 04-May-2022

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Access this article online

Website:

www.jwacs-jcoac.org

DOI: 10.4103/jwas.jwas_42_21

Quick Response Code:



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Table 1: Patients' demographics, intra-operative data and completeness of data entry

	Frequency (n = 3160)	Percentage
Sex		
Male	1861	58.8
Female	1250	39.6
No record	49	1.6
Age group [41.4±16.8]		
≤13 years	23	0.7
14 – 24 years	533	16.9
25 – 34 years	628	19.9
35 – 44 years	641	20.3
45 – 54 years	536	17.0
55 – 64 years	401	12.7
65 – 74 years	232	7.3
≥75 years	101	3.2
No record	65	2.1
Nature of surgical case		
Trauma	110	3.48
Non-trauma	3050	96.52
Surgery type		
Elective	2537	80.28
Emergency	623	19.72
Number of surgeons		
One	1021	32.3
Two	1808	57.2
Three or more	297	9.4
No record	34	1.1
Anaesthesia		
General	1681	53.2
Local	1283	40.6
Spinal	121	3.8
Caudal block	3	0.1
Others (Epidural,	5	0.2
Conscious sedation)		
No record	67	2.1
Completeness of record		
Complete	2106	66.6
Incomplete	1054	33.4

The study population consisted of all the patients who underwent emergency and elective surgeries in the general surgery divisions, either alone or in conjunction with other surgical specialties during the study period. All the cases done in the obstetrics and gynaecology theatre and procedures performed during surgical out-reach programmes organized by the hospital, within the study period were excluded.

The data were obtained from the central theatre operation registers and procedure registers of the gastrointestinal, oncological, and endocrine surgery divisions of General Surgery. The data obtained included age, sex, diagnosis, nature of surgical case (trauma versus non-trauma-related), the procedure performed, cadre of surgeon, number of surgeons, type of anaesthesia, urgency of surgery (elective versus emergency) and completeness of entries into the register for each patient. Descriptive statistics (like frequencies, mean, median, standard deviations and interquartile range) were used as appropriate while the Chi-square test was used to test for differences in the involved cadre of surgeons vis-à-vis urgency of surgery. These analyses were done using version 25.0 of the Statistical Package for Social Sciences Software for Windows with p value set at less than 0.05 to indicate significant difference.

Results

The records of 3,160 patients who underwent a total of 3,317 procedures over the 5-year period were obtained, giving a mean annual surgical volume of 663 procedures. One procedure was performed in 3,011 patients (95.3%), two procedures in 142 patients (4.5%), three procedures in 6 patients (0.2%) and 4 procedures in 1 patient (0.03%). In patients who had 2 or more procedures, the additional procedures were performed at different operating theatre sessions. All the 10 parameters required were completely recorded for the patients in 2,106 cases (66.6%) with at least one parameter unrecorded in 33.4% of cases. Table 1 provides information on patients' demographics, intra-operative data, and completeness of entries for the patients. There were more male (1861, 58.8%) than female (1250, 39.6%)

Table 2: Cadre of surgeons at procedures

Parameter	Frequency (Percentage) (n = 3160)			p-value
	Elective: number (%)	Emergency: number (%)	Total: number (%)	
Most senior cadre of surgeon at surgery				
Registrar	640 (86.8)	97 (13.2)	737 (23.3)	
Senior registrar	918 (70.6)	382 (29.4)	1300 (41.1)	<0.001
Consultant	979 (87.2)	144 (12.8)	1123 (35.5)	
Registrar present at surgery				
Yes	1493 (78.4)	410 (21.6)	1903 (60.2)	<0.001
No	1054 (83.9)	203 (16.1)	1257 (39.8)	
Senior registrar present at surgery				
Yes	1301 (75.0)	434 (25.0)	1735 (54.9)	<0.001
No	1246 (87.4)	179 (12.6)	1425 (45.1)	
Consultant present at surgery				
Yes	981 (87.4)	141 (12.6)	1122 (35.5)	<0.001
No	1566 (76.8)	472 (23.2)	2038 (64.5)	

patients with a male-to-female ratio of 1.5:1. The mean age was 41.4 ± 16.8 years (Age range 1-91 years) with the most frequent age group being the 25-44-year age range.

Majority of the surgeries (2537, 80.3%) was elective while 623 (19.7%) were emergencies. Three thousand and fifty (96.52%) of the procedures were for non-trauma-related cases. The

commonest method of anaesthesia was general anaesthesia (1681, 53.2%). In 1801 (57.2%) of the cases, the surgery was performed by two surgeons. The most senior cadre of surgeon at surgery was a senior registrar in 1229 (38.9%) of cases, a consultant in 1080 (34.2%) and a registrar in 705 (22.3%) of cases. A registrar was present at surgeries in 1903 (60.2%)

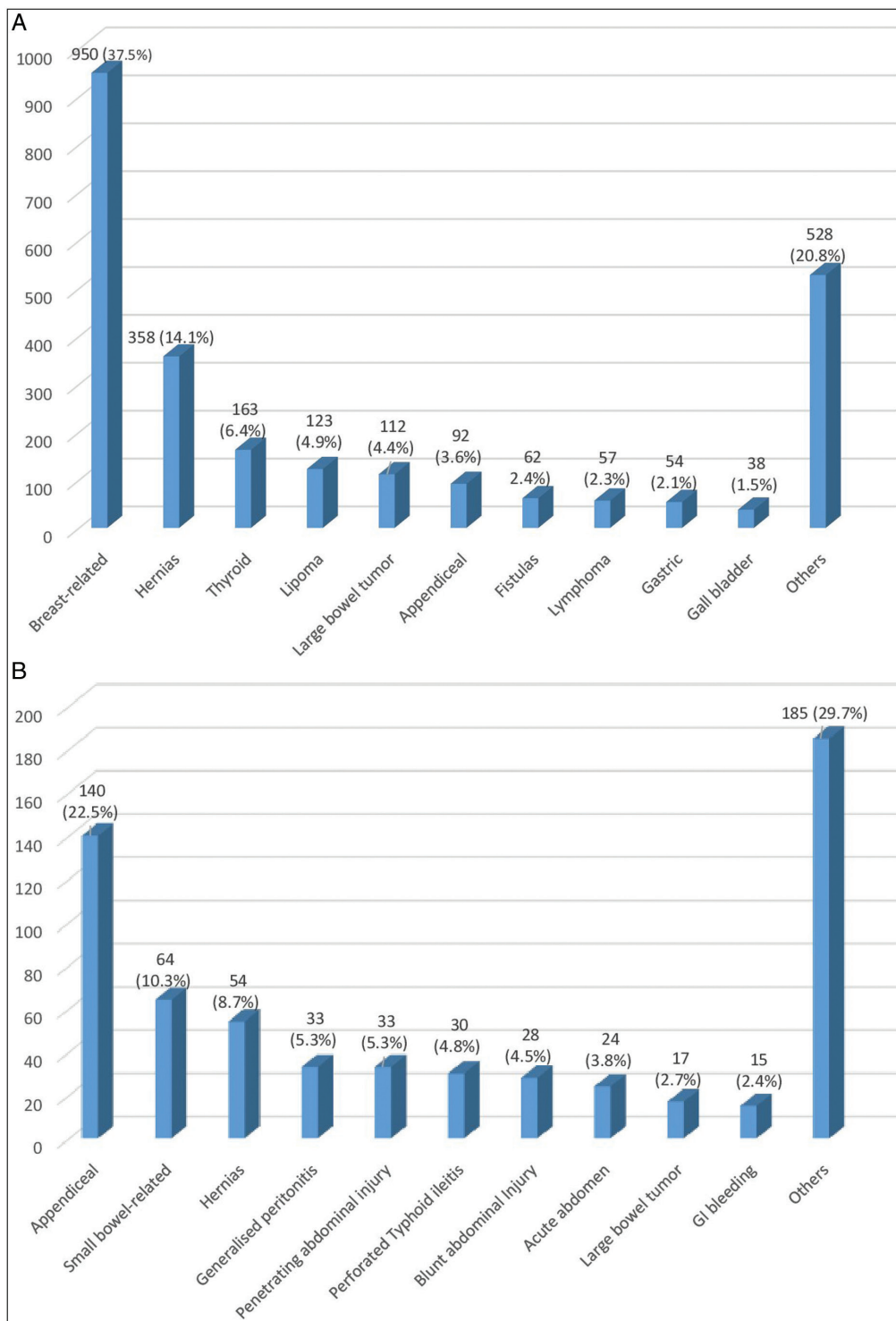


Figure 1: a: Distribution of 10 most common pre-operative diagnoses for elective cases. b: Distribution of 10 most common pre-operative diagnoses for emergency cases

cases, a senior registrar in 1735 (54.9%) and consultant in 1122 (35.6%) cases. The findings in [Table 2] indicate that for cases in which the cadre of surgeons was indicated, senior registrars were significantly more likely than registrars and consultants to have been the most senior at emergency procedures, while registrars and consultants were significantly more likely to have been the most senior at elective procedures. In addition, registrars and senior registrars were significantly more likely to have been present at emergency procedures, while consultants were significantly more likely to have been present at elective procedures.

[Figure 1a and b] show the 10 most common pre-operative diagnoses for elective and emergency cases, respectively. Overall (elective and emergency cases considered), as shown in [Table 3], breast-related conditions constituted the most frequent diagnosis (963, 30%), followed by hernias (425, 13.4%), peritonitis (251, 7.9%) and appendiceal diseases (193, 6.1%). In 63 cases (2%), the diagnosis was not entered in the operation register.

Sub-group analysis of the most common diagnoses is presented in [Table 4a-d]. As shown in [Table 4a], the common breast conditions were 341 cases of breast carcinoma (35%), followed by 265 other breast lumps (28%) and 252 fibroadenomata (26%). Majority of the hernias (76%) were inguinal/inguinoscrotal. The most common cause of peritonitis was intestinal perforation which constituted 193 cases (77%). Fifty-one of the 193 cases (26%) were due to perforated typhoid ileitis, followed by 36 cases (19%) of ruptured appendicitis.

[Table 4b] shows that 20 appendiceal diseases (12%) were due to an appendiceal mass. The most common thyroid-related diagnosis was 97 cases of simple goiter (58%) followed by 24 cases of thyroid cancer (14%). Majority of bowel obstruction (88, 65%) was in the small bowel. Fifty-eight (45%) of the large bowel tumors occurred in the rectum, followed by 48 cases (37%) in the colon. Lipomas of the scapula/shoulder and neck regions were the commonest, constituting 22 cases (18%) each.

There is nearly equal distribution between penetrating and blunt abdominal conditions as depicted in [Table 4c]. Post-operative enterocutaneous fistula least accounted for cases of fistulas (2, 3%). Twenty-nine cases (51%) of gastric-related conditions were due to gastric outlet obstruction secondary to both benign and malignant lesions, followed by 26 (46%) cases of gastric cancers. The most common gall bladder disease was cholelithiasis (23, 60%). [Table 4d] shows that soft tissue sarcomas occurred most in the limbs (8, 36%). Ninety-four percent ($n = 33$) of hydroceles in adults were of the vaginal variety.

[Figure 2a and b] show the 10 top common elective and five top common emergency procedures respectively. Overall, [Table 5] the commonly performed surgical procedures included laparotomy (30.06%), biopsy (29.70%), and

Table 3: Distribution of patients by diagnosis*

Diagnosis	Frequency (n = 3160)	Percentage
Breast-related conditions	963	30.5
Hernias	425	13.4
Peritonitis	251	7.9
Appendiceal diseases	193	6.1
Goitres	168	5.3
Intestinal / bowel obstruction	135	4.3
Large bowel tumors	130	4.1
Lipoma	124	3.9
Abdominal trauma	75	2.4
Fistulas	70	2.2
Unrecorded diagnosis	63	2.0
Other lumps†	62	2.0
Haematologic malignancies	58	1.8
Gastric conditions	56	1.8
Gall bladder diseases	38	1.2
Soft tissue sarcoma / tumor	36	1.1
Hydroceles	35	1.1
Acute abdomen†	31	1.0
Ganglion	21	0.7
Obstructive jaundice	19	0.6
Gastrointestinal bleeding	19	0.6
Peri-anal conditions	18	0.6
Pancreatic conditions	18	0.6
Intra-abdominal tumor / mass / malignancy	17	0.5
Established colostomies	17	0.5
Splenic conditions	15	0.5
Cervical (neck) lumps / conditions	14	0.4
In-growing toenail	13	0.4
Burst abdomen / wound breakdown	12	0.4
Haemorrhoids	10	0.3
Abscesses	10	0.3
Parotid diseases	6	0.2
Soft tissue infections	6	0.2
Liver conditions	5	0.2
Post-op complications	5	0.2
Gynaecologic conditions	4	0.1
Muscle dystrophy	3	0.1
Oesophageal conditions	3	0.1
Foreign-body-related conditions	3	0.1
Soft tissue wounds	3	0.1
Pyomyositis	2	0.1
Small bowel tumors	2	0.1
Inflammatory conditions	2	0.1

*The diagnoses are reported as recorded but categorised for easy presentation

†Sub-category not specified in the records

herniorrhaphy (11.40%), while haemorrhoidectomy ($n = 10$, 0.30%) and incision and drainage ($n = 9$, 0.27%) were less commonly performed.

[Table 6] shows frequency distribution of laparotomy procedures. In cases where the specific procedure performed at laparotomy were recorded, colostomy-related procedures

Table 4a: Distribution of breast, hernia and appendiceal conditions

Disease category	Frequency	Disease category	Frequency	Disease category	Frequency
Breast conditions	(n = 963)	Hernia	(n = 425)	Peritonitis	(n = 251)
Breast carcinoma	341	Inguinal/inguino-scrotal hernia	324	Intestinal perforation	193
Breast lump/mass	265	Incisional hernia	29	Perforated viscus*	62
Fibroadenoma	252	Umbilical hernia	23	Typhoid ileitis	51
Fibrocystic disease	44	Epigastric hernia	22	Appendix	36
Ductal papilloma	14	Unspecified	14	Duodenal ulcer	20
Phylloides tumour	11	Para-umbilical hernia	5	Gastric ulcer	15
Gynaecomastia	9	Ventral hernia	3	Colonic	6
Breast lipoma	6	Groin hernia	2	Peptic	5
Accessory breast	3	Femoral hernia	2	Rectal	2
Sebaceous cyst	3	Lumbar hernia	1	Jejunal	1
Other breast disease (e.g. breast wound)	3			Intra-abdominal abscess†	35
Breast sarcoma	2			Anastomotic leak/dehiscence	11
Mastitis	2			Gangrenous bowel	7
Galactocoele	2				
Breast hypertrophy	1				
Ductal ectasia	1				
Fat necrosis	2				
Paget's disease	1				
Inflammatory breast disease	1				
Breast abscess	1				

*Sub-category not specified in the records; †Includes appendiceal abscess

Table 4b: Distribution of other disease categories

Disease category	Frequency	Disease category	Frequency	Disease category	Frequency
Appendiceal diseases	(n = 193)	Thyroid	(n = 168)	Bowel obstruction	(n = 135)
Appendicitis*	173	Simple goitre	97	Small bowel	88
Appendiceal mass	20	Thyroid cancer	24	Large bowel	22
		Solitary thyroid Nodule	23	Adhesive bowel obstruction	17
		Graves' disease	13	Bowel obstruction*	8
		Toxic goiter	10		
		Thyroid abscess	1		
Large bowel tumour	Frequency	Lipoma	Frequency		
	(n = 130)		(n = 124)		
Rectal tumor	58	Scapular/shoulder Region	22		
Colon tumor	48	Neck	22		
Caecal tumour	16	Forehead/Head/Scalp	17		
Anal tumour	5	Lipoma*	15		
Hepatic flexure tumour	3	Back	14		
		Leg	8		
		Chest wall	7		
		Gluteal	5		
		Cheek/Jaw	2		
		Axillary	1		
		Groin	1		
		Perineal	1		

*Sub-category not specified in the records

were the commonest (87, 8.7%) followed by colectomy (67, 6.7%) cholecystectomy (44, 4.4%) and closure of enteric perforation (43, 4.3%).

[Tables 7a and b] show the distribution of subcategories of other procedures. Eighty-nine percent of biopsies ($n = 880$) were excision biopsies while 11% ($n = 105$) were incisional biopsies

Table 4c: Distribution of other disease categories

Disease category	Frequency	Disease category	Frequency	Disease category	Frequency
Abdominal trauma	(n = 75)	Fistulas	(n = 70)	Other lumps	(n = 62)
Penetrating	36	Colovesical fistula	37	Axillary lump	14
Blunt	35	Spontaneous enterocutaneous	15	Dermoid cyst	12
Unspecified	4	Rectovaginal fistula	14	Sebaceous cyst	11
		Unspecified	2	Unspecified	7
		Post-op enterocutaneous	2	Enlarged lymph Node	6
				Papilloma	3
				Cervical neurofibroma	2
				Implantation cyst	2
				Occipital lymph Cyst	2
				Capillary haemangioma	1
				Melanoma	1
				Supraclavicular Cyst	1
Haematologic malignancy	Frequency	Gastric conditions	Frequency	Gall bladder	Frequency
	(n = 58)		(n = 56)		(n = 38)
Lymphoma*	36	Gastric outlet obstruction*	29	Cholelithiasis	23
Non-Hodgkin's lymphoma	11	Gastric cancer	26	Cholecystitis	13
Hodgkin's lymphoma	9	Gastric polyp	1	Gall bladder cancer	2
Leukemia	2				

*Sub-category not specified in the records

Table 4d: Distribution of other disease categories

Disease category	Frequency
Soft tissue sarcoma/tumour (n = 36)	
Soft tissue sarcoma (unspecified)	15
Leg sarcoma	8
Limb sarcoma	5
Retroperitoneal tumour	3
Scalp sarcoma	2
Chest wall sarcoma	2
Lumbar sarcoma	1
Hydrocoele (n = 35)	Frequency
Vaginal Hydrocoele	33
Encysted hydrocoele of the cord	1
Congenital Hydrocoele	1

[Table 7a]. Majority of herniorrhaphies (n = 300; 79%) were in the inguinal region. About 85% of mastectomies (n = 229) were modified radical mastectomy with 2% of mastectomy (n = 6) done in conjunction with either breast reconstruction or total abdominal hysterectomy and bilateral salpingo-oophorectomy. Total thyroidectomy accounted for 80% of thyroidectomy (n = 129) and was combined with neck dissection in 2.5% of cases. Sixty-nine percent of colostomy-related procedures (n = 60) involved the creation of colostomies while only 3% of them (n = 3) required refashioning. The most common procedure performed on the colon was right hemicolectomy (n = 30; 45%).

Cholecystectomy was performed as an open procedure in 95% of cases (n = 42) and as laparoscopic cholecystectomy in 5% of cases (n = 2) [Table 7b]. Among cases of closure of perforated viscus, closure of ileal perforation secondary to typhoid fever, and gastric perforations, were the most common with equal

distribution (30% each). Only 15% of wide local excisions (n = 6) was done together with a flap cover for the resultant tissue defect. Gastrectomy was partial in 90% and total in 10% of cases. The commonest procedure during examination under anaesthesia was biopsy (14, 74%), followed by anal dilatation (4, 21%), and sphincterotomy (1, 5%).

Discussion

The pattern of surgical procedures performed in an institution is an important indicator of the level of care in practice. Reporting the practice of surgeons provides new data base for research, training and ultimately, improved care of the surgical patient. The need to improve on record keeping through a digitalized system has been highlighted from our finding of a relatively high proportion (33%) of entries into the records which were incompletely done. Besides the comparatively lower volume of procedures, general surgeons at our centre perform a wide variety of mainly elective, non-trauma procedures with laparotomy being the commonest.

Eighty percent of the procedures in this study were elective cases while 20% were emergencies. The finding of more elective than emergency surgeries in this study is not in line with the reports that at least 60% of surgeries in low and middle income countries (LMICs) are for emergencies.^[9] According to Gadija *et al*, nearly half (48.5%) of all booked surgical cases were cancelled in a tertiary institution in Northern Nigeria with the cancellation rate in general surgery being 13.4%.^[10] The most common reason for cancellation in that study was a patient-related factor (60.8%), due to patients absconding from surgery for personal reasons and lack of funds to pay for surgery. The cancelled cases may eventually present as emergencies, buttressing the findings in other reports that

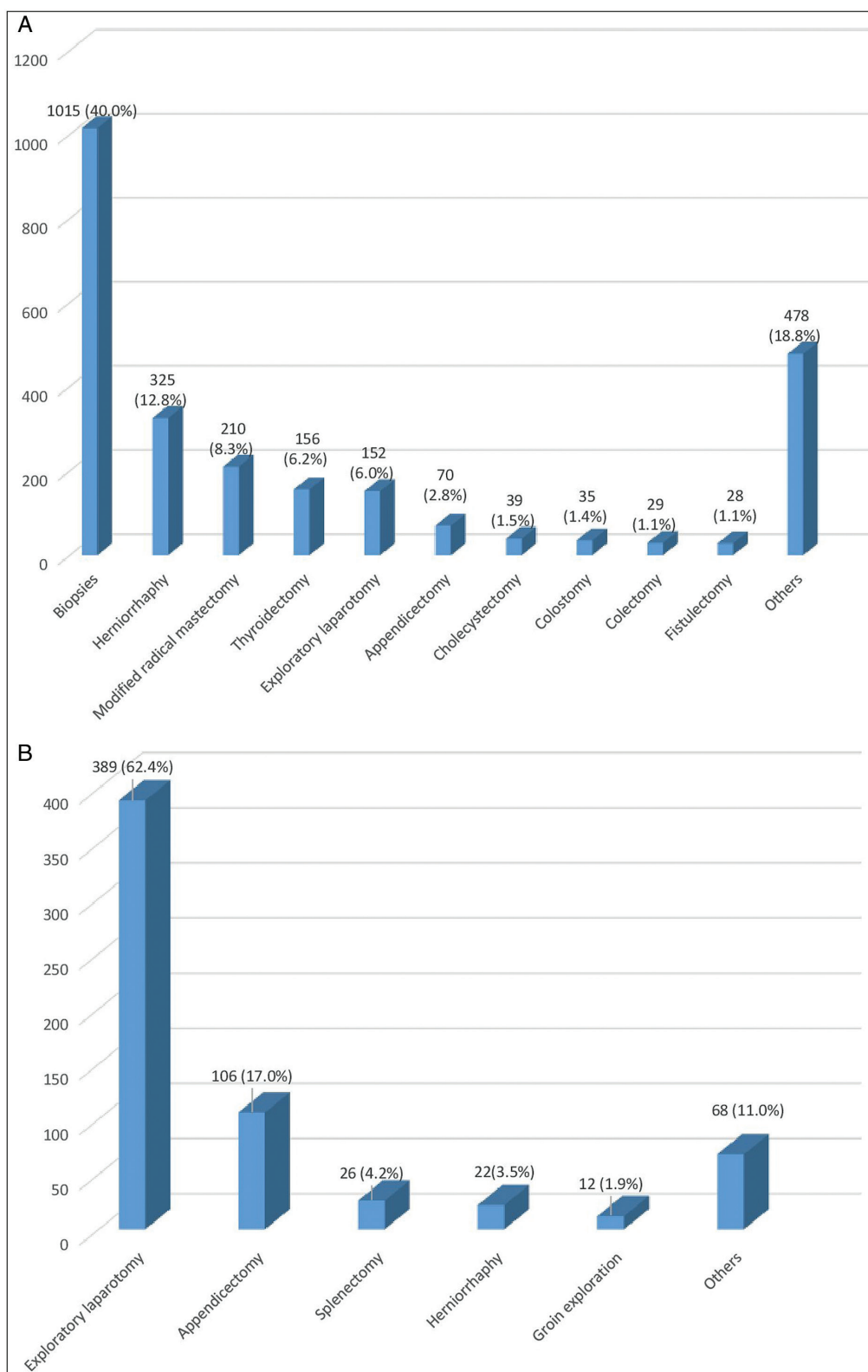


Figure 2: a: Distribution of 10 most common elective procedures. b: Distribution of 5 most common emergency procedures

most surgical cases in LMICs are emergency in nature. That notwithstanding, the findings from our study may be a pointer to a paradigm shift in the pattern of general surgical cases in this clime, either due to improved healthcare-seeking behavior

and early presentation or a more conservative approach to cases initially considered as requiring only immediate surgical intervention, like acute appendicitis. This scenario of decreasing volume of emergency cases is not limited to the

Table 5: Distribution of surgical procedures

Procedure (n = 3, 317)	Frequency§	Percentage
Laparotomy	995	30.00
Biopsy	985	29.70
Herniorrhaphy	379	11.43
Mastectomy	270	8.14
Appendicectomy*	213	6.42
Thyroidectomy	161	4.85
Wide local excision	40	1.21
Hydrocoelectomy	36	1.09
Other procedures†	34	1.03
Fistulectomy	30	0.90
Drainage of abscess	28	0.84
Lumpectomy	22	0.66
Wound debridement	20	0.60
Examination under anaesthesia	20	0.60
Wound closure‡	18	0.54
Groin exploration	17	0.51
Zadek's procedure	12	0.36
Breast conserving surgery	11	0.33
Haemorrhoidectomy	10	0.30
Parotidectomy	6	0.18
Microdochectomy	3	0.09
Thiersch stitch insertion	3	0.09
Mammoplasty	3	0.09
Secondary wound closure	1	0.03

*Excluded from laparotomy; †Includes orchidectomy, orchidopexy, herniotomy, reduction of rectal prolapse and trans-rectal drainage of pelvic abscess; ‡Includes secondary and delayed primary wound closures; §Total frequency is more than 3,160 due to more than one (some, non-mutually exclusive) procedure in same patient.

LMICs. A 20-year analysis of the trends in emergency general surgery by Wohlgenut *et al.* in Scotland showed that while emergency general surgery admissions have increased over time from 1997 to 2016, emergency general surgery operations have decreased.^[11] According to Mai-Phan *et al.*, only 57% of general surgical emergency admissions at the Royal London Hospital, United Kingdom required operative intervention.^[12]

In most of the cases in this study, two surgeons performed a procedure. However, a consultant surgeon was present in only 35% of surgeries compared to the senior registrars (55%), and the registrars (60.1%). This is at par with the finding by Ojuka *et al.* that a consultant was available in 34.5% of surgeries in a study that examined the operative exposure of a surgical trainee at a tertiary hospital in Kenya.^[13] Similar findings were reported by Faiz *et al.* that of all the emergency general surgical cases done at a London teaching hospital, a consultant was present in 36.2% of cases.^[14]

In 2015, the Lancet Commission on Global Surgery recommended an annual rate of 5,000 operations per 100,000 population as a benchmark at which LMICs could achieve most of the population-wide benefits of surgery by 2030.^[15] Although worse in LMICs,^[16] there is shortage of the surgical workforce globally.^[16] From this study, the volume of surgery performed over the five-year of study is low. While the lack

Table 6: Distribution of laparotomy procedures

Laparotomy procedures (n = 995)	Frequency	Percentage
Laparotomy*	419	42.11
Colostomy procedures	87	8.74
Colectomy	67	6.73
Cholecystectomy	44	4.42
Other repairs†	44	4.42
Closure of perforation	43	4.32
Bowel resection and anastomosis	43	4.32
Splenectomy	31	3.12
Drainage of ascites, pus or haemoperitoneum	28	2.81
Abdominoperineal resection	25	2.51
Triple bypass	22	2.21
Gastrectomy	21	2.11
Vagotomy	15	1.51
Re-exploration	15	1.51
Jejunostomy	14	1.41
Adhesiolysis	12	1.21
Biopsy	12	1.21
Gastrojejunostomy	10	1.01
Anterior resection	6	0.60
Gastrostomy	6	0.60
Fistula closure	6	0.60
Ileostomy	5	0.50
Bilioenteric bypass	5	0.50
Pancreatectomy	4	0.40
Detorsion of volvulus	3	0.30
Foreign body removal	3	0.30
Pyloroplasty	2	0.20
Liver surgery	2	0.20
Drain insertion	1	0.10

*Sub-category not specified in the records; † includes repair of mesenteric laceration, anterior abdominal wall defect and others.

of access to surgical care and impediments to service delivery in a developing country may be a contributing factor,^[17] inaccurate recording of procedures done may be responsible as evident in our study. A study by Anderson *et al.* on the surgical volume and post-operative mortality rate at a referral hospital in Western Uganda showed that operating room logbooks, accurately kept, provides a good measure of surgical volume as it captures 99% of prospectively collected data.^[18] General surgical procedures accounted for 24.4% ($n = 2,077$) of annual procedures in that prospective study,^[18] about thrice the annual volume in our study. This may be due to a difference in the pattern of surgical pathology of both countries. In the developed part of world, the annual volume of surgery is higher and the workload of a general surgeon according to Liu *et al.* was expected to grow by 31.5% between 2000–2020.^[19] The workload and practice pattern of general surgeons in the United States of America from 1995 to 1997 revealed that the average number of procedures per surgeon per year was 398, according to Ritchie *et al.*^[20] Tulloh *et al.* reported a similarly higher case load where each rural surgeon in Victoria, Australia (from 1993 to 1998) recorded more than 500 operations per year, excluding endoscopies.^[21]

Table 7a: Distribution of sub-categories of other procedures

Procedure	Frequency	Percentage
Biopsy (n = 985)		
Excisional	880	89.00
Incisional	105	11.00
Herniorrhaphy (n = 379)		
Inguinal	300	79.16
Incisional	19	5.01
Epigastric	19	5.01
Herniorrhaphy (Unspecified)	19	5.01
Umbilical	14	3.69
Ventral*	5	1.32
Paraumbilical	2	0.53
Femoral	1	0.26
Mastectomy (n = 270)		
Modified radical (MR) only	229	84.81
Mastectomy (Unspecified)	19	7.04
Simple	10	3.70
Subcutaneous	9	3.33
MR + breast reconstruction	4	1.48
MR + TAH + BSO	2	0.74
Thyroidectomy (n = 161)		
Total only	129	80.12
Subtotal	17	10.56
Thyroidectomy (Unspecified)	8	4.97
Total + neck dissection	4	2.48
Near total	2	1.24
Completion	1	0.62
Colostomy-related (n = 87)		
Colostomy fashioning	60	68.97
Colostomy closure	24	27.59
Colostomy re-fashioning	3	3.44
Colectomy (n = 67)		
Right	30	44.78
Colectomy (Unspecified)	19	28.36
Left	9	13.43
Subtotal	4	5.97
Sigmoid	4	5.97
Transverse	1	1.49

Most of the pre-operative diagnoses in this study were due to breast-related conditions followed by hernias, peritonitis, and appendiceal diseases. While breast-related conditions and hernias remain the commoner pre-operative diagnoses for elective procedures, appendiceal conditions were the commonest for emergency procedures. The distribution of the pre-operative diagnoses is reflected in the pattern of procedures recorded with laparotomy, biopsy, herniorrhaphy, mastectomy, appendicectomy and thyroidectomy being the commonly performed procedures. The pattern of the procedures we performed is comparable to those of rural surgeons in the developed countries. These findings differ from those in developed climes where the most common procedures performed by general surgeons, ranked by the frequency, included cholecystectomy, colonoscopy, endoscopic procedures, and skin excision according to Decker *et al.*^[1] The findings by Decker *et al.* were based on the practices of general surgeons in 3 American states: Maine, South

Table 7b: Distribution of sub-categories of other procedures (continued)

Procedure	Frequency	Percentage
Cholecystectomy (n = 44)		
Open (95%, n = 42)		
Cholecystectomy only	33	75.00
Cholecystectomy + bile duct exploration	6	13.64
Interval	3	6.82
Laparoscopic (5%, n = 2)	2	4.55
Closure of perforated viscus (n = 43)		
Typhoid ileal	13	30.23
Gastric	13	30.23
Perforated viscus (Unspecified)	11	25.58
Duodenal	4	9.30
Large bowel	1	2.33
Jejunal	1	2.33
Wide local excision [WLE] (n = 40)		
WLE only	34	85.00
WLE + flap cover	6	15.00
Hydrocoelelectomy (n = 36)		
Unilateral	24	66.67
Bilateral	12	33.33
Gastrectomy (n = 21)		
Partial	19	90.48
Total	4	9.52
Examination Under Anesthesia [EUA] (n = 19)		
EUA + biopsy	9	47.37
EUA + biopsy + colostomy	5	26.32
EUA + anal dilatation	4	21.05
EUA + sphincterotomy	1	5.26

TAH + BSO = Total abdominal hysterectomy and bilateral salpingo-oophorectomy

Carolina, and Wisconsin. Even among rural general surgeons in North and South Dakota in the United States, endoscopies, skin and soft tissue procedures and cholecystectomy with or without common bile duct exploration represented a larger proportion of their practices.^[22] There is a striking resemblance in the pattern of emergency procedures on both sides of the divide with appendicectomy maintaining a lead among other procedures. Two-thirds of the total emergency workload in Southeast London included appendicectomy, incision and drainage of abscess, and laparotomy according to Faiz *et al.*^[15] McCarthy reported that partial colectomy, small bowel resections, cholecystectomy, operative management of peptic ulcer, lysis of peritoneal adhesions, appendicectomy and laparotomy are the seven procedures accounting for 80% of emergency general surgery operations, deaths, and complications in the United States.^[23]

There are some salient features of the pattern of the procedures performed. Minimal Access Surgery (MAS) was performed in only two patients during the period under study, because the procedure had just been introduced towards the end of the period of the study. From July 2008 to June 2010, 14 cholecystectomies, two appendicectomies and one diagnostic

laparoscopy were the only MAS performed in our institution in adult patients.^[24] Over a 2-year period from 2011 to 2012, the rate of laparoscopic cholecystectomy had tripled to 42, representing 54.5% of cholecystectomies in that period.^[25] This is comparatively lower than the 1,066 cases of laparoscopic cholecystectomy over a 10-year period between 1996 and 2005 at Chieti University Hospital, Italy.^[26] With improved funding, manpower training, greater healthcare insurance, and institutional commitment, our prevailing trend of predominantly open general surgical procedures may change towards more minimal access surgeries.

The narrow spectrum of most of the elective surgeries, biopsies and herniorrhaphy, rather than major surgeries like pancreatic, liver and bilioenteric procedures has negative impact on the training of resident doctors in the specialty of general surgery. It also highlights the suboptimal performance of the primary and secondary healthcare institutions that should ordinarily cater for the minor procedures, and the paucity of rural-based general surgeons in our environment. Whilst the trainee surgeon in our setting will likely graduate to become more of a “generalist” than a “specialist” general surgeon, it has been argued that being able to cater for the healthcare needs of the people based on their prevalent surgical cases is more important than having many “super-specialists” with fewer patients who require their expertise. A shift towards a specialist general surgeon may lead to boredom, poor undergraduate training, high surgeon-to-patient ratio, high cost and insufficient cover for emergencies.^[27] It is therefore advocated that the increasingly widening gap between the general surgeon and specialist surgeon be narrowed and a middle path pursued such that today’s general surgeon – like those of old – acquires enough skill to practice in a variety of settings.^[28]

Besides the dearth of rural area-based general surgeons, patient’s choice is another reason for the high volume of minor elective procedures in a tertiary hospital like ours. A study on the perception of factors influencing primary health-care facility (PHF) choice among National Health Insurance Scheme (NHIS) enrollees at Amino Kano Teaching Hospital (AKTH) in Northwest Nigeria by Michael *et al.* revealed that these enrollees consider the presence of functioning equipment/facilities, ease in receiving specialist care, and overall high quality of care in their choice of PHF. Most of them chose AKTH even though over 75% of them were aware of NHIS services offered by three other government hospitals in the city and 81% of them were aware of similar services offered at two large private hospitals in the city.^[29]

The limitations of this study include its retrospective nature, unavailability of electronic database and poorly kept and missing paper-based records which reduced the accuracy of our findings. To mitigate this deficiency, the procedure logbooks were cross-checked with individual division’s operation registers to fill the missing data and improve on the data. However, the case notes and the operation notes were not examined, and so the details of the operative procedures were not accessed.

We recommend the adoption of electronic data collection system in our environment and continuous training and retraining of staff on accurate documentation and health record keeping. Periodic surgical audit should be a routine practice and the findings therefrom given wide publicity. These would help to guide the judicious allocation of the available meagre healthcare resources and ensure a focused surgical training program in developing countries.

Conclusion

General surgeons at our institution perform a wide variety of mainly elective, non-trauma related procedures and laparotomy is the commonest. Improved data collection system and periodic surgical audit would guide judicious allocation of meagre healthcare resources and ensure focused surgical training in the developing countries.

Acknowledgement

None.

Author contribution

Adefemi Oladiran Afolabi contributed to study conceptualization, study design, manuscript editing and final manuscript review; Ikechukwu Bartholomew Ulasi contributed in study design, literature search, data acquisition, data analysis, and manuscript preparation; Josephus Kayode Ladipo contributed in study design, manuscript editing and final manuscript review.

Author statement

The authors declare that this manuscript has been read and approved by all the authors, that the requirements for authorship as stated earlier in this document have been met, and that each author believes that the manuscript represents honest work.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors do not have any personal interest/gain that may affect the unbiased conduct, results and presentation of this study to declare.

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