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Health and Economic Impact of Surgical Site Infections for Obstetric Surgical in Patients at General Hospital Funtua, Katsina State North-Western Nigeria

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ABSTRACT

Infection has been the feature of man across the globe. Surgical site infections (SSIs) are the most common complications after surgery that has significant impact in patient Morbidity, mortality and health care cost. A descriptive cross sectional study was used involving all subjects who attended maternity unit for delivery. A non probability purposive sampling technique was employed to recruit the total sample size of one hundred. After obtaining informed written consent for the study, all subjects who met the inclusion criteria were successfully enrolled in to the study. Pre-operative, intra-operative and postoperative data were collected using standardized data collection form based on CDC/WHO criteria. The data were analyzed using SPSS software. The results showed that the minimum age of the subjects ranged between 21 years to 30 years with the median age of 25 year. Most of the subjects had no formal education and were not engaged in any occupational services yet with slight increased in body mass index and reflected high number of primigravida. The major findings revealed that the average extra medical costs for subjects with surgical site infection during the period of index hospitalization was NGN5100 (US$30.0 per subject, ($p<0.001$). In conclusion, surgical site infection recognized during period of index hospitalization has a significant extra resource utilization on subjects. Therefore, it is recommended that government, hospitals management and obstetrician have a vital role to play in putting measures that will reduce the problems and more investigations are needed in the field for post discharge subjects and to quantify the indirect medical costs.

Keywords: *Surgical Site Infection, Economic, Hospitalization, Health, Patient*

INTRODUCTION

Although surgical site infections (SSIs) are known to cause substantial illness and costs during the index hospitalization, little information exists about the impact of infection during the period of index hospitalization, which constitutes the majority of SSIs (1). SSI the second most common cause of nosocomial infection after urinary tract infections, cause approximately 17% of all hospital-acquired infections (2) and lead to increased costs and worse patient outcomes in hospital inpatient (3).The Centers for Disease Control and Prevention estimates that approximately 500,000 SSIs occur annually in the United States (4). Costs and outcomes secondary to SSIs can vary by location and surgery type. Infections in cardiac surgery have been estimated to add from US$8,200 (1982 dollars) to $42,000 (1985 dollars) to the cost of care after adjustments are made for preexisting illnesses and conditions, and these increased costs are likely attributable to excess hospital and intensive care unit stays (5). Overall, SSIs may result in $1–$10 billion in direct and indirect medical costs each year (6). With the current trends favoring a shortened postoperative hospital stay, outpatient surgery, and same-day surgery, more SSIs are occurring after discharge from the hospital and, therefore, beyond the reach of most hospital infection control surveillance programs (7). Of all surgical procedures, 75% are now estimated to occur in the outpatient or ambulatory setting, and for those that do occur in the inpatient setting, postoperative length of stay is decreasing (8). An estimated 47% to 84% of SSIs occur after discharge; most of these are managed entirely in the outpatient setting (9). Given the high costs and adverse patient outcomes associated with SSIs, quantifying the clinical and economic impact of SSIs recognized after discharge from the hospital is important. The magnitude of these costs might not be known if ascertainment were left solely to the index hospital's information systems (7). SSI is one of the most common preventable complications following major surgery and represents a significant burden in terms of patient morbidity, mortality and hospital costs (1). Despite improvements in operating room practices, instrument sterilization methods, better surgical technique and the best efforts of

infection prevention strategies, surgical site infections remain a major cause of hospital-acquired infections and rates are increasing globally even in hospitals with most modern facilities and standard protocols of preoperative preparation and antibiotic prophylaxis (1). Attempts at reducing the rate of surgical site infections (SSIs) date to the early nineteenth century with the study of the epidemiology and prevention of surgical fever by James Young Hamilton (10).Thereafter, Joseph Lister pioneered his use of antiseptics for the prevention of orthopedic SSIs in 1865. Fortunately, many other advances have been made in surgery and infection control over the past 150 years (11). However, as medicine has advanced, new types of infection risks have developed. For example, over the past 50 years, the frequency of surgical procedures has increased, procedures have become more invasive, a greater proportion of operative procedures include insertion of foreign objects, and procedures are performed on an increasingly morbid patient population. As a result, SSIs remain a leading cause of morbidity and mortality in modern health care (11).

In addition, overcrowding and understaffing in hospitals results in inadequate infection control practices and a lack of infection control policies, guidelines and trained professional also adds to the extent of the problems (12). Although surgical site infection are known to cause substantial illness and cost during the index hospitalization, little information exists about the impact of infection diagnosed after discharged, which constitute the majority of surgical site infection (13). In the study from the Republic of Tanzania, the mean postoperative hospital stay was 5.4 days for uninfected patients compared with 13 days for those with surgical site infection (14). In the study from Burkina Faso, the hospital stay was 10 days longer on average in patients with SSI (12). In another Ethiopia study, the mean postoperative stay was 19.6 days in patients with surgical site infection compared to with 11.3 days in uninfected patients (15). Although surgical site infections (SSIs) are known to cause substantial illness and costs during the index hospitalization, little information exists about the impact of infection during the period of index hospitalization hence the need for the study.

METHODOLOGY

Research Design

A cross-sectional study was used involving subjects who attended maternity unit within the period of study at General Hospital Funtua Kastina state.

Study Setting

General Hospital Funtua of Katsina state is in the North-West part of geopolitical zone of Nigeria. It is a secondary healthcare delivery centre with 187 beds capacity. The hospital has eight (8) wards each of which has a surgical unit. The hospital has about eighty four nurses (84) with an average of about four hundred and twenty obstetric surgical patients outflow annually.

Sampling Techniques and Sample Size

A non probability purposive sampling method was used to select subjects that have attended maternity unit during the study period. A total of one hundred respondents were used for the study.

Ethical Consideration

Ethical consent was obtained from the ethical review board of the hospital and informed consent was obtained from each subject or subjects care giver before being enrolled in to the study.

Instrument for Data Collection

The instrument was developed by the researcher (questionnaire) based on the Center for Disease Control and Prevention (CDC/WHO) and a research assistant was trained on the use of the instrument. The questionnaire was used to subjects variables such as demographic characteristics, pre-operative and postoperative data such as type of surgery, preoperative hospital stay, indication for surgery, parity, type of surgical incision, diunal cost and average cost of hospital stay, until time of discharge. The instrument was tested for validity and reliability through pilot study. Also two full-time nurses' assistants were trained on the use of the instrument.

Data Collection

The data were collected by both the researcher and research assistants based on the characteristic of the subjects such as demographic characteristics, pre-operative and postoperative data , type of surgery, preoperative hospital stay, indication for surgery, parity, type of surgical incision, diunal spent and average cost of hospital stay until time of discharge.

DATA ANALYSIS

The data were entered in to the computer using SPSS software version 16 and analyzed according to the objective of the study. In addition descriptive and inferential statistics were performed.

RESULTS

Socio Demographic Data

Frequency distribution of subjects by demographic characteristics

Variable: N=100	Frequency	Percent
Age (grouped) yrs.		
11-20	30	30
21-30	43	43
31-40	24	24
>40	03	03
Total	**100**	**100.0**
Gender		
Male	00	00
Female	100	100
Total	**100**	**100.0**
Marital Status:		
Single	00	00
Married	100	100
Total	**100**	**100.0**
Highest Education Level:		
No formal Education	41	41
Primary Education	28	28
Post primary education	31	31
Total	**100**	**100.0**
Patients' Occupation:		
Not working	53	53
Unskilled manual	00	00
Skilled manual	47	47
Total	**100**	**100.0**

As reflected on table 4.1, the age of the subjects ranged from 11years to 65years with median age of25 years and Sd ±0.07 .Over 43% of the respondents were in the age group (21-30 yrs).All the respondents were married females. On the educational level, 41% had no formal education and 28% had basic primary education. With regards to respondents' occupation, 53% were full house wives with no occupational services and 47% were engaged in skilled occupational services.

Table 2: Subjects Variable on the Manifestation of SSIs

Variables= Age	SSI (positive) N=47	SSI (negative) N=53	P- value
11-20	14	28	0.67
21-30	22	20	0.99
≥30	11	5	0.69
Educational level			
no formal education	17	42	0.85
Primary education	22	43	0.78
Pot-primary education	8	15	0.28
Occupational level			
unemployed	32	41	0.45
Skilled manual	15	12	0.43
Type of surgical incision			
Pfnestyl	50	50	
Classical midline	50	50	
Total	100	100	

Majority of the subjects diagnosed with surgical site infections were between the age ranges of 21-30 years, and were unemployed. With regard to the presence of post-operative wound infection, 47% of subjects developed infection with equal chance of occurrences between the incision type .Others were reflected on the table above.

Table 4.3: Resource Utilizations on the Period of Hospitalization by the Subjects

Variables	SSI (positive) N=47	SSI (negative) N=53	P- value
Average diurnal spent			
≤250 NGN(US$1.5)	15	38	------
≥250 NGN(US$1.5) Mean spent Per day=NGN275 (US$2.0)	32	15	------
Period of index hospitalization			
< 7 days	1	28	-------
7-14 days	14	20	-------
>14 days Mean=15 days	32	5	-------

Most of the subjects diagnosed with surgical site infections have extra resource utilization of NGN5100 (US$30.0) and had longer period of hospitalization compared to those subjects who did not manifested with surgical site infection.

Table 4.3 Pre-Operative History of the Respondents

Variables=100	Frequency	Percent	SSI Rate %
Indication for surgery			
Prolong labour	19	19	-
Eclamsia	32	32	
Obstructed labour	35	35	
A.P.H	14	14	
Total	100	100	
History of transfusion			
Yes	34	34	78
No	36	36	22
Total	100	100	100
Co-existing illness			
Yes	34	34	65
No	66	66	35
Total	100	100	100
Type of surgery			
Elective	53	53	29
Emergency	47	47	71
Total	100	100	100

Parity			
Primigravida	38	38	22
Multiparous	35	35	55
Late primigravida	27	27	23
Total	**100**	**100**	**100**

Majority of the subjects (35%) were diagnosed with obstructed labour, while 14% were diagnosed of Ante partum bleeding, others were reflected on the table. Most of the subjects (64%) had transfusion and fewer subjects (34%) had co-existing illness. Greater subjects (53%) had elective caesarean section while 47% had emergency cesarean section. With regard to parity 38% were primi gravidas and only 27% of the subjects were late primi.

DISCUSSION

In this study most of the subjects were between the age group of 21-30 years, very few subjects were greater than 40 year. Similar demographic observation was reported by another study conducted among subjects undergoing caesarean section in Aminu Kano Teaching Hospital Kano, Nigeria (16).The study also reflected high number of primigravida as opposed to the previous reports. Most subjects had no formal education and were not engaged in occupational services. The study revealed that surgical site infection recognized during period of index hospitalization has extra resource utilization on subjects by NGN 5100 (US$30.0) per subject, this increased in economic burden could be link with the economic constrains in adopting a standardized protocol of surgical wound management in a low income countries to include overcrowding and understaffing in hospitals resulting in inadequate infection control practices and a lack of infection control policies, guidelines and trained professional also adds to the extent of the problems, and some studies reported lower economic burden in the developed nations (17)

CONCLUSION AND RECOMMENDATION

The study concluded that there is a significant economic impact for subjects with surgical site infections and direct medical costs is higher than that reported in developed countries, and in some developing nations, therefore the study implies that surveillance of extra resource utilization among the studied group and indirect medical costs estimation

with feedback to obstetrician and hospital management can check out the economic burden at the study setting.

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