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Length of Stay of Surgical Inpatients at University College Hospital, Ibadan, Nigeria

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Authors' contributions

This work was carried out by both authors. Author OSI conceived the study, wrote introduction, actively involved in data collection and relevant literatures review. Author AAF prepared the study design. Both authors contributed to data analysis, the discussions section and reviewed the manuscript. Both authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aims: This study was conducted to assess the Length of Stay (LOS) of surgical inpatients and compared factors associated.
Study Design: Retrospective review of records.
Place and Duration of Study: The study was carried out at the University College Hospital (UCH), Ibadan. Review of records of 404 inpatients who had surgery from January to December, 2010 was conducted.
Methodology: Information was collected on socio-demographic, LOS and other variables related to the surgical procedure with the aid of a semi-structured pro-forma. Cost of care was estimated using hospital billing documents. LOS was summarized using median with 25^{th}-75^{th} percentile. LOS was categorized into ≤ 7 and >7 days. Chi square test was used to compare factors associated with LOS. Level of statistical significance was set at 5%.
Results: The median age of patients was 30 years with inter-quartile range of 13-42 years. Males were 257(63.6%). Overall median LOS was 11 days with an inter-quartile range of 5-20 days. In all, 254(63%) stayed longer than 7 days. Longer stay was statistically significant in 141(75%) of patients who had emergency surgery (p<.001), 35(87.5%) Neurological Surgery (p=.01), 188 (66.9%) General anaesthesia (p=.02), and

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64(81.0%) of those who had blood transfusion (p<.001).
Conclusion: Prolonged LOS was experienced by a high proportion of surgical inpatient at University College Hospital, Ibadan. Types of surgery, emergency surgery, higher American Society of Anaesthesiologists (ASA) grade and blood transfusion were the factors identified to have led to longer LOS. These factors are non-modifiable. There is therefore a need for a prospective research to identify modifiable and hospital related factors responsible for prolonged LOS of surgical inpatients.

Keywords: Cost; surgery; anaesthesia; blood transfusion; resource; inpatients.

1. INTRODUCTION

Minimising hospital length of stay (LOS) has been shown to be of importance in reducing resources utilised for patient care without sacrificing quality of care. More human, material, and financial resources will be required for patients whose health condition required longer stay in the hospital. LOS has therefore been used as one of the indicators employed to determine hospital performance [1]. Hospitals with reduced LOS are said to have done better than others with longer stay.

In the developed countries, hospital stay among surgical inpatients has been decreasing. LOS is still high in Nigeria despite its disadvantages [2,3]. Prolonged LOS in the hospital has been shown to be a source of embarrassment to family members. Difficulties in carrying out post-operative investigations purchase of post-operative drugs and payment of hospital bill is rampant among patients who spent longer time on admission [4].

Hospital stay is necessary to ensure optimal management of most surgical patients. It allows the patients to recover from the effect of the surgical procedure. However hospital stay also has associated risks including increased health care expenditure, problem with mobilizing patients out of bed, increased risk of nosocomial infections, and adverse drug reactions particularly with intravenous drug use and complications related to other invasive procedures [5]. These risks have been shown to increase hospital stay [6,7].

Studies on hospital LOS are needed to know the areas where hospital services must be reorganized and restructured to meet current and future demands [8]. Few studies exist in published literatures that documented the LOS of surgical inpatients in Nigeria. The mean duration of hospital stay was 13.11 days among patients with post traumatic bowel injury in Ibadan, Nigeria [9]. Only few studies have documented the length of stay of all surgical patients seen over a period of time. This study therefore aimed to determine the LOS among inpatients that had surgery in 2010 and to identify factors associated with prolonged stay at University College Hospital, Ibadan.

2. METHODOLOGY

We carried out a retrospective descriptive review of records of patients who had surgery between January and December, 2010 at the University College Hospital, Ibadan (UCH). A tertiary health institution in South West Nigeria.

A total of 3,312 patients had surgery in the main theatre of University College Hospital, Ibadan from January to December 2010. In all, 1,571 surgical in-patients in the sub-

specialities of General Surgery, Paediatric Surgery, Plastic Surgery, Urology, Orthopaedics and Neurosurgery, met the inclusion criteria. Few patients had Cardiothoracic Surgery and they were added to General Surgery. Only 420 case notes were available for review. Patients that were excluded include those that had day case surgery and patients admitted in the private suit. Others excluded were Ear, Nose and Throat patients and Ophthalmology patients, since they belong to other departments.

A structured pro-forma was used to extract information of interest. The hospital number of surgical patients seen from January to December, 2010 were obtained from the main operating theatre's surgery register. The hospital number collected was used to locate patient's case notes from the record unit of the Surgery outpatient clinic (SOP). From available evidence in the patients' case note and the use of hospital billing document summation of all the cost of care was done to estimate the direct cost.

Data was entered and analysed with SPSS version 15. LOS was the number of days spent from admission to the time of discharge. LOS was categorised using a cut off of ≤7 days and >7 days. Proportions were compared for ≤7 and >7 days using a Chi-square test. Level of statistical significance was set at 5%.

3. RESULTS

Out of the 3,312 patients who had surgery in the main theatre of University College Hospital, Ibadan from January to December 2010, only 1,571 cases met the inclusion criteria. In all, 420 case notes were available and retrieved out of which 16 case notes contained incomplete information on key variables of interest. Only 404 case notes were analysed, while the remaining 1,167 were not due to missing case notes and missing variables of interest. However, the mean age of analysed cases when compared with un-analysed cases had no significant difference as shown in Table 1. The Sex distributions of analysed and un-analysed cases are as showed in Table 2, no significant difference exists in the two groups. This showed that the available results for the analysed cases can be generalised.

Table 1. Comparison of mean age between analysed and un-analysed case notes

Variable	Age in years Mean ± Standard deviation	t-test	p-value
Age(N)			
Age of analysed cases (404)	30 ± 20	1.327	.185
Age of un-analysed cases (1167)	28 ± 18		

Table 2. Comparison of sex distribution between analysed and un-analysed case notes

Variable	Analysed Cases	Un-analysed Cases	Chi-square	p-Value
Sex				
Male	257(63.6%)	745(63.8%)	0.007	.935
Female	147(36.4%)	422(36.2%)		

3.1 Socio-demographic Characteristics of Patients

Table 3 shows the socio-demographic characteristics of patients and compared with LOS. The median age of patients was 30 years with inter-quartile range of 13-42 years. About half of the patients 194(48.0%) were 39 years and below, males were 257(63.6%). Married patients were 183(45.3%). In all 150(37%) spent ≤ 7days on admission while more patients 254(63%) were on admission for > 7 days.

Table 3. Socio-demographic characteristics of patients and Length of Stay

Variables	Total n (%)	Length of Stay		Chi-square	p-value
		≤ 7 days	>7 days		
Age group		n (%)	n (%)		
<40	194(48.0)	73(37.6)	121(62.4)	0.40	.84
≥40	210(52.0)	77(36.7)	133(63.3)		
Sex					
Male	257(63.6)	93(36.2)	164(63.8)	0.268	.60
Female	147(36.4)	57(38.8)	90(61.2)		
Marital Status					
Single	208(51.5)	77(37.0)	131(63.0)	1.646	.44
Married	183(45.3)	66(36.1)	117(63.9)		
Widowed	13(3.2)	7(53.8)	6(46.2)		

Table 4 shows the surgical characteristics of patients and compared with LOS. More than half 216(53.5%) had Elective Surgery while 188(46.5%) had Emergency Surgery. General surgery group were 209(51.7%) while Neurology was 40(9.9%). Surgery on the Thorax and Abdomen were done in 151(37.4%) patients. Almost half 199(49.3%)of the surgeries were done by consultants. The patients who had their surgeries delayed or postponed from the initial surgery date recorded in the patient's case notes were 42(10.4%).

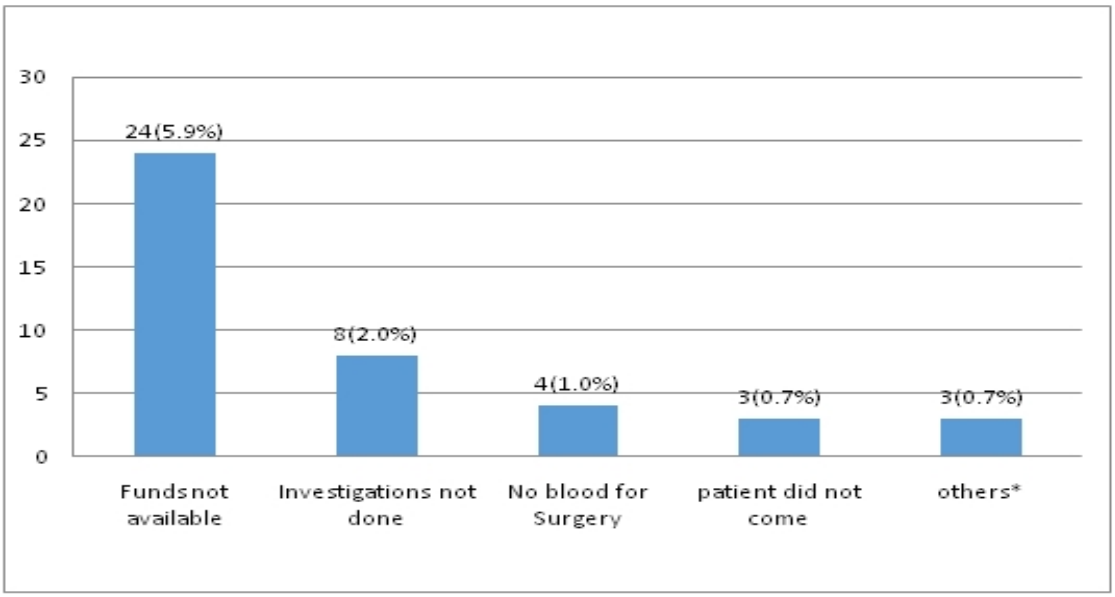
In all, 141(75.0%) of patients that had emergency surgery spent more than 7 days compared with 113(52.3%) of those who had elective surgery p<0.001. The majority of patients that had Neurological Surgery 35(87.5%) had prolonged stay while almost half 20(48.8%) of Urologic Surgery patients had LOS >7 days p=0.01. Of all patients who had surgery in the head and neck region 56(72.7%) stayed >7 days while only 43(46.7%) patients who had surgery in the perineumstayed>7 days p=0.01.

3.2 Reasons for Delayed or Postponed Surgery

The reason for the delay or postponement of surgery is as showed below in figure 1. Among the 42(10.4%) patients who had their surgeries delayed or postponed from the initial surgery date recorded in the patient's case notes 24 (5.9%) had delayed surgery due to lack of funds. The remaining reasons were as shown in Fig. 1.

Table 4. Surgical characteristics of patients and Length of Stay

Variables	Total n (%)	Length of Stay		Chi-square	p-value
		≤ 7 days	***>7 days***		
Surgery type by group					
Elective Surgery	216(53.5)	103(47.7)	113(52.3)	22.159	<.001
Emergency Surgery	188(46.5)	47(25.0)	141(75.0)		
Surgery group					
General	209(51.7)	87(41.6)	122(58.4)	17.471	.01
Orthopaedics	56(13.9)	16(28.6)	40(71.4)		
Urology	41(10.1)	21(51.2)	20(48.8)		
Plastic	58(14.4)	21(36.2)	37(63.8)		
Neurology	40(9.9)	5(12.5)	35(87.5)		
Anatomical location of surgical procedure					
Head/neck	77(19.1)	21(27.3)	56(72.7)	15.592	.01
Upper limbs	41(10.1)	17(41.5)	24(58.5)		
Thorax/abdomen	151(37.4)	49(32.5)	102(67.5)		
Perineum	92(22.8)	49(53.3)	43(46.7)		
Lower limb	43(10.6)	14(32.6)	29(67.4)		
Rank of Surgeon					
Consultant	199(49.3)	66(32.2)	133(66.8)	2.638	.10
Resident	205(50.7)	84(41.0)	121(59.0)		
Delayed/Postponed surgery					
Yes	42(10.4)	11(26.2)	31(73.8)	2.402	.12
No	362(89.6)	139(38.4)	223(61.6)		



**Others were no space in the theatre, faulty anaesthetic machine, and patient lateness for admission.*

Fig. 1. Reasons for delayed or postponed surgery

Table 5 shows Anaesthesia, blood transfusion, estimated blood loss during surgery, cost of care and compared LOS. More than half had General Anaesthesia 281(69.6%). More than half 227(56.2%) had American Society of Anaesthesiologists (ASA) I while others were assigned ASA II [99(24.5%)], ASA III [68(16.8%)] and ASA IV [10(2.5%)]. In all, 79(19.6%) had blood transfusion. Only 23(5.7%) had surgeries lasting 3 hours and above. Less than half 196(48.5%) lost 100mls and below blood while 72(17.8%) lost 500mls and above. Half of the patients spent between ₦50,000.00 and ₦100,000.00 for their care.

Patients with General anaesthesia had the highest proportion with LOS >7 days (p=.02), patients who had ASA grade of higher value are more likely to spend more time on admission (p<.001). Patients who had blood transfusion 64(81%) had longer LOS compared with 190(58.5%) of those who did not have blood transfusion (p<.001). Blood loss of 500mls and above 58(80.6%) is significantly associated longer LOS (p<.001). The majority of those who had a total direct cost of care of ₦100,000 and above 62 (98.4%) had longer stay (p<.001).

Table 5. Anaesthesia, blood transfusion, and estimated blood loss during surgery and length of stay

Variables	*Total n (%)*	*Length of Stay*		*Chi-square*	*p-value*
		≤ 7 days	*>7 days*		
Anaesthesia					
General Anaesthesia	281(69.6)	93(33.1)	188(66.9)	8.427	0.02
Local Anaesthesia	74(18.3)	38(51.4)	36(48.6)		
Other types of Anaesthesia*	49(12.1)	19(38.8)	30(61.2)		
American Society of Anaesthesiologist Grading(ASA)					
I	227(56.2)	107(47.1)	120(52.9)	22.620	<0.001
II	99(24.5)	26(26.3)	73(73.7)		
III	68(16.8)	15(22.1)	53(77.9)		
IV	10(2.5)	2(20.0)	8(80.0)		
Blood transfusion					
Present	79(19.6)	15(19.0)	64(81.0)	13.845	<0.001
Absent	325(80.4)	135(41.5)	190(58.5)		
Estimated blood loss during surgery					
Less than100 mls	196(48.5)	87(44.4)	109(55.6)	14.14	<0.001
>100mls and <500 mls	136(33.7)	49(36.0)	87(64.0)		
500mls and above	72(17.8)	14(19.4)	58(80.6)		
Cost of Care					
Less than ₦50,000	142(35.1)	105(73.9)	37(26.1)	135.766	0.001
> ₦50,000 and < ₦100,000	199(49.3)	44(22.1)	155(77.9)		
₦100,000 and above	63(15.6)	1(1.6)	62(98.4)		

**Other types of anaesthesia were spinal, regional block, and conscious sedation.*

As shown in Table 6, the overall median LOS was 11 days with an inter-quartile range of 5-20 days. Patients that had General Surgery had median duration of stay of 10 days and an inter-quartile range of 4-18 days. Patients that had Orthopaedic Surgery had median duration of stay of 14 days with an inter-quartile range of 6-24 days. Patients that had

Urological Surgery had median duration of stay of 8 days with an inter-quartile range of 4-16 days. Patients that had Plastic Surgery had median duration of stay of 10 days with an inter-quartile range of 5-20 days. Patients that had Neurological Surgery had median duration of stay of 17 days with an inter-quartile range of 11-27 days.

Table 6. Median duration of hospital stay in different surgical groups

Duration Median (Q_1-Q_3)*	All cases (overall)	General surgery	Orthopaedic surgery	Urological surgery	Plastic surgery	Neurological surgery
Days spent from admission to surgery	2(1-7)	2(0-7)	4(1-9)	1(0-5)	3(1-7)	2(1-6)
Days spent from surgery to discharge	6(2-11)	6(2-10)	8(3-14)	5(1-9)	5(1-12)	12(7-20)
LOS	11(5-20)	10(4-18)	14(6-24)	8(4-16)	10(5-20)	17(11-27)

**(Q_1-Q_3) means inter-quartile range*

4. DISCUSSION

To know the areas where hospital performance must be reorganized and restructured to meet future demand studies on hospital LOS are needed [8]. Effective reduction of a hospital's average length of stay is not a question of simply discharging patients earlier. Instead, it is ensuring that patients recover more quickly and reach the point at which they are ready to leave thehospital sooner. LOS differ across groups of patients having different surgical procedures, the overall median LOS among surgical inpatient was 11 days with an inter-quartile range of 5-20 days. This is slightly lower than a mean duration of hospital stay of 13.11 days in patients with post traumatic bowel injuryalone in the same centre [9]. This review included higher proportion of elective cases who had lesser LOS compared to emergency surgical cases like post traumatic bowel injury.

Though this study was not limited to Paediatric Surgery the LOS of patient reviewed was less than the LOS reported in another teaching hospital in South Western Nigeria that ranged from 1 to 127 days (mean 17 days) among paediatric patients [10]. This LOS is higher than what was documented in the developed countries [11]. In some of the develop countries patients may be discharge to convalescent home thereby reducing their LOS, such practices is less common in Nigeria. About two third of the surgical patients studied had a LOS of >7 days on admission. This finding contrast sharply with findings in a secondary health care facility in the Niger Delta area of Nigeria that reported about 37% of the surgical inpatients spending more than seven days on admission [4]. It is obvious that less complicated cases are likely to be found in secondary health care facilities compared to a tertiary facility that is a referral centre. The Niger delta study did not also include Orthopaedic, Plastic and Neurosurgery that contributed to the Median LOS in this study.

Understanding the factors that influence LOS is very important. LOS is a key performance indicator for hospital management and a key measure of efficiency of the health system. Some patients had their surgery postponed due to unavailability of funds, investigation results and blood for surgery. Some patients did not come for surgery. However, the reason for this could not be captured. Only few patients were not operated due to faulty anaesthetic

machine and space in the theatre on the initial day planned for the surgery. In this study just above half of the female patients spent more than 7 days in the hospital. A high percentage of women (80.95%) spent more than 7 days following admission to a secondary health care facility in the Niger Delta area of Nigeria [4]. Male patients in this study spent a slightly longer time on admission though it is not statistically significant. However, previous study documented higher LOS among male patient [12]. Males are also more exposed to factors that predisposes them to emergencies which may contribute to longer hospital stay.Age did not significantly affect LOS in this study. A study done in New Zealand reported a significantly prolonged LOS among older patients [12]. Higher proportion of patients who had elective procedures in this study spent less time on admission. Elective procedure would have afforded the surgeon adequate time to prepare the patient for surgery, thus reducing delay usually encountered pre-surgery and eventually reducing LOS. Shorter LOS for patient that had elective surgical procedure has been reported [13].

The influence of procedures performed on LOS has been previously documented [14]. Neuro-surgery patients as seen had longer stay than patients with perianal surgery. ASA II and above was significantly associated with longer LOS. The higher the ASA the less stable the patient is for surgery. Other studies have also showed prolonged LOS in ASA groups two to four compared with group one due to increase in co-morbidities[15,16,17].

This study revealed that blood transfused patients stayed longer on admission and the more the estimated blood loss and blood transfused the higher the LOS. Some studies have also showed that blood transfused patients had increased LOS [18,19,20]. Failure of some of the patients to secure blood donor at the exact time when needed could be responsible for this. Patients transfused may also have had more severe conditions compared to those who were not. Cost of care increases with LOS and vice versa in this study. However details of factors responsible was not part of the scope of the study.

5. CONCLUSION

This study found that the overall median LOS among surgical inpatient was 11 days with an inter-quartile range of 5-20 days. Most of the factors associated with LOS were non-modifiable. There is a need for a prospective research to follow up patients from admission to discharge to identify patient and hospital related factors determining LOS and make recommendations. Future research to examine directly the relationship between patient health outcomes, the direct cost of care and LOS is needed.

LIMITATION

Aside missing case notes, another limitation of this study is the lack of information on the severity of cases. However, the ASA grading of patient`s physical status pre-operative was used in lieu of this. Hospital related variables like the number of health personnel that attended to the patient could not be ascertained. Hence, the level of care received was not determined.

CONSENT

Not applicable.

ETHICAL APPROVAL

Approval for the study was received from the University of Ibadan/University College Hospital research ethics review board. The UI/UCH Ethics Committee assigned number is UI/EC/11/0274.

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COMPETING INTERESTS

The authors declare no competing interests exist.

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