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Pediatrics Surgery and Outcomes in Resource Limited Communities in Morogoro Tanzania

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Abstract **Original Research Article**

Introduction: Surgery in children is important medical component in clinical aspect both emergence and elective aiming to life serving, preventing disability and improvement of quality of life in diseased children. The cause of surgery in children are of different categories but can be grouped int emergency and elective and about 71% of surgeries in some countries in Africa are due to congenital inguinal scrotal disorders. The causes may differ from one country to the other. This study aimed to evaluate the surgical services being provided at Saint Francis Rural Referral Hospital in Tanzania.

Methodology: The retrospective study was done at Saint Francis Referral Hospital Ifakara Tanzania by using hospital data of the operated children from 2018 to 2024. Non probability purposive sampling was applied to collected the required information by using data collecting checklist. All meeting criteria were included. Data analysis was done by using SPSS version 26.

Results: A total of 349 children were operated during the period involving 65.6% of males and 34.4% females. Most of the patients operated were between 2 to 5 years and 6 to 16 years with the mean age of 2 □ 5years. Otolaryngology, general surgery, orthopedic and urology were the surgeries done in this study. Among the operated children 24.1% developed post-operative complications and there was 4.58% mortality rate.

Conclusion: Pediatric surgical care in rural hospitals is very important as among especially life serving procedures in rural regions. Improvement of pediatric surgical care and availability of pediatric nurses' specialist is highly recommended.

Keywords: Paediatric Surgery, Paediatric Nursing Care, Paediatric Advocate, Infrastructure, Infection, Optimal Outcome.

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INTRODUCTION

Pediatric surgery involves diagnosis, operative and post-operative care for children who have birth defects, injuries, or illnesses during childhood(1). Surgery in children remans an important component in clinical aspect both emergence and elective(1–3). The cause of surgery in children are of different categories. May be due to congenital defect whereby surgery is for anatomical anomaly correction(3–5). **It estimates that about 30% of global disease burden is treated yet 1,75 billion children lack surgical care acces**sibility(2,6,7) of which **87%** occurs in low and middle income countries

(LMICs)(8,9) leading to the increase of pediatric morbidity and mortality(2,10). Approximately 45000 children with surgical conditions are admitted annually in the United States(11) of which the majority are gastrointestinal, orthopedic, ENT or urological surgery(2,5). It has been reported that about 71% of surgeries in some countries in Africa are due to congenital inguinal scrotal disorders(8). Other causes are acquired including trauma and other illness requiring surgical intervention(3,5,10). In most cases, there is a delayed diagnosis at primary health centers than elective surgical conditions(1,7,10). Timely emergency surgical intervention prevents death and disability in this vulnerable population(4,9). It has been reported that improvement of infrastructure (including equipment), pediatric surgical training, conduction of research and accessibility of safe surgery advocating for children are needed to be implemented in order to improve pediatric surgical care globally but in LMICs at large(2,3,7,9,10). This study aimed to assess pediatric surgical services and its outcome at the rural referral hospital which may be similar to other rural hospitals of the same rank in developing societies. It further aimed to identify areas needing improvement to enhance pediatric surgical care.

METHODOLOGY

Study Design and study area

Retrospective cross section study was conducted on archived data of children who underwent surgery for two years (2022 - 2024) at St Francis Regional Referral Hospital (SFRRH). SFRRH is the only referral hospital with specialized care at the level of intermediate referral hospital. It has several departments including pediatric, internal medicine, obstetrics & gynecology and final surgery (with units involving orthopedic, urology, otorhinolaryngology, pediatric surgery and general surgery). Other supportive departments include laboratory, pharmacy, Emergency and critical care units, diagnostic imaging and dialysis.

Sampling Method

Non probability Purposive sampling method was adapted by using the existing hospital archived data for the two years. All the biodata of the children aged from 0 day to 16 years which met the inclusion criteria were involved in this study.

Data Collection Tools and Procedure

Data collection tools included: Hospital medical records and health management information system (HMIS). The patients' demographic particulars, type of surgery, post-operative outcomes were the information of importance based on the data collecting checklist. Patient's data which missed potential information were excluded from the study. Extracted data was recorded in structured format using a data collection checklist sheet. Cross-checking was performed to ensure accuracy and completeness of the recorded data. Any discrepancies were resolved by reviewing the original records.

Data Processing and data analysis

The data were entered in Microsoft Excel; they were cleaned, transcribed, coded and then analyzed using the statistical package for social sciences (SPSS) version 23. The results are presented as graphs charts, and tables. Chi square was used to compare the nominal variables with their outcomes to determine prognostic factors, furthermore, the factors with statistical significance 95% CI ($\alpha = 0.05$) were compared using the multivariate logistic regression.

Ethical Consideration

Patient confidentiality was maintained by anonymizing the data. The study was conducted in accordance with ethical guidelines of St. Francis University College of Health and Allied Science Review Board.

RESULTS

In this study, a total number of 349 children were operated during the period. Among them 229 (65.6%) were males and females constituted 120 (34.4%) whereby most of the patients operated were between 2 to 5 years and 6 to 16 years with the mean age of 2 ± 5years as it is shown in the figure 1 bellow.

The types of surgeries performed within that period were otolaryngology, general surgery, orthopedic and urology. Otolaryngology was the most surgery done composing 41.55%, followed by general surgery 32.38%, orthopedic surgeries composed 23.8% and urology was less frequent constituted 2.3%.

Out of 349 children who were operated 24.1% (84/349) developed post-operative complications including infection 20.0% (69/349), post-operative hemorrhage 3.44% (12) and dehydration 0.86% (3). Among the Children who were operated 333 survived while 16 died resulting in an overall survival rate of 95.42% (333/349) and 4.58% (16/349) mortality rate. Out of 113 the patients who underwent general surgery procedures, 86.7% (98/113) survived while 13.27% (15/113) died. There was 100% of survival rate in orthopedics and urology surgeries while otorhinolaryngology had significant high survival rate 98.7% (82/83) and only one patient died composing 1.2% (1/83). The association between demographic characteristics, type of surgery and post-operative complication with the outcome is summarized in table 1.

DISCUSSION

The leaving conditions determine the nature of disease management especially surgical operations. This study intended to highlight critical issues on the surgical operations in children conducted with the limited resources available in rural setting. It is apparently true that, rural setting in Africa could be termed to be the least healthy areas globally, thus, this leads to poor health that directly imparts on children who undergo surgical conditions (7,10). Despite the fact that paediatric-surgical conditions are common in Tanzania like any other developing countries, but still not always is available in

rural hospitals like St Francis due to multiple factors such lack of experience and conducive post-operative care at the institutional level including neonate and paediatric ICU (3,5). The results indicated the significant pediatric surgical work load within three years which increase institutional stress on the available human and material resources which is common in low- and middle-income countries (12–14). Inappropriate pre and post-operative care usually results into life threatening especially in emergencies and neonate department (15).

This study provided analysis of paediatric surgical services done at St. Francis which is rural referral hospital of which shows the significant high morbidity 24.1% and mortality 13.27%. This may be contributed by inadequate capacity in post-operative care for neonate and paediatric care(2,9). It is well known that in Tanzania and other developing least developed countries there is extremely rare specialized paediatric nurses while global paediatric nurses are about 53,000 (16) while the number of registered number of paediatric nurse in Tanzania is unknown. This implies that most of paediatric nursing care is provided by general nurses who have limited capacity in paediatric critical and emergence cares (3,16,17).

The age group between 0-2mo were the least while 6years t0 16 years were more the operated group in comparison to other age groups this correlates to what was reported by Rapaport *et al* whose study reported low prevalence 1.3% of surgical case in below one year old while 81.2% surgical procedures were done among 12 to 17 years(8). But also other literatures have reported likelihood of low rate of surgical procedures in young ages than older groups(1,8,12,14). However, this study differ from what was reported by other literatures whereby the rate of surgical; admission in baby of 0-28 days old was relatively high 22.8% (4), but also Kabongo *et al* reported 19.1% in infant of 0-1 year children who were admitted due to surgical conditions(18). Variation may be contributed by participant's selection criteria. In this study, males were more predominant than female 65.62% and females were 34.38%. The study becomes similar to what has been reported in other literatures whereby male to female distribution has been reported to be 66.5% and 33.5% by Firomsa *et al* and Jennifer *et al* reported females to have lower odds of surgical intervention (aOR:0.7, 95% CI: 0.6–0.8) in comparison to males (1,11,18). However, the study shows dissimilarities to other studies whereby female distribution has been reported to be high than male as it was reported by Rapaport, *et al* in his study female composed 78%(8)

There were a variety of pediatric surgeries done in this hospital during the period whereby otorhinolaryngology was the most surgical condition observed composing 41.55% of all followed by general surgery 32.38%, orthopedics 23.78% while urology was the least composed 2.30%. These findings reflect the importance of otorhinolaryngology, pediatric, orthopedic, and urologist specialist surgeons at rural areas to reduce the number of referrals which normally lead to the queues and further increase workload at Zonal and national referral hospitals.

There were significant post-operative complications 24.1% whereby infection was dominant 20.0%, others were post - operative hemorrhage 3.43% and dehydration 0.85%. High infection rate may be contributed by high incidence of hospital acquired infection in neonate and infants (4,12,13,17,19). But also, intubation and surgery associated infection are other areas of risk for infection (15,20). It is well known that endotracheal intubation leads to clearance of mucociliary which is a risk for exogenous and endogenous bacterial colonization leading to pneumonia and probable of septicemia as well (19). Exogenous transmission may come from health care workers (3), succussion tubes airway apparatus while endogenous transmission re normal floral from the normal anatomical air way(10,12). This cause polymicrobial organisms causing ventilator associated pneumonia (VAP)(19).

In this study, the outcomes varied by surgery type whereby general had high death rates 4.3% in comparison to other surgeries. The large number of deaths in this group recorded could be due to inclusion of the neonates which were not recorded in other surgical categories including orthopaedics, otorhinolaryngology and urology. But also, it should be known that, most of general surgical conditions were emergency including congenital anomalies, Intestinal obstruction, peritonitis and other life threatening which required emergence life serving surgical intervention such that underlying pathological condition and delayed diagnosis and hemodynamic instability at the moment of hospital arrival in this delicate population contribute for the death unlike other surgical categories (orthopaedics, urology and otorhinolaryngology) which most of them were elective. The findings of this study corelate with existing literature on paediatric surgical outcomes in LMICs(17,18). The mentioned above complications and the lower survival rates in neonate and infant surgeries mirror challenges faced in developing countries, where managing critical paediatric and neonates requires specialized expertise and resources(16,17) not always available in resource limited areas(1,19). This study adds to the of evidence that there is a necessity of enhancing surgical capacity and specialized care in this surgical risked population to reduce the gap in post operative outcomes between high-income countries and LMICs(2,4,7,9). A large number of institutional and national initiatives are required to improve the optimum surgical service outcome(3,5,9).

CCONCLUSION

Pediatric surgical care is very important in rural hospitals must be recognized among other life serving procedures, reduction of disability and improving quality of life to the diseased children. Hence, there is a need to improve pediatric surgical care in order to reduce post operative outcome and mortality rate. Availability of pediatric nurses' specialist is highly required at this institution to reduce post operative morbidity and mortality. However, more studies are needed to identify more risk factors related to pediatric surgical improvement in the rural tertiary hospitals il limited resourced areas.

Limitation of the Study

The study relies on existed medical records, which may not have been initially collected with research purposes in

mind such that some of information's were missing. But also, other variables not recorded in the MTUHA book such as socio-economic status, nutritional status, or pre-existing illness which may influence surgical outcomes.

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Accordance Statement

The study did not involve any human or animal experiments, but protocol of using human data was approved by SFUCHAS IRB. The participants whose data has been included in this study have been preserved according to human particulars preservation guidelines.

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Declarations

Ethics approval and consent to participate. The study was approved by the SFUCHAS Review Board (IRB).
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