

Postoperative Intensive Care Admissions of Paediatric Surgical Patients in a Nigerian Tertiary Hospital: Indications and Evaluation of Management Outcome.

¹ B.O. BOLAJI, ² A. A. NASIR, ² J. O. ADENIRAN, ² L. O. ABDUR-RAHMAN
AND O. O. OYEDEPO

¹Department of Anaesthesia, ²Paediatric Surgery Unit,
Department of Surgery, University of Ilorin Teaching Hospital, Ilorin, Nigeria

SUMMARY

A retrospective study of all paediatric surgical patients aged 15 years and below, admitted into the Intensive Care Unit (ICU) of the University of Ilorin Teaching Hospital (UITH) following surgery was carried out, covering a period of 10 years. Demographic information, surgical procedures performed, indications for intensive care admission and outcome were obtained. Sixty-seven general paediatric surgical patients were admitted with a male to female ratio of 1.4:1. There were 32 (47.8%) infants, 6(9%) pre-school children and 29(43.3%) older children. There were 57(85.1%) emergency procedures. Of the 40 patients who had documented indications for admission, 25(62.5%) had respiratory insufficiency and only five (20.0%) were ventilated. Twenty (29.9%) patients died. Primary diagnosis, American Society of Anesthesiologists' (ASA) physical status score, emergency surgery and type of procedure significantly affected outcome. Conclusion: Availability of appropriate paediatric ventilatory facilities and personnel may reduce mortality in our ICU.

Keywords: Paediatric surgical; postoperative; intensive care; indications; outcome

INTRODUCTION

The intensive care unit provides services for patients with potentially recoverable conditions who can benefit from more detailed observation and invasive treatment than can be provided in general wards or high dependency units.¹ Paediatric surgical patients, because of their size and peculiar physiology, may sometimes need cardiopulmonary support postoperatively. This is better provided in an intensive care unit. Paediatric supportive and monitoring facilities lag behind in the intensive care units of many developing countries. Most attention on paediatric health care in developing countries is focused on prevention and control of communicable diseases and malnutrition.² This study was carried out to review the indications for admission, management outcome and problems encountered in paediatric surgical patients admitted into our intensive care unit over a 10-year period.

PATIENTS AND METHOD

The ICU register, case notes, anaesthetists' records, operation notes and discharge summaries of children aged 15 years and below admitted postoperatively into the ICU from January 1997 to December 2006 at the University of

Ilorin Teaching Hospital were retrospectively reviewed. Data collected included demographic information, procedures, duration of surgery, indications for ICU admission, ASA physical status score and management outcome. Children discharged from intensive care unit were compared with those who died. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS®). Continuous variables were compared with student's t test and discrete variables were analyzed with Chi square test and Fisher's exact test where appropriate. A p value of less than 0.05 was considered significant.

RESULTS

A total of 875 surgical patients were admitted over the ten year study period. Sixty-seven (7.7%) were general paediatric surgical admissions with a yearly admission rate of 7. There were 39 boys and 28 girls (M/F ratio= 1.4:1). Median age at admission was 42 months (range 1 day to 15 years). There were 15 (22.4%) neonates, 17 (25.4%) infants, 6 (9%) pre-school children and 29(43.3%) older children. There were 57 (85.1%) emergency cases and 10 (14.9%) elective cases. Closure of intestinal perforation accounted for 20(29.9%) of the procedures followed by exploratory laparotomy in 16(23.9%), and, resection and anastomosis in 11 (16.4%) (Table I).

Out of 40 patients with documented indications for ICU admission, respiratory insufficiency constituted

Correspondence: Dr. Bolaji, B.O., Department of Anaesthesia, University of Ilorin Teaching Hospital Ilorin, Nigeria. E-mail: olubolajidr@yahoo.com

25 (62.5 %), observation only in 10 (25 %) and unstable haemodynamic variables in 5 (12.5%) (Table II). Of the 25 patients that required ventilation for respiratory insufficiency, only five (20.0%) were ventilated. The duration of ICU admission was 1-8 days (median 4 days). Twenty patients died (overall mortality of 29.9%) and all of these patients had emergency operations. Sixteen (80%) of the mortality occurred in patients that had laparotomy and for most of them (14 or 70%), the procedure was done for closure of intestinal perforations, resection and anastomosis or drainage of peritoneal collection (Table I). None of the patients with ASA physical status less than 2 died while 46.7% of patients with ASA IV died. Comparing children discharged from intensive care unit with those that died; emergency surgery ($p = 0.000$), type of procedure ($p = 0.001$), higher ASA score ($p = 0.043$) and indication for ICU admission ($p = 0.024$) were all associated with increasing mortality. There were no significant differences in age, sex, duration of surgery, length of ICU stay and status of operating surgeon between the two groups.

Table I: Distribution of procedures and mortality

Procedures	Number	Mortality %	Mortality
Closure of perforation	20	8	40.0
Laparotomy	16	5	31.3
Intest resect & anastomosis	11	3	27.3
Colostomy	5	0	0.0
Reduction of intussusception	3	0	0.0
Excision biopsy	3	0	0.0
Appendectomy	2	1	50.0
Nephrectomy	2	0	0.0
PSARP	2	1	50.0
Separation of conjoined twin	2	2	100.0
Repair TOF	1	0	0.0

TOF=Tracheo-oesophageal Fistula, PSARP= Posterior Sagittal Ano-Rectoplasty. Intest resect & anastomosis = Intestinal resection and anastomosis

Table II: Indications for ICU admission and outcome

Indication	Number	Mortality	%Mortality	P Value
(N=40)				
Resp insuff	25	5	20.0	
Observation	10	0	0.0	
Haem instab	5	3	60.0	0.024

Resp. insuff= respiratory insufficiency; Haem. instab.= Haemodynamic instability

DISCUSSION

The ICU of the University of Ilorin Teaching Hospital has only 3 beds which are not adequate for the 450 bedded tertiary hospital. There should be at least one ICU bed to a maximum of 100 patients in a well-equipped hospital.³ Most intensive care units in developing countries are predominantly manned by personnel trained for adult

patients⁴, with little attention to physiological peculiarities of children. This has a negative impact on their management.

The yearly admissions rate into our ICU of 7 is low compared to 16 of postoperative paediatric ICU admissions reported by Kushimo *et al*⁴. The higher admission rate in the Kushimo study may be due to adequate number of ICU beds (6 beds) for the corresponding hospital. Though most of their patients had cardiothoracic operations, many of our cases were gastrointestinal procedures. Twenty (29.9%) of the patients in this study had closure of typhoid intestinal perforations. This multi-systemic disease affects vital organs of the body including Zenker's degeneration of respiratory muscles and myocarditis with expectedly high mortality when the patients are not electively ventilated postoperatively as highlighted in previous reports.^{5,6} Out of 25 patients that required ventilation for respiratory insufficiency, only five (20.0%) were ventilated because the available ventilator could only be used for older infants and children. The overall mortality rate of 29.9% in this study is lower than 52.4% reported by Kushimo *et al* in children below 12 years.⁴ The lower mortality rate in spite of inadequate facilities may be due to different case-mix and a lower admission rate in our ICU compared to the Kushimo study. Higher ASA physical status score was associated with increased mortality in this report. This may be due to delay in presentation of the patients leading to deranged physiological parameters. We were however unable to do either Acute Physiology and Chronic Health Evaluation (APACHE) or the Simplified Acute Physiology Score (SAPS) scoring for our patients due to non availability of blood gas analyzer during the period covered by this study. These are scores that may be used to determine severity of illness and predictor of group outcome.^{7,8}

CONCLUSION

Respiratory compromise was the commonest indication for admission of paediatric surgical patients admitted into our ICU postoperatively. Most of these patients had laparotomy following typhoid perforation. Acquisition of paediatric/neonatal ventilators as well as the training of personnel to cater for neonates and the very young infants may reduce mortality in our ICU.

REFERENCES

1. Garry S., Mick N: ABC of intensive care. *Br Med J*. 1999; **318**: 1544 – 1547.
2. Ameh E. A., Ameh N: Providing safe surgery for neonates in Sub-Sahara Africa. *Trop Doct*. 2003; **33**: 145–147.
3. Bell J. A., Bradeley R. D., Jenkins B. S., Spencers G. T. Six years of a multidisciplinary intensive care unit. *Br Med J*. 1974; **1**: 483–488.
4. Kushimo O. T., Okeke C. I., ffoulkes-Crabbe D. J. O. Paediatric admission into the Intensive Care Unit of the Lagos University Teaching Hospital. *Nig Qt J Hosp*

- Med.* 1998; **8**: 52–55
5. Adeniran J. O., Taiwo J. O. Salmonella and Ilorin surgeons: Who is winning the race? *Trop J of Health Sci.* 2007; **15**: 61–65.
 6. Ameh E.: Typhoid ileal perforation in children: a scourge in developing countries. *Ann Trop Pediatr.* 1999; **19**: 267–272.
 7. Oh T. E., Hutchinson R., Short S., Buckley T., Lin E., Leung D. Verification of the Acute Physiology and Chronic Health Evaluation scoring system in a Hong Kong intensive care unit. *Crit Care Med.* 1993; **21**: 698–705.
 8. Le Gall J. R., Lemeshow S., Saulnier F. ICU Scores: New Simplified Acute Physiology Score (SAPS II). *JAMA* 1994; **4**: 271–1321.