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Pediatric surgery as an essential component of global child health

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ABSTRACT

Recent initiatives in global health have emphasized universal coverage of essential health services. Surgical conditions play a critical role in child health in resource-poor areas. This article discusses (1) the spectrum of pediatric surgical conditions and their treatment; (2) relevance to recent advances in global surgery; (3) challenges to the prioritization of surgical care within child health, and possible solutions; (4) a case example from a resource-poor area (Uganda) illustrating some of these concepts; and (5) important child health initiatives with which surgical services should be integrated. Pediatric surgery providers must lead the effort to prioritize children's surgery in health systems development.

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Introduction

Child health is an important part of health care in all countries, but is especially important in less developed countries where the proportion of the population under 20 is nearly 50%, compared to an average of 35% globally.[1] Pediatric surgical conditions play a significant role in child health in these settings. In this article, we will discuss

1) the spectrum of pediatric surgical conditions and their treatment,
2) their relevance to recent advances in global surgery,
3) challenges to the prioritization of surgical care within child health,
4) a case example from a resource-poor area (Uganda) highlighting some of these points, and
5) important child health initiatives with a need to integrate with surgical initiatives.

What is pediatric surgery, and its role within global surgery

Global surgery has recently been defined as "an area of study, research, practice, and advocacy that seeks to improve health outcomes and achieve health equity for all people who require surgical care, with a special emphasis on underserved populations and populations in crisis. It uses collaborative, cross-sectoral, and transnational approaches and is a synthesis of population-based strategies with individual surgical care."[2] Global pediatric surgery has a similar definition, with the focus on the care and prevention of surgical disease in childhood.

Pediatric surgical conditions cross a broad range of disease categories, namely infections, injuries, cancer, and congenital anomalies. A significant proportion of the burden, perhaps upwards of 50%, may be attributable to emergency conditions that require time-critical interventions, in the order of hours, rather than days. They also span the breadth of childhood, with some conditions requiring life-saving interventions in the neonatal period, while others may not present until the teenage years. Furthermore, while some conditions may require a single intervention, others ideally require follow-up through childhood. Analysis of mortality of specific conditions emphasizes the significant disparity in outcomes between high and low-income countries.[3]

Recent advances in global surgery and their relevance to child health

Millennium Development Goals

In the past 3 decades global health priorities and significant health policies have recognized and started to address the particular needs of children, with the United Nations Millennium Development Goal (MDG) 4 aiming to halve child (under 5)

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mortality by 2015.[4] As the time frame of the MDG's have come to an end, significant debate in the last year has surrounded the adoption of a new set of Sustainable Development Goals (SDGs) as a guide for LMICs.[5] Surgical care of children will be critical to meeting these goals, and defining this contribution as the SDGs are defined, will be important for advocacy and recruitment of resources.

Lancet Commission on surgery (LCOS)

While communicable diseases and malnutrition continue to be leading causes of death for children under 5 years, surgical illnesses including congenital anomalies, surgically treated infections, trauma, and burns also contribute to the burden of disease (BoD) in children.[6]

Estimates from the LCOS were that approximately 30% of the global burden of disease is amenable to surgical intervention.[7] A finer analysis of burden by surgical disease categories in children has not been performed to date. Overall analysis of BoD data confirms the broad range of diseases in which surgical care plays a role, and emphasizes that even within a selection of congenital disorders (congenital heart defects, cleft lip/palate, and neural tube defects), there is a significant proportion of avertable disease.[8]

The 5 key messages of the LCOS warrant further exploration relative to the surgical conditions that affect children[9]:

1) *An estimated 5 billion people globally lack access to surgical* care —yet the proportion of these that are children, and the distribution and scale-up needs for pediatric procedures are unknown. The Commission proposed a group of 3 "bellwether" procedures (cesarean section, laparotomy, and treatment of open fracture) as those that signify a system operating at a sufficient level of complexity to do most other surgical procedures; a similar group of children's surgical procedures has not been as formally proposed.
2) *143 million additional surgical procedures are needed each year to save lives and prevent disability* – more information is needed on how many of these procedures are needed in children.
3) *33 Million people face impoverishing expenditure related to surgical care yearly*—we need more information on the costs associated with care for children's conditions.
4) *Investment in surgical and anesthesia services is affordable*, *saves lives*, *and promotes economic growth*—although some cost-effectiveness studies on pediatric surgical procedures have recently been published precise estimates of savings from scale-up of children's surgical care are still lacking.[10–12]
5) *Surgery is an indivisible*, *indispensable part of health care*—specifically, universal health coverage is an essential component of the global health agenda after 2030, but the roadmap to ensure coverage for children's surgical conditions has not yet been well defined.

One of the early priorities since the Commission launch has been the promotion of surgical indicators amongst other health-related development indicators, and the documentation of country-level "dashboards" to profile these priority areas above as a component of public health. Zambia has created such a dashboard as a sample, and the pediatric surgery community may develop similar indicators most appropriate for the specialty and context, so that country-level profiles can be made.[13]

Disease control priorities, 3rd edition (DCP-3)

As another guide for policymakers, health planners, and donors, a 3rd edition of the Disease Control Priorities in Developing Countries was launched earlier in 2015, including a volume on Essential Surgery.[14] Key messages from this group also have direct implications for pediatric surgery as a key component of child health:

1) *1.5 Million deaths could be averted each year through essential surgical procedures*—though the proportion in children is unknown.
2) *Essential surgical procedures are cost-effective, and 28 of 44 procedures can be provided at a first-level hospital*. The essential surgical procedures applicable to children include:
   a) Cleft lip and palate repair
   b) Club foot repair
   c) Shunt for hydrocephalus
   d) Repair of anorectal malformations and Hirschsprung's disease
   e) Appendectomy
   f) Bowel obstruction
   g) Colostomy
   h) Inguinal hernia
   i) Trauma laparotomy
   j) Fracture management
   k) Skin grafting and escharotomy for burns

While this specific "package" of conditions and required procedures has not been evaluated in LMICs, several studies have examined the capacity of selected facilities in LMICs to treat these conditions, showing numerous gaps and a limited coverage for both emergency and elective procedures.[15–17] While surgical care of children is a well-developed component of child health in high income countries (HICs), the only policy, to our knowledge, in global pediatric surgery is one promoting male circumcision to prevent HIV transmission.[18]

3) *Strategies such as "task shifting"* (*performance of a range of procedures by a cadre of non-physicians*) *have expanded coverage, especially in rural areas, for numerous countries that have adopted this policy* (such as Malawi, Mozambique, Tanzania, and Zambia). Studies of overall outcomes have been encouraging, but such analysis for children's surgical conditions specifically, is limited.[19]
4) *Substantial disparities remain in perioperative mortality rates between HICs and LMICs, thus underscoring the need for safe perioperative care*. The provision of safe pediatric anesthesia care remains a critical step for any scale-up effort. Workshops such as the SAFE pediatric anesthesia course disseminated by the World Federation Societies of Anesthesiologists (WFSA) are critical in this regard, as are programs such as the Global Pulse Oximetry Initiative, and those training more providers for safe anesthetic care in children.[20–22]
5) *The cost-effectiveness of essential surgical procedures supports the need to invest in surgical care to achieve universal coverage*—a very similar message to the LCOS and one that highlights the need for providers of children's surgery to continue estimating the cost-effectiveness of the interventions we currently provide or scale-up (by adding providers, infrastructure, services, etc).

World Health Assembly (WHA) Resolution on Emergency and Essential Surgical Care

Another recent critical development is the passage of the WHA Resolution 68.15 to "Strengthen Emergency and Essential Surgical Care as a component of universal health coverage."[23] This was a key event in terms of advocacy for surgical providers and groups focused on care in LMIC settings. The resolution suggests many critical areas of action, including the integration of emergency and essential surgical care within primary care facilities and first-level hospitals as a key element to reaching universal health coverage. This resolution thus lends even greater urgency to adapting locally endorsed "packages" of pediatric surgical care that can be integrated through health facilities and other elements of the health system. The Amsterdam Declaration has proposed a similar

package of emergency procedures, though not specifically focused on children.[24] Meanwhile, the DCP3 endorsed a list of essential procedures detailed above and a capacity guideline for detection and treatment of a set of congenital anomalies.[25] The Global Pediatric Surgery network has also proposed a similar capacity guideline for a broader group of pediatric surgical conditions, beyond congenital anomalies.[26] This type of approach is critical at national and regional levels, detailing resource needs and gaps, based on evidence of local outcomes. Such a process will most likely be successful if driven by local stakeholders, and supported by the donor community and other groups engaged in global surgery provision.

Table 1 summarizes some of the key messages from these initiatives and suggests relevant tasks for the global pediatric surgery community.

Challenges to the prioritization of surgical care within global child health

Numerous challenges impede the integration of pediatric surgical care within global child health programs. Despite recognition of the impact and importance of pediatric illness, little priority has been given to pediatric surgical diseases in LMICs. This is partly due to the fact that "pediatric surgery has often been viewed as too expensive and as a non-essential service excluded from most child health programs in such countries."[27] Others have found that the public continues to have "an unconscious bias that surgery is a luxury item that cannot be afforded even though it has been shown to be cheaper than condom distribution with regard to DALYs saved."[28] For example, pediatric inguinal hernia repair in sub-Saharan Africa is as cost-effective as tetanus vaccination, however, there are no coordinated initiatives to improve access globally.[12]

Some of the most common and life-threatening congenital illnesses are either prohibitively expensive, as in the case of cardiac surgery, or socially unappealing, such as colorectal malformations.[29] Congenital colorectal conditions are included in the list of essential procedures, but are not well-recognized in contrast to cleft lip and palate repair, which have garnered high levels of international support and collaboration.[30] Thus, even within the landscape of pediatric surgical interventions, there is wide variation among levels of global support between conditions. The example of international success for craniofacial anomalies could be seen as a template for other global surgical programs but, rather than focusing on specific disease "silos," improving surgical care is likely best seen as part of investment in a functional and complete health system.[31]

Several studies highlight the state of pediatric surgical care in various countries of sub-Saharan Africa.[16,27,32] There has been little change over the 12-year period of these studies, with each illustrating a significant burden and poor access to pediatric surgical care in the region. Pediatric surgical conditions, including primarily injuries, congenital anomalies, and surgical infections in a study of pediatric patients in Sierra Leone, account for a significant burden of disease and 6–9% of all pediatric hospital admissions.[27] Despite comprising a significantly larger burden of childhood disease than HIV in sub-Saharan Africa, there are few resources available for their treatment.[16,33–35] When comparing UNICEF funding in LMICs of pediatric surgical care (no earmarked funds) with that of HIV care (3% of an annual 3.6 billion USD budget), the prioritization is clear.[36] The annual "State of the World's Children" report bears no mention of surgical services.[37] This low priority of pediatric surgery in LMICs is also evident when quantifying resources on the ground in sub-Saharan Africa. In every component examined, from trained pediatric surgeons and anesthesiologists, to medications, to operating room facilities with functioning equipment, the resources were found to be grossly inadequate, with many countries entirely without any specialist surgeons and often lacking basic elements of reliable electricity and water in the operating theater.[16,34,38]

Children with surgical illness and their families in LMICs do not have a strong voice, and the majority of their plight has gone unnoticed. Surgical illness comprises a spectrum of disease that can be difficult to tie together in garnering support. Even the very cost-effective hernia repair is difficult to "market" with pictures of groins, and "before and after" photos of children with congenital colorectal disease are inappropriate. Yet we know that treatable emergency conditions routinely lead to unnecessary mortality, and that delayed care can lead to long-term disability. While metrics such as avertable and delayed averted DALYs attempt to capture this disability, they fall short of telling the "whole story."[39,40] The untreated child with a surgical condition may be abandoned, socially excluded, and never attend school.[41] Families can fracture, and chronic untreated disease can lead to a hopelessness that is difficult to quantify through traditional metrics, and better told through a story. The numbers of surgical providers in LMICs to share these stories are limited, and difficult to even notice in the context of advocacy for a multitude of other pressing health priorities.

Health policies that do not explicitly focus on vulnerable populations such as children can often lead to the neglect of essential services to these populations. At the isolated rural health facility, there is often a fear of anesthetizing children, and we often note that limited operating room time may be occupied by elective procedures for adults, who may be able to more effectively advocate for themselves. A lack of pediatric, and especially neonatal equipment, supplies, and medications, adds to a lack of pediatric surgical productivity at many first-level and regional hospitals.

At the public level, there is often a limited understanding that some diseases are treatable, including many visible congenital anomalies. Some programs have tried to increase the identification of such anomalies by educating birth providers and other community health workers who may have limited prior knowledge of such conditions.[42] This type of case identification may help in addressing one of the many barriers to access—the delay in seeking care.

While multiple recent advances in global surgery have occurred, this movement has not had an explicit focus on the surgical needs of children. Even within the GBD study, for example, estimates of surgical disease in children would cross many categories, and while the DCP-3 included a chapter on congenital anomalies, essential children's surgery includes a wide range of other conditions beyond those listed above.

Furthermore, while many specialist groups have attempted to address the global BoD in their specialties, there has been very limited integration between these groups. Whether the platform of delivery is permanent as in specialized hospitals or temporary as in targeted short-term surgical missions, most specialist initiatives focus narrowly on selected groups of conditions, and often function outside of the government health system.[43]

While increasing attention has been paid to the shortage in providers of children's surgery and peri-operative care, the shortage in the rest of the pediatric health workforce bears mention. While HICs rely on a wide range of pediatric specialists and subspecialists to identify and treat children, these providers are lacking in LMICs. This adds an additional barrier not only to scaling up services, but also in the advocacy needed to treat essential pediatric surgical conditions. Table 2 summarizes these challenges, and the possible solutions.

Case study: Pediatric surgery and child health in Uganda

We will use a case study of Uganda as a resource-constrained country to illustrate some of the points raised above, and to apply

Table 1
Recent global surgery messages, indicators and recommendations, with relevant tasks for pediatric surgery.

	LCoGS		DCP3	Tasks for pediatric surgery (PS)
Key messages	5B people do not have access to safe, affordable surgical and anesthesia care when needed		1.5 million deaths could be averted through essential procedures	Define essential PS procedures then estimate access to facilities able to perform procedures; estimate deaths averted
	143M additional procedures are needed in LMICs each year to save lives and prevent disability			Estimate current and counterfactual number of PS operations in LMICs
	33M individuals face catastrophic health expenditure due to payment for surgery and anesthesia each year			Estimate mean cost of essential PS procedures, apply it against mean family income in each country
	Investing in surgical services in LMICs is affordable, saves lives and promotes economic growth		Essential procedures are cost-effective and 28/44 can be provided at first-level hospital	Summarize evidence from PS CEA studies and document cost and outcomes for key procedures
				Document cost-effectiveness of increasing delivery of children's surgical services
			Task shifting has expanded surgical coverage in LMICs	Assess/discuss status of task shifting for pediatric surgical conditions
	Surgery is an indivisible, indispensable part of health care		Invest in surgical care to achieve universal coverage	Document importance of PS within global child health care
				Review existing child health policies that include surgical care
				Document need for children's surgical care to achieve universal coverage
				Identify advocacy strategies for neglected children's surgical conditions
Core indicators	Prepared-ness	Access to bellwether procedures within 2 hours		Choose PS bellwether procedures and map national hospitals able to provide them
		Surgery, Anesthesia and Obstetrics (SAO) workforce density		Estimate surgical and anesthesia provider density able to perform essential pediatric procedures
	Delivery	Surgical volume		Estimate actual and counterfactual PS volumes by country
		Perioperative in-hospital mortality	Substantial disparities exist in perioperative mortality between HICs and LMICs	Compile (national) data on perioperative mortality in children
	Impact	Protection against impoverishing expenditure		Estimate % of population at risk of catastrophic/ impoverishing expenditures in children
		Protection against catastrophic expenditure		
Recommendations: national surgical plan components	Infrastructure	Surgical facilities; facility readiness; blood supply; access and referral systems	Promote research into product development	Recommend infrastructure requirements for essential PS care
			Ensure donated items can be maintained	
	Workforce	Surgical, anesthetic, and obstetric providers; allied health providers (nursing, operational managers, biomedical engineers, and radiology, pathology, and laboratory technician officers)	Promote use of non-physician clinicians	Recommend workforce needs for essential PS care, primarily surgical and anesthesia
			Better organization and standardization of current workforce	Identify training opportunities for children's surgery and anesthesia providers and allied disciplines
	Service delivery	Surgical volume; system coordination; quality and safety	Monitoring during anesthesia; use of surgical safety checklists	How many essential PS procedures are needed, performed by which quality of care metrics, and how can this process be efficiently coordinated?
				How can children's surgical care be “packaged” and incorporated into ongoing child health initiatives (newborn, cancer, trauma, infectious, emergency)
	Financing	Health financing and accounting; budget allocation	Inclusion of essential surgery through public finance	What is the annual budget needed for providing all essential PS procedures?
	Information management	Information systems; research agenda	Monitoring and evaluation of surgical systems	Ensure national information systems capture PS data. Define research agenda needed for filling existing gaps in data above as well as ongoing monitoring and evaluation
				Propose metrics at a national level for a “country profile” or “dashboard” for children's surgery

Adapted from Meara et al.[9] and Mock et al.[14]

challenges, solutions, and opportunities to a specific local context. Like many other similar countries, over half of Uganda's population of 34 million is under the age of 14 years, with one of the highest birth rates in the world—making it in fact the youngest country in the world.[44] This population remains primarily (> 80%) rural, with the majority of surgical care in the periphery being provided by medical officers (general physicians).

Challenges

Human and physical resources and delays in care. There are a total of 5 practicing, fully trained (3 full-time clinical), pediatric surgeons and 1 pediatric anesthetist in the country. This leaves a deficit of approximately 100 pediatric surgeons for the country, based on US estimates of workforce requirements. This is typical of the deficit for other countries in the region.[45] Much of the neonatal

Table 2
Challenges and possible solutions in prioritizing children's surgery.

Areas	Challenges	Solutions
Knowledge translation	Large-scale surgical movements have not had a focus on children	Review and adapt main messages, indicators and recommendations for children's surgery in LMICs
Public education	Poor public understanding that some diseases are treatable	Devise context-appropriate educational materials and programs for community health workers and for the public
Public relations/ advocacy	Affected children and families do not have a voice	Devise innovative advocacy strategies Document burden and harms not captured through traditional health metrics (i.e., DALYs)
	Surgery viewed as a luxury, not included in child health policies, reports, and packages	Document burden of disease Demonstrate cost-effectiveness and economic impact Document proportion of children (cf. adults) accessing surgical care Propose practical packages of care Reinforce necessity based on principles of equity Reinforce need to achieve universal coverage
	Different levels of visibility and support depending on conditions	Document unmeasured burden and health, economic, and social impact of various less-visible but common conditions Promote system-wide capacity improvements in addition to specialty services and hospitals
Health systems (integration)	Significant disease burden coupled with limited capacity in existing facilities	Propose and implement plans for scaling up workforce, infrastructure, and delivery
	Specialty surgical hospitals are not well integrated within health systems	Increase dialogue between hospitals/services and optimize training and care integration where possible Find a common united voice for children's surgery Emphasize need for time-critical interventions (i.e., emergency surgery) that are best met through system-wide improvements
	Workforce shortages in children's medical specialties, in addition to surgery/anesthesia providers	Increase dialogue with medical specialties Expand discussion of workforce needs beyond surgery/anesthesia providers alone

surgical care is provided in the country's national referral hospitals, primarily Mulago Hospital, located in the capital.

Many surgical neonates arrive late, contributing to the significantly increased mortality compared to high-income settings. This is most glaring for gastroschisis, where survival is negligible compared to close to 100% in high-income settings. A preliminary estimate is that only 3.5% of the need for neonatal surgical care is currently being addressed.[46]

The limited number of births attended by a skilled provider also hinders early identification and treatment of anomalies. Education programs have targeted selected anomalies such as cleft lip and club foot but as of yet, no other diseases.[47] The limited pediatric surgical workforce have run several programs to educate rural providers on identification and safe transfer for selected anomalies, but these are challenged by the limited number of surgical providers available for such educational outreach activities.[48] The general pediatric workforce is also limited, as are pediatric subspecialists such as those with formal training in neonatology, also limiting successful care integration and case identification.

Selected subspecialty hospitals have effectively treated elective surgical conditions, such as the CURE pediatric neurosurgery hospital, and the CoRSU reconstructive hospital in Kampala, which focuses on the treatment of surgical disabilities. These units have developed their own training programs but have not fully integrated with all national training institutions and programs. Furthermore, while these hospitals focus on treating mostly elective conditions, emergency pediatric surgery capacity at public facilities remains limited.

Ugandan child health initiatives. Numerous programs and initiatives are in place to support newborn survival, such as the "Helping Babies Breathe" program run regionally, though not integrated with identification and transfer mechanisms for surgical neonates. Broader child health and advocacy programs have flourished in communicable disease treatment (especially HIV, tuberculosis, and malaria) as well as "neglected tropical diseases" (namely endemic parasitic diseases), but again they have not been integrated with surgical diseases. Packages of care have targeted essential newborn interventions through the use of community health workers, but initial interventions for surgical conditions have not been part of these packages.[49,50] Extrapolating from the current coverage of neonatal surgical care, an effective neonatal general surgery package could avert a similar burden of disease as other priority conditions such as neglected tropical diseases, malnutrition, and tuberculosis.[46]

Broader child health initiatives such as the Integrated Management of Childhood Illness (IMCI) have been promoted throughout the country, although without integration with surgical programs. The Uganda Cancer Institute serves as the primary referral center for children with solid tumors requiring multimodal therapy. The unit is led by a fully trained pediatric oncologist assisted, in the last several years, by a weekly tumor board conference. Nonetheless, presentation of cancer in children is often delayed, and adversely affects outcomes. Just as for other health conditions, the population frequently seeks care from non-formal health providers (such as traditional healers) before accessing the more formal health system.

Service provision. Given the rural population, the vast proportion of emergency surgical care is provided in regional and general hospitals, as these are the first-level hospitals most accessible to the rural population. Here, surgical care is performed by medical officers (physicians with no specialty training) with anesthesia care provided by anesthesia officers (non-physicians). Some studies

suggest that the proportion of pediatric cases performed is very limited, outside of that provided by visiting teams.[16] Although several other countries have adopted selective task-shifting in surgery to non-physicians as a possible solution, this has not been the case in Uganda. Nonetheless, there remains an increasing focus on strategies to support and supervise rural surgical providers.[51] Unfortunately, there is no clear identification of which pediatric surgical conditions should be treated at specific levels of the health care system, and supervision by trained pediatric surgical providers remains limited due to the acute workforce deficit. Neonatal surgery and reconstructive procedures are best performed by the few trained specialists and this has resulted in long delays before definitive treatment of selected conditions. This results, for example, in years of delays before temporary ostomies are closed for patients presenting with abdominal emergencies, including congenital colorectal conditions and acquired conditions (such as typhoid perforations). Recent analysis showed that the congenital colorectal diseases (anorectal malformations and Hirshsprung Disease) accounted for more hospital days than all other diagnoses combined.[52] The implications of this have included malnutrition (acute malnutrition in surgical children is 3 times that of admissions to the general pediatrics service), stigmatization and social discrimination, and totally preventable newborn, infant and childhood morbidity and mortality.[53]

Selected initiatives

To meet the ever-growing pediatric surgical need, Ugandan pediatric surgeons and their Western colleagues have become very creative in meeting the surgical needs of children. Uganda has developed partnerships and collaborations that have been instrumental in meeting pediatric surgical needs via:

- Pediatric surgical "camps" (outreaches) and skills transfer.[54]
- Building a network of faculty for training of local pediatric surgeons, starting with greater recruitment of surgeons and anesthetists, and support for local junior faculty.[55]
- Creation of training opportunities abroad, such as the creation of a clinical fellowship training position in Vancouver, British Columbia.
- Greater collaboration and growing interest in pediatric anesthesia.
- Creation of greater operating space through international support, such as support from the Archie Foundation, a Scottish-based charity.
- Locally led research such as an inpatient and outpatient database and disease-based outcome research.[46]
- SAFE anesthesia course led by the Association of Anesthetists of Great Britain and Ireland (AAAGBI) and trauma education courses, ongoing in rural and urban hospitals.[56,57]
- National stakeholders meeting for childrens surgery in September, 2015, to promote collaboration among initiatives and a common voice for children's surgery.

A pediatric surgery ward manual for students and trainees is also being developed based on the most common surgical conditions encountered. In addition, a skills-based pediatric surgery emergency workshop is being developed for trainees, general surgeons, and medical officers. This will be instrumental in early identification, referral, and appropriate care of common emergencies in this population. Nurses, anesthetists, pediatricians, and other stakeholders have been identified to have a prominent role in the development of this program.

Important child health initiatives with a need to integrate with surgical initiatives

Child health and survival initiatives such as the WHO's Integrated Management of Childhood Illnesses strategy and the American Association of Pediatrics' "Helping Babies Survive" program have not included surgical care thus far, and the recognition that surgery is an integral component of child health should lead to inclusion of surgical care in broader child health initiatives in the future.[58,59]

In the last year, significant attention has been focused on newborn care priorities, with the ambitious goal of "no newborn left behind."[60] They have emphasized that newborn care was not specified in the MDGs and enumerated systems challenges and evidence-based scale up of interventions.[61] A key strategy has been outlining of a package of newborn care; unfortunately, identification and management of surgical newborns has not been included in the discussion, despite a focus on systems level interventions to care for sicker newborns and to think beyond just survival.[62,63] As children's surgical providers, we must also advocate that the surgical newborn should be included in this discussion, especially given the broader public health goals of universal coverage of essential health interventions.

Conclusions

In conclusion, surgical care is a critical component of children's health worldwide, but significant gaps exist in recognition, provision, and advocacy of pediatric surgical care in most LMICs. Building on recommendations by the LCGS and DCP3, essential children's surgical care must be included and prioritized in new national and international health policy, training and infrastructure planning, and in ongoing child health initiatives. Successful children's surgery initiatives, both locally and globally, should be built upon and expanded to include the breadth of childhood surgical disease and integrated into national health care systems. Pediatric surgical providers should be at the forefront of this urgent effort.

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