Update in Anaesthesia

BRIEF COMMUNICATION

Paediatric anaesthesia at a tertiary hospital in Nigeria

Ilori IU,* Beshel-Akpeke RA, Usang UE
*Correspondence email: iniabasi25@yahoo.com

INTRODUCTION

Many hospitals in sub-Saharan Africa lack the basic facilities for the administration of safe anaesthesia for adult and paediatric patients.[1] Despite these deficiencies, anaesthetic services in our institution have not been audited and so we have no true picture of our anaesthesia service and its effect on anaesthetic outcome. This audit is a retrospective analysis of the paediatric anaesthesia service provided in a tertiary hospital in a resource poor environment, looking specifically at intraoperative adverse events.

METHODS

University of Calabar Teaching Hospital, Calabar, Nigeria, has 3 theatre sites: the main theatre for all surgical specialties, the obstetric and gynaecology complex and a separate ophthalmology site. One of the five consultant anaesthetists is a specialist in paediatric anaesthesia and seven of the eighteen trainees are senior registrars, regularly anaesthetizing children under 5 years.

The data of paediatric patients, aged 0 to 18 years, between August 2007 and September 2009 were extracted retrospectively from the anaesthetic records at the main theatre complex. The patients were grouped into 0 to 5 years and above 5 years. The parameters collected were age, sex, weight, ASA status, haematocrit level, surgical diagnosis, anaesthetic technique and intraoperative adverse events. The data was analyzed using a Microsoft Excel spreadsheet.

RESULTS

We extracted data for 623 paediatric patients during this 2-year period, accounting for 29% of 2178 surgical procedures performed in the main theatre complex. The male to female ratio was 2.3:1, with 311 patients aged 0 to 5 years and 312 over 5 years. The surgeries were mainly elective (527 procedures, 85%). The American Society of Anesthesiologists (ASA) class I patients were 61% and ASA IV were only 2%.

The anaesthetic techniques used for the different age groups and are shown in Table 1.

There were 63 adverse events recorded in 57 (9%) patients. Table 2 shows the age distribution of the adverse events. Forty (63%) of the events occur in the 0 to 5 years group. Respiratory events were the most frequent accounting for 48% of all adverse events, with 74% occuring in the younger age group. Laryngeal spasm accounted for 48% of the respiratory events (15 events). There was one case of masseter muscle spasm in a 7-year-old female child. There was no mortality recorded among the patients. Most of the events occured in ASA 1 and 2 patients (Table 3). The pattern of surgical disease is shown in Table 4. Ear, nose and throat (ENT) pathologies were the commonest, numbering 156 (26%).

DISCUSSION

This audit describes paediatric anaesthesia data that was retrospectively extracted from the anaesthetic

IU Ilori
Department of Anaesthesiology

RA Beshel-Akpeke
Department of Anaesthesiology

UE Usang
Department of Surgery
University of Calabar Teaching Hospital
PMB 1278
Calabar 540001
Nigeria

Table 1. *Anaesthetic techniques by age group (GA – general anaesthesia)*

Anaesthetic technique	0 – 5 years	>5 years	Total (%)
GA with intubation	191	127	318 (51%)
GA with no intubation	78	72	150 (24%)
Total intravenous anaesthesia with ketamine	11	15	26 (4%)
Regional	12	69	81 (13%)
Combined regional and GA	20	28	48 (8%)

Table 2. *Intraoperative adverse events by age group*

Adverse events	0 - 5 years	>5 years	Total (%)
Respiratory	23	8	31 (48%)
Cardiovascular	4	2	6 (10%)
Delayed awakening	5	4	9 (14%)
Equipment malfunction	4	4	8 (13%)
Postoperative nausea and vomiting	1	2	3 (5%)
Failed spinal	1	2	3 (5%)
Medication error	2	0	2 (3%)
Masseter muscle spasm	0	1	1 (2%)
Total	**40 (63%)**	**23 (37%)**	**63 (100%)**

records in a tertiary hospital where there are skilled anaesthetic and surgical staff. Children constituted 29% of the total 2178 patients in this audit. This is high compared to 9.6% of all operative procedures reported by Ameh et al at rural teaching hospital in northern Nigeria in 2001.[2] In French speaking sub-Saharan Africa, Maman et al reported that 10% of patients were under 10 years of age in Yaounde, Cameroon and 12% under 16 years in Togo.[3] The increase in the percentage of paediatric surgical patients in our sub-region may reflect the relatively urban setting of the hospital or may indicate an improvement in health facilities utilisation. It also suggests that paediatric surgical diseases represent a significant burden of surgical health problems, which should therefore be considered an essential component of our government's child health programme.

An experienced surgical and anaesthesia team considerably decreases operative morbidity and mortality, especially in young children.[4] In the USA, there was a significant reduction in anaesthetic related adverse events from 16 to 2% between 1978 and 1988, as the number of physician anaesthetists increased. This reduction in adverse events was achieved before the introduction of pulse oximetry and other monitors.[4] The 63 adverse events (9%) reported in this audit were specifically intraoperative adverse events. This is comparable to the rate of 9.3% reported by Edonmonyi et al at University of Benin Teaching Hospital, Benin City, Nigeria where there are also trained anaesthetic manpower.[5] All the adverse events were associated with general anaesthesia except for three failed spinal blocks (5% of all events).

Respiratory events were the most frequent perioperative incident, in line with published series in paediatric anaesthesia.[6,7] Laryngeal spasm accounted for 48% of the respiratory events (15 events). Adverse incidents such as these should not result in adverse outcomes when managed by experienced specialists,[4] and there were no recorded intraoperative deaths during the 2-year period of this audit. We would largely attribute this to the presence of staff trained in paediatric anaesthesia. In developing countries there is a need to encourage more physician anaesthetists to develop an interest in paediatric anaesthesia as paediatric patients make up a sizeable number of surgical diseases (29% in this audit). Paediatric surgical patients are distributed across different surgical specialties and are handled by the respective specialist and not necessarily by dedicated paediatric anaesthetists and surgeons. The Federation of Associations of Paediatric Anaesthesia (FEAPA) recommends that paediatric anaesthesia should not be undertaken by an occasional anaesthetist.[8] Unfortunately this recommendation is not feasible in many developing countries where there is a lack of physician anaesthetists. Anaesthesia as a specialty is relatively unattractive to young medical graduates as it is viewed as not being lucrative.[9] Poor working conditions, lack of job satisfaction and poor remuneration has contributed greatly to emigration of trained manpower to developed world.

Table 3. *ASA status and adverse events*

ASA class	No of patients	No of adverse events (%)
1	385	23 (44%)
2	174	28 (37%)
3	54	10 (16%)
4	10	2 (3%)

Table 4. *Pattern of surgical disease*

Disease type	Percentage of patients
Ear, nose and throat surgery	26
Hernia and hydrocoele	19
Congenital abnormalities	12
Tumours and cysts	11
Trauma	11
Gastrointestinal	10
Infections	6
Urology	5

Although the majority of adverse events were associated with general anaesthesia it is not clear whether there is scope in our practice to increase the use of regional anaesthesia. General anaesthesia was administered in 79% of the patients which is similar to previous reports,[2] with regional anaesthesia employed in only 13%. This may reflect a lack of equipment, lack of expertise in paediatric regional techniques or simply that many of the procedures are not suitable for regional techniques in these age groups.

The adverse events involving equipment malfunction did not show any age inclination (Table 2). The 13% of adverse events involving equipment may be underestimate of the true figure, since under-reporting of equipment failure due to unwillingness to complete paperwork is recognised.[6] Given that 70% of the children did not have their weight documented, under-reporting due to the disinclination of the anaesthetists may be a factor in this audit. Technicians do not usually have formal training in the maintenance of the anaesthetic equipment and spare parts are rarely available. The purchase of anaesthetic equipment should include a training package for maintenance as well as reasonable quantity of spare parts for replaceable components.

There is generally paucity of information on the actual prevailing conditions in which anaesthesia is administered in most developing countries.[6] Poor documentation and under-reporting of adverse perioperative events may have contributed to lack of improvement in the available facilities for safe administration of anaesthesia in our environment. There is a need for proper documentation and report of all perioperative adverse events however minor so that healthcare providers can learn from it and improve on service delivery. It could also act as guide in setting guidelines for safe anaesthetic practice in resource poor environments. A governance system for formal reporting of adverse events involving non-availability or malfunctioning of equipment would make healthcare planners aware of the risks to which anaesthetised patients are exposed.

CONCLUSION

Anaesthesia for children in a resource poor environment can be safe with appropriately trained and skilled manpower. However there still much to be done in relation to equipment maintenance. In recent times the Nigerian government has striven to equip most of its tertiary health facilities with necessary equipment for efficient and safe delivery of health services to its citizen. With no concerted effort to maintain this equipment, the improvement in facilities will be short-lived. Anaesthetic care providers should document and report all adverse events however minor or easily managed. This may assist in assessing our quality of service and identify areas for improvement. The availability of paediatric monitoring facilities would help in decreasing morbidity and mortality in the very young.

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