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## Pattern and Outcome of Pediatric Surgical Admissions to a Nigerian Tertiary Hospital

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**Background/Purpose:** The patterns and the factors influencing outcome of paediatric surgical admissions may be crucial to policy formulation. This study reports the pattern and the outcome of paediatric surgical admissions in a developing country.

**Materials & Methods:** The pattern and the outcome of paediatric surgical admissions at the University of Benin Teaching Hospital between January and December 2009 were audited in a retrospective study.

**Results:** In total, 871 children aged between one day and 16 years who accounted for 43% of paediatric surgical workload were admitted, 322 (37%) on emergency basis. Of these, only 530 (60.8%) were admitted to a paediatric surgical ward while the rest were admitted in different wards, including nonsurgical wards, due to shortage of manpower and lack of paediatric surgical facilities. Three consultant paediatric surgeons and 17 nurses (only one paediatric nurse) managed an average of 46 new admissions per month with doctor to patient and nurse to patient ratio of 1: 15 and 1:33 respectively. Shortage of bed spaces also resulted in the admission of many clean surgical cases in the same ward with septic medical cases. This increased postoperative infective complications, duration of hospitalization and mortality rate especially among 106 neonates admitted to Special Care Baby Unit compared to those in paediatric surgical ward ( $P < 0.0001$ ).

**Conclusion:** The need for the provision of more paediatric surgical facilities and training of more paediatric surgical personnel to match the high paediatric surgical workload is emphasized by this audit.

**Index Word:** Pattern, Paediatric, Surgical, Admissions, Outcome.

### INTRODUCTION

The recent decades witnessed a tremendous growth in the field of medicine, especially in the area of sub-specialization in surgery<sup>1,2</sup>. This has resulted in an improved healthcare delivery, more efficient patients care and better prognosis of surgical pathology that once had fatal outcome. Paediatric surgery has not only become an independent specialty but has evolved into a multidisciplinary field of medicine. In developed countries, each subspecialty is well organized; having its own wards, manpower and facilities, and handles specific aspect

of paediatric surgical pathology<sup>1</sup>. Also, admission of children with similar surgical pathologies into a single ward under the care of highly skilled and specialized nurses makes nursing and review by surgeons prompt and efficient<sup>1,3</sup>.

Although paediatric surgery has evolved as an independent subspecialty of surgery in many centres in developing countries, sub-specialization within paediatric surgery is rare<sup>2,4</sup>. Designated paediatric surgical wards may not have enough facilities for the usually large volume of paediatric surgical workload.

Consequently, the lack of facilities and manpower often results in sharing wards, equipment, and nursing staffs with other surgical and even non-surgical specialties<sup>4-8</sup>. This poses a unique challenge that influenced the quality of care and outcome of children with surgical pathology in developing countries. Apart from foreign literatures<sup>2,7,9,10</sup>, data are scant on factors influencing paediatric surgical admission in developing countries where such information may be crucial to effective policy formulation.

This one-year audit sought to determine the pattern, the influencing factors and the outcome of paediatric surgical admissions to a referral paediatric surgical centre in Nigeria.

## PATIENTS AND METHODS

This one-year audit on paediatric surgical admission was undertaken between January and December 2009 at the University of Benin Teaching Hospital. The hospital is a multi-departmental multi-disciplinary tertiary hospital located in Edo state in the South-South Geopolitical Zone of Nigeria. It has a paediatric surgical unit with a 30 bedded ward that is run by three consultant paediatric surgeons and 17 nurses, and serves as a referral centre to Edo and neighboring states. In addition to the 30 bedded paediatric surgical ward, many children with surgical pathology were admitted to other wards, including non-surgical wards. The paediatric surgeons did not subspecialize in paediatric surgery; they provided general paediatric surgical care and jointly admit patients into the ward during the period of study. Moreover, some surgery specialists handled paediatric surgical conditions and also admitted their cases into the paediatric surgical ward. The case files and records of all paediatric surgical admissions were retrieved from the medical record department and complimented with wards records. Data collated included biodata, date of admission, indication and factors that influenced admission into various wards, incidence of nosocomial infection, length of hospitalization, challenges, and outcome. Two children with incomplete records were excluded from the study.

**Statistical analysis:** The data obtained were analyzed using SPSS version 13 software (SPSS, Chicago, IL, USA) package. Continuous data were compared with student t test, while categorical data were analyzed using Chi-square test with a  $p$ -value  $\leq 0.05$  regarded as significant.

## RESULTS

A total of 871 children with surgical pathology who were aged between one day and 16 years were admitted, 322 (37%) on emergency basis during the study period. They constituted 43% of 2027 children treated for surgical pathology, with the remaining 1156 (57%) managed on outpatient and day care bases. Only 530 (60.8%) of the 871 children were admitted into the paediatric surgical ward while the rest were admitted into different wards as shown in fig. 1. Admissions into non-surgical wards were influenced by lack of paediatric surgical intensive care unit, insufficient bed space in surgical ward and some children being too big to enter baby cots and smaller beds. Consequently, admissions of 32 elective cases were deferred due to unavailable bed space.

Postoperative nosocomial sepsis and wound infection were major challenges that were very common among 106 neonates admitted to Special Care Baby Unit (SCBU) compared to other wards. An extremely significant statistical difference was observed when incidence of nosocomial infective complications was compared between surgical and non-surgical wards ( $P < 0.0001$ ). Similarly, there was higher mortality, 14 (13.2%), recorded among the 106 neonates admitted to SCBU compared to other wards ( $P < 0.0001$ ) as depicted in table 1. More deaths were recorded among children admitted on emergency compared to elective admissions with an extremely significant statistical difference observed ( $P < 0.0002$ ). However, there was no statistically significant difference observed when mortality was compared between older children in non-paediatric surgical wards and the paediatric surgical ward ( $P = 0.0739$ ).

The number of patients admitted into the paediatric surgical ward during the year ranged from 28 cases in July to 62 cases in September, with an average of 46 admissions per month as shown in fig. 2. The average hospitalization duration was 8 days, ranging from 24 hours for children who had herniotomy to three months for those with burns/fracture. This was an average of 18 (553/30) admissions to a bed per year. The paediatric surgeon to patient ratio was 1: 15 and nurse to patient ratio was 1: 33 during the year. Of 17 nurses in paediatric surgical ward, only one was a formally trained paediatric nurse while the others had their formal training in other specialties.

Table 2 shows the surgical pathology that necessitated admissions into the paediatric surgical ward, the number that got well and were discharged home, those transferred to other wards for continued

management by other specialties, and the total deaths recorded. Urological conditions, 200 (36.2%), were the highest indications for admission with no associated mortality. However, 4 of the mortalities recorded in the paediatric surgical ward were among children with gastrointestinal pathology. There was no death

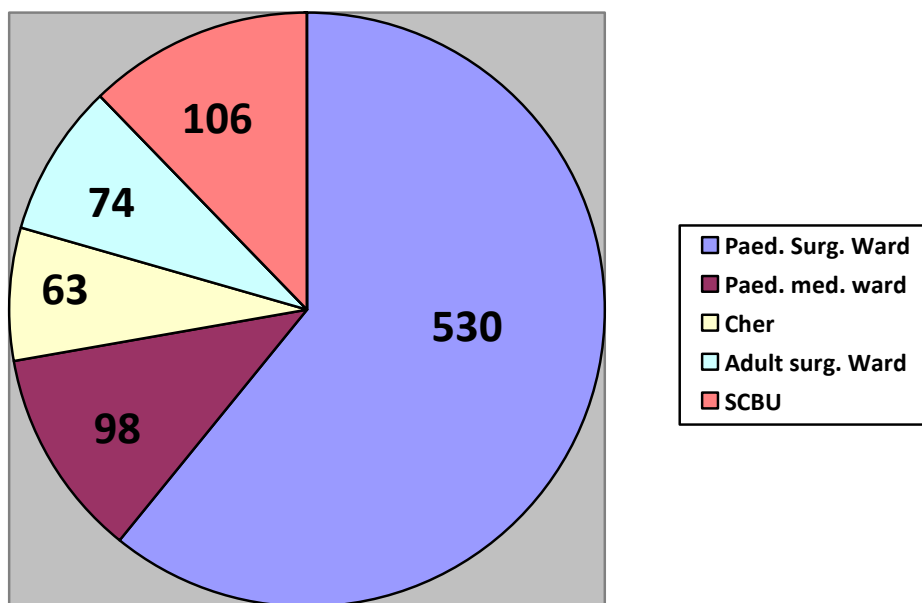
among children with medical conditions who accounted for 23 (4.2%) admissions into paediatric surgical ward. Their admissions into surgical ward were similarly due to insufficient bed spaces in medical wards.

**Table 1: Number of admissions to various wards, postoperative infections and percentages of mortality recorded per ward during the year.**

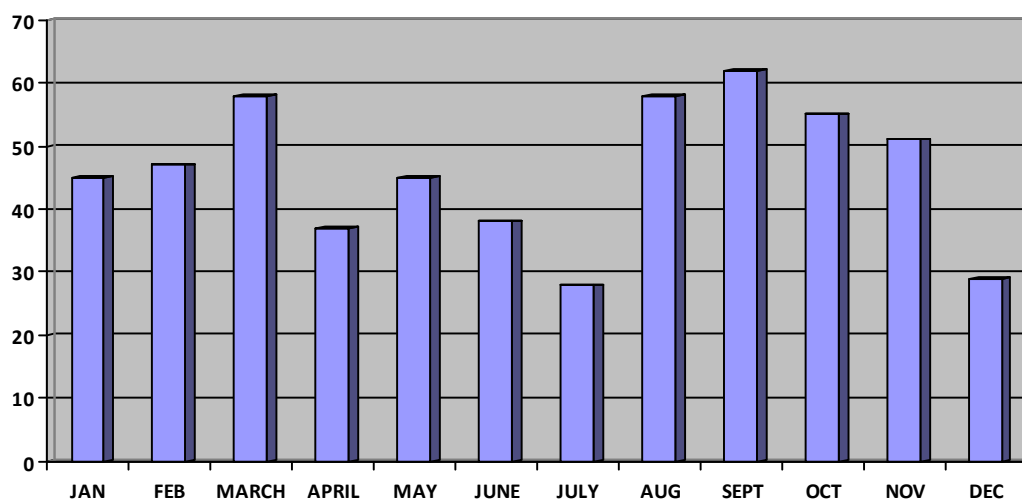
Wards	Numbers	Infections (%)	Deaths (%)
Paediatric surg. ward	530	11 (2.1)	10 (1.9)
Paediatric med. ward	98	18 (18.4)	2 (2.1)
Children emergency (cher)	63	0 -	0 -
Adult surg. ward	74	8 (10.8)	0 -
SCBU	106	63 (59.4)	14 (13.2)
<b>Total</b>	<b>871</b>	<b>100 (11.5)</b>	<b>26 (3)</b>

**Table 2: Pathology requiring admission into paediatric surgical ward, number of discharges, deaths, and transfer to other wards.**

Systemic involvement	Admissions	Discharges	Transfers	Deaths
Gastrointestinal	105	99	2	4
General Surgical	23	21	0	2
Urological	200	197	3	0
Neurosurgical	2	2	0	0
ENT	58	56	1	1
Ortho/trauma	51	50	0	1
Maxillofacial	31	31	0	0
Cardiothoracic	9	7	2	0
Burns/plastic	51	47	2	2
Paediatric medical	23	23	0	0
<b>Total</b>	<b>553</b>	<b>533</b>	<b>10</b>	<b>10</b>



**Fig. 1: pattern of ward admissions of children with surgical pathology.**



**Fig. 2: Monthly distribution of admissions into paediatric surgical ward.**

## DISCUSSION

Even with the exclusion of day cases and children managed on outpatient bases, this audit recorded a high number of children with surgical pathology admitted who constituted 43% of paediatric surgical workload during the period. There was a considerable stress on the available human and material resources that was similar to the experiences of other authors<sup>4,5,11</sup>. The disparity between the large volume of paediatric surgical ward load and the available meager resources in developing countries is reflected in this and other similar studies<sup>5,7</sup>. The lack of adequate paediatric surgical facilities resulted in many children admissions to non paediatric surgical wards (39.2%). These wards were far apart and made giving adequate surgical attention difficult, especially in emergency situation. This may have influenced the poorer outcome recorded in non surgical wards as previously reported<sup>5,8,11</sup>.

Although there was a 30 bedded paediatric surgical ward during the period, lack of neonatal surgical intensive care facilities resulted in neonates with surgical pathology being admitted to SCBU that was designed for neonates with sepsis and other infectious and non infectious medical pathologies<sup>1,9,10</sup>. The SCBU was the only ward with neonatal intensive care facilities such as incubator, radiant warmer and ventilator during the study period. Consequently, postoperative nosocomial sepsis and wound infection were more common in non surgical wards, especially among surgical neonates in SCBU. This was perhaps because they were admitted and shared the same facilities with neonates that had septic and infectious pathology. Such admissions were also reported by other authors as a major cause of nosocomial infection in their centres<sup>10,12</sup>. The poorly developed immunity of the neonates allowed rapid spread of infection from one neonate to the other in this review. Isolation of septic patients was emphasized as the main preventive measure of nosocomial infection in many intensive care units<sup>12,13</sup>.

Postoperative wound infection also significantly increased the length of hospitalization especially those of the neonates and children with burns and fractures. The overall paediatric surgical mortality, 26 (3%), recorded during the period resulted directly from infective complications as reported by others<sup>9,10,14</sup>. Infective complications also contributed to the high mortality recorded among children admitted on

emergency basis as they presented late and resistant infection had established on arrival. The deferment of scheduled elective cases due to insufficient bed spaces posed emotional challenge to the parents, children and the paediatric surgical staff. Authors in similar setting in this subregion also experienced this challenge that constituted a major drawback to effective paediatric surgical care<sup>4,5,7,8,11</sup>. These scenarios in developing countries are at variance with reports from developed countries where there is a balance between paediatric surgical admissions and available facilities<sup>1,3</sup>.

Outcomes of children with urological surgical pathologies admitted to the paediatric surgical ward were excellent even though they were the most common indications for admission. The highest mortality was recorded with gastrointestinal surgical pathologies which was similar to findings in other studies<sup>8,11,15</sup>.

An average admission of 46 new children to the ward per month was significantly higher in this review than reports from other centres<sup>4,8,11,15</sup>. The nurse to patient ratio of 1: 33 was similarly higher in this review than what obtains in developed countries where reported ratios were significantly lower<sup>3,14</sup>. Moreover, only 11.8% of the nurses were formally trained paediatric nurses. This may signify that the quality of nursing care may have been poorer compared to developed centres<sup>3,4</sup>. This study is limited by the retrospective design and the short duration of time covered. The findings, therefore, may not adequately represent paediatric surgical admissions in this subregion.

## CONCLUSION

Inadequate human and material resources resulted in deferment of many elective cases and many admissions to non surgical wards which led to higher infective complications, increased the length of hospitalization and mortality rate. We emphasize the need for the provision of more paediatric surgical facilities and training of more paediatric surgical personnel to match the high paediatric surgical workload. Efforts should be made to nurse clean surgical cases separate from septic surgical and medical cases to reduce the risk of nosocomial infection .

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