

CHAPTER 1

PAEDIATRIC SURGERY SPECIALTY AND ITS RELEVANCE TO AFRICA

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Introduction

In Africa, children constitute more than half of the population,¹ and therefore much effort is devoted to the prevention and treatment of childhood diseases. Emphasis is placed on diseases that cause the greatest morbidity and mortality, such as communicable diseases (especially human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), malaria, and respiratory infections), maternal and perinatal conditions, and nutritional deficiencies.² In many African countries, scarce health care resources have been concentrated on the provision of immunisation, HIV control, malaria eradication, and other public health concerns. As a result, diseases for which surgical intervention offers the only hope for prevention, palliation, or cure usually do not come within the radar of health policy makers. Given that surgical diseases have not been considered significant health care problems in Africa, the paediatric surgical speciality has not received the attention it deserves.³

Paediatric surgeons have been described as the only true general surgeons;⁴ this is especially the case in Africa, where paediatric subspecialisation is rare in orthopedics, urology, otolaryngology, thoracic surgery, plastic surgery and neurosurgery. The paediatric surgeon in Africa, therefore, provides cost-effective care at a considerable bargain for these impoverished countries. A detailed list of paediatric surgical diagnoses encountered in an urban hospital in Africa is provided in Table 1.1. Unaccounted for in most studies are those children for whom treatment is inaccessible due to distance, cost, or lack of qualified personnel. Bickler et al. analyzed all paediatric visits at the main urban hospital in Banjul, The Gambia, and estimated the incidence of paediatric surgical problems at 543 per 10,000 children

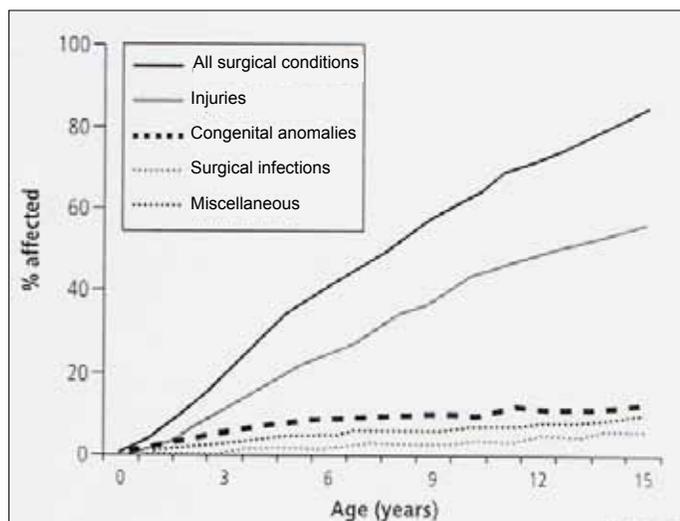
aged 0–14 years, of which 46% required surgical procedures. Using age-specific incidences, the authors estimated the cumulative risk for all surgical conditions at 85.4% by age 15 years (Figure 1.1).^{5,6}

Despite sparse epidemiologic data, there is increasing recognition of the value of surgery as a component of basic health care and an important means of providing both preventive and curative treatment.⁷ As such, it is imperative that paediatric surgical care be integrated into a comprehensive strategy to reduce the burden of disease in Africa.

Table 1.1: Surgical conditions seen among children (n = 1200) treated at elective surgery at Komfo Anokye Teaching Hospital, Kumasi, Ghana.

Disease entity	Number of children	Percentage of total
Inguinal hernia and hydrocele	611	51
Undescended testis	93	8
Umbilical hernia	63	5
Extra digits	58	5
Neoplasms	44	4
Cystic hygroma/hemangioma	36	3
Anorectal malformations	34	3
Uncircumcised penis	28	2
Hirschsprung's disease	27	2
Enlarged lymph nodes	26	2
Rectal polyp	14	1
Thyroglossal and branchial cysts	11	0.9
Oesophageal stricture	10	0.8
Epigastric and incisional hernia	10	0.8
Wilms' tumour	9	0.8
Thyroglossal cysts	9	0.8
Rectovaginal fistulas	8	0.7
Sacrococcygeal teratoma	8	0.7
Spina bifida	5	0.4
Ambiguous genitalia	3	0.3
Anal stenosis	3	0.3
Enterocutaneous fistula	3	0.3
Hypersplenism with splenomegaly	3	0.3
Popliteal cyst	3	0.3
Pyloric stenosis	2	0.2
Patent urachus	2	0.2
Miscellaneous other	74	7

Source: Adapted from: Abantanga FA, Amaning EP. Paediatric elective surgical conditions as seen at a referral hospital in Kumasi, Ghana. ANZ J Surg 2002 72(12):890–892.



Source: Bickler SW, Rode H. Surgical services for children in developing countries. Bull World Health Organ 2002; 80(10):829–835.

Figure 1.1: Estimated risk of requiring surgical care in a paediatric population living in Banjul, The Gambia. Cumulative risk was estimated by using age-specific incidences.

Historical Background

Modern archaeology has uncovered evidence of surgical operations in Africa that predated the Neolithic age, including children as patients.⁸ The first medical school was established in Alexandria, Egypt, by Herophilus in the fourth century B.C.E. and developed further in the third century B.C.E. by Erasistratus.⁹ Therefore, the concept of surgery is not alien to the continent, notwithstanding the lack of progress that occurred over many centuries.

The practice of paediatric surgery as a specialty in Africa has its roots in South Africa during the 1920s with paediatric surgeons from the Hospital for Sick Children, Great Ormond Street, London, as pioneers.¹⁰ In the late 1940s and 1950s, the first paediatric surgical unit was established at Groote Schuur Hospital in Cape Town by Jan H. Louw, and since then, the practice of paediatric surgery in Africa has become firmly established. Several national and regional organisations have been formed to promote the practice of paediatric surgery. In 1994, the Pan African Paediatric Surgical Association (PAPSA) was formed, which held its inaugural meeting in Nairobi, Kenya, in March 1995. In 2004, the African Journal of Paediatric Surgery (AJPS) was founded by Francis Uba. This publication has already achieved listing in MEDLINE, thus removing a major obstacle to the growth of the specialty.

In the past five decades, many Africans have trained in paediatric surgery, both overseas and recently in indigenous residency programmes. Paediatric surgery divisions now exist in several departments of surgery, many of which participate in the education of medical students and general surgery residents. In a few centres, subspecialty training in paediatric surgery has been established with a formalised curriculum. Regulation and oversight of paediatric surgery training has been carefully maintained by professional bodies that administer the examination and certification required for credentialing as a subspecialist.

Currently, examination and certification in paediatric surgery have been organised on a regional basis. In South Africa, surgeons who have completed general surgery training and an additional two years of subspecialty training may take the specialty examination in paediatric surgery offered by the College of Medicine of South Africa.¹¹ In West Africa, surgeons become eligible for examination and certification in paediatric surgery after a minimum of two years of general surgery training and a further 20 months of subspecialty training under the aegis of the West African College of Surgeons.¹²

African surgeons have made significant contributions to the practice of paediatric surgery and have also championed the development of the specialty locally. Many paediatric surgeons with roots in Africa have achieved local and international recognition for their clinical, research, and leadership roles. As a prime example, the dominant hypothesis on the aetiology of intestinal atresia was the outcome of a series of experiments performed by Jan Louw and Chris Barnard at the Red Cross Children's Hospital in Cape Town. This seminal work, published in *Lancet* in 1955, provided direct evidence for vascular accidents as the likely mechanism in the pathogenesis of intestinal atresia during foetal development. Louw was honoured with the prestigious Sir Denis Browne Gold Medal by the British Association of Paediatric Surgeons (BAPS) in 1980. The 2004 honouree for this award was another South African, Sir Lewis Spitz, who rose to the Nuffield Chair of Paediatric Surgery at the Hospital for Sick Children, Great Ormond Street, London. Recently, Sid Cywes was accorded the honorary fellowship of the American College of Surgeons. Additionally, Donald Nuss, who developed the minimally invasive repair for pectus excavatum, began his training in Africa.

Burden of Surgical Diseases in African Children

With only 11% of the world's population, Africa bears 25% of the global burden of disease. Several well-known factors, including endemic poverty, poor literacy rates, civil conflicts, and corrupt political leadership, contribute to the overwhelming burden of childhood disease in

low- and middle-income countries. Although comprehensive data on the incidence of paediatric surgical conditions in Africa is lacking, available information suggests that trauma, congenital anomalies, and surgical infections are common.¹³ Yet, the focus on the prevention and treatment of infectious diseases has often led to the neglect of trauma and other surgical disease as important factors in the overall disease burden in children from these regions.¹⁴

Despite the perceived high costs and limited availability of a trained workforce and equipment, surgery is often an essential and integral part of basic health care, as in cases of treatment of injuries, urinary retention, and inhaled foreign bodies, or preventive, as in the case of elective hernia repair.⁵ In fact, Gosselin et al. performed a cost-effectiveness analysis to evaluate the costs and disability-adjusted life years (DALYs) saved by the provision of surgical services to children in a rural hospital in Sierra Leone, and the positive effect was comparable to that of other public health interventions.¹⁵

Failure to recognise the importance of surgical treatment has led to neglect by both governmental and donor agencies. Of the estimated 234 million major surgical procedures performed worldwide annually,¹⁶ which is 7 times the number of persons infected with HIV, only 3.5% of these are performed in the poorest nations, many of which are in Africa.¹⁷

The view of surgical disease as being relatively unimportant has been amplified by a lack of accurate epidemiological studies. However, emerging data highlight the need to re-examine conventional thinking. One report from a rural hospital in Malumfashi, Nigeria, and another from a large urban hospital in Banjul, The Gambia, showed that paediatric surgical cases account for 6.6% and 11.3% of all paediatric admissions, respectively.^{18,19} In both studies, 80–90% of all paediatric surgical admissions were due to congenital anomalies, surgical infections, and trauma. Determination of the true incidence of congenital anomalies is difficult due to the associated stigma still seen in many native populations. In South Africa, with better surveillance systems and greater awareness among the population, the incidence of congenital anomalies is about 12 per 1,000 live births.²⁰

Among surgical diseases, trauma is an important cause of morbidity, mortality, and disability in African children.²¹ According to estimates by the World Health Organization (WHO), injuries account for 13% of the childhood disease burden and nearly 1 million deaths per year in developing countries.^{22,23} Africa's children are at more risk of dying from motor vehicle crashes than European children.² Deen et al.²² have projected that the relative contributions of injuries and noncommunicable diseases to the childhood disease burden in developing countries will increase from 28% in 1990 to 45% by 2020. Reports from urban and suburban West Africa indicate that trauma is responsible for about 9% of attendance in a children's emergency room and is the most common cause (47%) of paediatric admissions.^{19,24} Even in rural Africa, where studies are few, there are indications that trauma is an important cause of paediatric admissions to health facilities.^{18,25}

Recently, there has been a growing recognition of the importance of surgical disease in the global effort to reduce the burden of disease.²⁶ WHO has developed the Global Initiative for Emergency and Essential Surgical Care (GIEESC), which currently includes pilot projects in 17 countries, of which 8 are in Africa.

Barriers to Effective Paediatric Surgical Care

The most significant obstacle to the development of paediatric surgical services in Africa is the lack of interest shown by the various governments as well as the nongovernmental organisations (NGOs).²⁷ The role of the NGOs is quite crucial because their contribution to health care expenditures in many African countries is substantial and occasionally exceeds the health budget of national governments.² These NGOs, especially the UN agencies (World Bank, WHO, and the United Nations Children's Fund (UNICEF)) and private foundations (e.g., The Bill and Melinda Gates Foundation) exert even greater influence

because they often set the agenda for health care priorities of many developing countries.

Socioeconomic and Cultural Factors

Africa remains a predominantly illiterate and poor continent, with the majority of the population surviving on less than US\$2 daily.²⁸ Due to the lack of health insurance, out-of-pocket private expenditure on health care is the norm. Therefore, health care is in direct competition with the basic subsistence needs for food, shelter, and clothing. In the few countries where health care is free or subsidised for children, surgical conditions are often excluded. Unfortunately, even families that can afford to pay may be unaware that surgical treatment is feasible or available for a variety of disabling, disfiguring, or life-threatening congenital or acquired conditions.

A persistent cultural attitude toward congenital anomalies continues to hinder access to corrective surgery. Congenital anomalies may be ascribed to supernatural causes or the curse of the gods. Fortunately, egregious behaviour such as the sacrifice of malformed babies has been largely eliminated, although reluctance to seek treatment persists.

Poor Health Care Facilities

Jan H. Louw established the first paediatric surgery unit in southern Africa at the Groote Schuur Hospital in Cape Town in 1948; this became a full department in 1952.¹⁰ Since then, several other centres have emerged in South Africa where medical care in general and paediatric surgery services in particular have advanced to a level comparable with many Western countries. The practice of paediatric surgery as a specialty has now been established in several other African countries, but unfortunately the majority of these are plagued with poor facilities and dysfunctional health care systems. The only dedicated children's hospital in sub-Saharan Africa is the Red Cross War Memorial Hospital, Rondebosch, South Africa. Here, paediatric surgeons enjoy facilities in a major clinical and research paediatric centre recognised both regionally and internationally.¹⁰

In Nigeria, with a population of 150 million, the government has only recently approved the construction of its first comprehensive children's hospital, expected to open in Zaria in a few years. Currently, most paediatric surgeons in Africa practice in large urban hospitals that principally serve adult patients. Many of these centres are overcrowded, poorly funded, and lack facilities such as a dedicated paediatric ward, paediatric emergency room, neonatal intensive care unit (NICU), paediatric radiology, and paediatric pathology, which are considered basic requirements for a sustainable paediatric surgery practice. Where these facilities exist, they are often poorly equipped and are frequently operated by doctors who have not undergone dedicated paediatric training. The lack of paediatric anaesthesia has caused some surgeons to rely on local anaesthesia or staged procedures for complex cases.^{27,29}

Referral and Transport

Poor obstetric services limit the ability to perform prenatal diagnosis and planned delivery for infants with severe congenital anomalies, as is routinely obtained in most developed countries. Many pregnant women do not receive antenatal care, and sometimes the only obstetric service available is delivery by untrained traditional birth attendants (TBAs).^{27,30} Untrained TBAs are unable to recognise congenital anomalies for which early surgical treatment is essential to prevent early death. Such conditions include oesophageal atresia, intestinal atresia, and congenital diaphragmatic hernia. Even when referrals to appropriate health care facilities are made, the poor condition of rural roads and inadequate transport facilities often lead to neonatal loss in transit or presentation in a debilitated and decompensated physiological state.

Shortage of Trained Workforce

Despite the increasing number of medical schools in Africa, the number of doctors practicing on the continent remains grossly inadequate. In Ghana, about 1,500 doctors serve the 20 million population, and only

32 specialists work in Malawi, with a population of 10 million.^{31,32} In Nigeria, fewer than 40 practicing paediatric surgeons cater to a paediatric population (less than 18 years of age) that exceeds 80 million. This gives a ratio of one paediatric surgeon to about 2 million children (compared to 1:100,000 in North America). The few paediatric surgeons available are often overworked and are largely inaccessible to the overwhelming majority of the populace. The void is filled at best by nonspecialist surgeons or general practitioners and at worst by quacks and traditional healers.

The reasons for the shortage of trained paediatric surgeons are not farfetched. Lack of facilities and supporting personnel has limited the capacity to train paediatric surgeons locally, and opportunities for training overseas have been severely curtailed. To compound this problem, paediatric surgery is not a popular choice of career for aspiring surgeons. This situation has been attributed to the heavy workload, a frustrating lack of facilities, and poor compensation. Under these conditions, it is difficult to attract young surgeons with the promise of a rewarding and satisfying career. The endemic brain drain has also played a role in depleting the number of practicing surgeons, many going overseas for further training but never returning to their home countries. The workforce shortage cuts across the entire spectrum of paediatric care, including nursing, radiology, anaesthesiology, and pathology.

Recommendations

The relevance of paediatric surgery in Africa and other developing regions is no longer in doubt.³³ However, if the impact of the paediatric surgical practice as part of essential health care to children is to be felt, then a major paradigm shift is needed. Some of the ideas presented here have been drawn from the seven-point strategy advocated by Bickler et al., which should be required reading for all paediatric surgeons and health policy makers in Africa (see Table 1.2).^{6,13}

Table 1.2: Strategies for improving paediatric surgery care in Africa.

1	Define communities' health needs with input from the communities.
2	Demonstrate the need for paediatric surgical services.
3	Foster community participation.
4	Start with what is available and build on existing services.
5	Integrate preventive and curative services.
6	Facilitate ongoing training.
7	Remain goal-directed within available resources.

Source: Adapted from Bickler SW, Kyambi J, Rode H. Pediatric surgery in sub-Saharan Africa. *Pediatr Surg Intl* 2001; 17:442–447.

Research

African paediatric surgeons should become more involved in clinical and basic science research in order to improve the care of their patients and generate awareness for their work. The most fundamental task here is to collect, analyze, and publish data reflecting local experience with childhood surgical disease.

Training

Wider exposure of medical students and surgeons-in-training to paediatric surgery would likely generate more interest in the specialty. Trainees could, however, develop an aversion to the specialty if a positive mentoring environment is not provided. The tendency toward exploitative and even brutal treatment of surgical residents is an unfortunate legacy of Halstedian training. Recognition of the deleterious effect of such an abusive environment to surgical education has been the impetus behind the resident work-hour limitations now in force in most Western countries. Unfortunately, the old habits remain the norm in much of Africa, and may be a major obstacle to recruiting bright young talent into the specialty. The quality of paediatric surgery train-

ing has been adversely affected by the lack of adequate facilities and limited exposure to current techniques.³⁴

Increasing global partnerships provide an opportunity to improve human and material capacity.¹⁷ Such partnerships could involve exchange programmes with colleagues and trainees from developed countries, but also intraregional collaboration that could be incorporated into local residency training programmes.³⁵ Skills transfer can be achieved by using novel methods, such as telesimulation and telementoring, where mentors or experts in other parts of the world can offer advice or direct real-time surgical procedures being performed in resource-poor hospitals.³⁶

Several professional surgical societies have recently developed global surgery initiatives that provide training opportunities for African surgeons, including the American College of Surgeons (ACS),³⁷ the American Paediatric Surgical Association (APSA),³⁸ and the Association for Academic Surgery (AAS).³⁹ Efforts are under way to create a central clearinghouse where all available overseas training opportunities will be made accessible to trainees in developing countries.

Leadership

Although specialty organisations for paediatric surgeons are essential, it is important to be connected to the wider field of surgery. This can be achieved by ensuring that paediatric surgery remains an integral component of the surgery department educational activities as well as morbidity and mortality conferences. Presentation of research work should not be limited to specialty meetings; rather, a strong paediatric surgery presence needs to be maintained in national and regional conferences involving surgeons of different specialties. Furthermore, paediatric surgeons should seek every opportunity to network and collaborate with paediatricians by organising joint educational activities and participating in paediatric meetings. This will give paediatric surgeons visibility among their peers and facilitate public recognition of their vital role in the provision of child health care. The surgical section of the American Academy of Paediatrics is the prototype for such collaboration.³

Paediatric surgeons should strive to achieve leadership positions in their surgery departments as well as in umbrella national and regional surgical organisations to ensure that the interests of children and the specialty are well represented. Finally, paediatric surgeons in Africa should maintain strong collaborative relationships with colleagues in other parts of the world at personal, professional, and organisational levels. The quality, reputation, and international recognition of local specialty certification would be enhanced by recruiting examiners from other parts of the world to participate at the various local certification examinations.³

Support for Nonsurgical Personnel

Given the dearth of trained paediatric surgeons, it is inevitable that the vast majority of children with paediatric surgical conditions will seek care from adult surgeons, nonsurgeon physicians, and nonphysician health professionals. Many newborn infants die needlessly due to lack of referral for surgical care. Educational programmes that enhance the awareness and diagnostic abilities of health care personnel within the

locality of each paediatric surgeon will likely improve early referral, particularly for life-threatening conditions. A pocket manual of common paediatric surgery conditions has been specifically written with such personnel in mind.⁴⁰

Conclusion

The paediatric surgery specialty is now indispensable in the overall effort to relieve the disease burden in Africa and other developing regions. However, for the practice to remain relevant in the coming years, advocacy for funding and public health policies geared towards the needs of children must be intensified and maintained.

Although significant obstacles exist in the infrastructure and workforce, paediatric surgeons must take the lead as advocates for children and in educating the public as well as policy makers on the need to recognize surgical disease in children as a significant health problem. By focusing on clinical excellence, engaging in serious research, and adopting a training model that provides real mentorship, African paediatric surgeons can provide the highest level of care possible to their unique group of patients.

Evidence-Based Research

Table 1.3 presents a study on the costs and DALYs averted by a hospital in Sierra Leone.

Table 1.3: Evidence-based research.

Title	Cost/DALY averted in a small hospital in Sierra Leone: what is the relative contribution of different services?
Authors	Gosselin RA, Thind A, Bellardinelli A
Institution	University of California, Berkeley, California, USA; University of Western Ontario, London, Ontario, Canada; Emergency Hospital, Goderich, Sierra Leone
Reference	World J Surg 2006; 30(4):505-511
Problem	To estimate the cost/disability-adjusted life years (DALYs) averted by health facilities, including surgery in adults and children, thereby providing cost-effectiveness data to guide resource allocation decisions in the developing world.
Intervention	Estimation of the costs and the DALYs averted by an entire hospital in Sierra Leone.
Comparison/control (quality of evidence)	Cost-effectiveness analysis is a complex undertaking, but the DALYs method is probably the best composite measure.
Outcome/effect	For the three-month study period, total costs were calculated as \$369,774, with an estimate of 11,282 DALYs averted (cost/DALY averted of \$32.78). This compares favourably to other nonsurgical health interventions in developing countries.
Historical significance/comments	This study suggests that contrary to traditional dogma, surgery in adults and children is a cost-effective public health intervention, particularly in developing countries. If these findings are confirmed by future studies, they provide strong rationale for expanding paediatric surgery care in Africa.

Key Summary Points

1. Childhood surgical disease is an understated cause of morbidity and mortality in Africa.
2. Paediatric surgery saves as many disability-adjusted life years (DALYs) as other public health interventions.
3. African paediatric surgeons have made significant contributions to the specialty.
4. Paediatric surgeons must take the lead as advocates for children among the public and policy makers.
5. Training needs can be partly met by utilising global partnerships.

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