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Global general pediatric surgery partnership: The UCLA–Mozambique experience

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ABSTRACT

Background/purpose: There has been increasing recognition of the disparities in surgical care throughout the world. Increasingly, efforts are being made to improve local infrastructure and training of surgeons in low-income settings. The purpose of this study was to review the first 5-years of a global academic pediatric general surgery partnership between UCLA and the Eduardo Mondlane University in Maputo, Mozambique.
Methods: A mixed-methods approach was utilized to perform an ongoing needs assessment. A retrospective review of admission and operative logbooks was performed. Partnership activities were summarized.
Results: The needs assessment identified several challenges including limited operative time, personnel, equipment, and resources. Review of logbooks identified a high frequency of burn admissions and colorectal procedures. Partnership activities focused on providing educational resources, on-site proctoring, training opportunities, and research collaboration.
Conclusion: This study highlights the spectrum of disease and operative case volume of a referral center for general pediatric surgery in sub-Saharan Africa, and it provides a context for academic partnership activities to facilitate training and improve the quality of pediatric general surgical care in limited-resource settings.
Level of evidence: Level IV.

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There has been increasing recognition of the disparities in surgical care throughout the world, but the attention to pediatric surgery has been relatively limited [1]. Increasingly, pediatric surgeons are working to improve local infrastructure and training of surgeons in low-income settings [2]. In 2007, the David Geffen School of Medicine at the University of California, Los Angeles (UCLA) established an academic partnership with the Universidade Eduardo Mondlane (UEM) and its affiliated teaching hospital, Hospital Central Maputo (HCM), in Maputo, Mozambique, with the goal of improving training and delivery of pediatric care. The partnership was expanded to include pediatric surgical training in 2010.

The Mozambican health care system has suffered greatly, in large part because of an exodus of health care workers during independence from Portugal in 1975, and a 15-year civil war from 1977 to 1992 [3]. In 2007, at the genesis of the UCLA–UEM academic partnership, there were only 10 Mozambican pediatricians and only one Mozambican practicing general surgeon dedicated to the surgical care of children. Approximately half the population of 25 million is younger than 18 years [4]. In 2011, Mozambique ranked 184 of the 187 countries in the world on the human development index (United Nations Development Programme), which is a metric used to assess the social and economic development levels within countries. The goal of our partnership was to strengthen the health care system through the development of a pediatric general surgery training center.

The purpose of this study was to review the first 5-years of our global academic pediatric general surgery partnership. By systematically describing resource distribution and limitation, the spectrum of disease, operative case volume, and partnership activities, we hope to illustrate the challenges and accomplishments that can be expected of academic medical partnerships in other global health settings.

1. Methods

1.1. Hospital needs assessment

A mixed-methods approach was utilized that involved both quantitative and qualitative data collection, including key informant interviews with local and visiting physicians and surgeons, to perform an ongoing needs assessment of the pediatric general surgery service.

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1.2. Evaluating spectrum of disease and operative volume

In order to evaluate the spectrum of disease and operative case volume, we reviewed logbook data for pediatric general surgical ward admissions and operative cases performed in both the elective and emergency settings for the entire year of 2012. All age groups that presented to the pediatric ward were reviewed. Data were summarized by grouping discharge diagnoses and operative procedures into categories. Admission logbooks included the following data: age, length of stay, diagnosis, and city of origin. Operative logbooks included location of procedure (urgent operating room versus elective operating room), age, gender, and province of origin. We calculated the proportion of patients originating outside of the Maputo province for each diagnostic and operative category. Results for each category were compared with those from all other categories combined using Wilcoxon rank sum test for continuous variables and Fisher's exact test for categorical variables.

Partnership activities from the period 2010 to 2015 were reviewed and summarized thematically.

2. Results

2.1. Resources

Hospital Central Maputo is a 1500 bed teaching hospital with an average daily census that expands to over 3000 during the rainy season. The Department of Pediatrics is housed in its own building on campus with 300 beds, of which 32 beds in 6 patient rooms are dedicated to pediatric surgical patients on a dedicated ward. None of the patient rooms have a faucet or sink for hand washing. Alcohol-70% and gloves are usually available for patient examination. There is one dedicated room for procedures (e.g., incision and drainage, suture removal, and dilations) that has a faucet and sink but limited towels to dry hands. The procedure room does not have oxygen or monitoring capacity so conscious sedation is not performed. Burn wound care facilities and pain management are limited. The operating rooms are located in a separate building requiring that patients be transported two-blocks by ambulance to undergo surgery. In order to improve efficiency, some of the operating rooms have two operating tables so that two cases can be performed simultaneously. There is no critical-care pediatric transport team. The general pediatric surgery service has only one and a half days of operative block time per week as they share the operating rooms with all other surgical services. In the operating room, there are limited pediatric supplies (neonatal pulse oximetry, endotracheal tubes, central venous catheters, heaters, and endoscopes). There is no dedicated pediatric operating room team and limited fine instruments and sutures. Pediatric laparoscopy is currently not available. Urgent operations are performed in separate operating rooms located adjacent to the general emergency room and shared with other surgical services. Patients that require monitoring postoperatively are generally admitted to the pediatric intensive care unit (PICU). At the beginning of our partnership activities in 2010, there were two pediatric ventilators. Currently, there are an estimated five ventilators, but central venous monitoring is not yet available. The nursery (*berçario*) has an estimated census of sixty patients. It is expanding and improving but currently has limited capacity for caring for critically-ill neonates. Central venous access is not available and parenteral nutrition is limited. Neonatal ventilators were not available at the start of the partnership, but they are currently being introduced.

2.1.1. Imaging

Ultrasound, computed tomography, and magnetic resonance imaging are increasingly available, but the quality and interpretation of these studies are limited. There are no dedicated pediatric diagnostic or interventional radiologists. Currently, there is no reliable supply of contrast and no routine fluoroscopy available to perform contrast studies outside of the operating room.

2.1.2. Pathology

The hospital has a referral center for pathology, and is well-equipped to perform fine needle aspiration. However, frozen sections and special stains are not routinely available. Results for suction rectal biopsies have been unreliable. Often, congenital megacolon is diagnosed later in life. Leveling colostomies are routinely performed to make sure that the pull through is done at a functional level.

2.1.3. Laboratory results

While comprehensive hematology and chemistry panels can be obtained, many laboratory tests and genetic studies are not routinely available. For example, advanced hormonal and genetic work-up for congenital adrenal hyperplasia and other endocrine abnormalities cannot be performed. A microbiology laboratory is available for gram stain and culture/sensitivity, but not routinely utilized because of delays in reporting results.

2.1.4. Health care personnel

At the beginning of our partnership, there was only one Mozambican general surgeon who was actively responsible for the pediatric general surgery ward and served as Chief of the Pediatric Surgery. At that time, there were only one or two Cuban surgeons providing general pediatric surgical care to other provinces in the country. Mozambique has many such expatriate surgeons to help address the shortage of physicians in the country. A full-time Russian pediatric surgeon and visiting British surgeon had previously helped to train the native general surgeon in pediatric surgery. In addition, a North Korean junior surgeon was sent as part of an exchange to provide assistance/training for a few years around the time our partnership began. A trained pediatric surgeon from Cuba later came to provide additional coverage. There are no anesthesiologists with subspecialty training in pediatric anesthesia. Nurses are also limited in number. There are only two or three nurses during the day and one nurse at night caring for 32 patients on the general pediatric surgery ward.

2.1.5. Training

Hospital Central Maputo has initiated a pediatric surgical residency program. The first trainee completed 2 years of general surgery training in Maputo (2008–2010) and 2 years of training in Spain at a children's hospital (2010–2012), before returning to Maputo for an additional year (2013) to complete her pediatric surgical residency, before joining the faculty at Hospital Central Maputo. Two additional residents are now training in pediatric surgery (2013). Mozambique surgical training programs are expanding their involvement with the College of Surgeons of East, Central, and Southern Africa (COSECSA) to help standardize and improve surgical training. The first author (VA) has recently been certified by COSECSA as the first pediatric surgery fellow in Mozambique, although there is still a shortage of fellows to provide mentorship and assistance with career development. The current general pediatric surgery curriculum incorporates rotations in pediatric surgery, general surgery, neurosurgery, orthopedics, urology, plastic surgery, maxillofacial surgery, anatomic pathology, pediatric intensive care, and nursery. The goal is to supplement this training with rotations abroad.

2.2. General pediatric surgery ward admission diagnosis

For the year of 2012, 1153 patients were admitted to the pediatric general surgery ward. The most frequent discharge diagnosis was burns ($n = 274$), which accounted for nearly one quarter of the admissions. Patients with burn diagnosis had a significantly lower median age (2.2 vs. 4 years; $p < 0.0001$), had longer median length of stay (4 vs. 2 days; $p < 0.001$), and were less likely to originate from a province outside of Maputo (4% vs. 8%; $p < 0.04$). The following distribution of burn severity was noted for the 223 patients in whom it was recorded: 1st degree, 2 (1%); 2nd degree, 208 (93%); and 3rd degree, 13 (6%). The median estimated total body surface area for the 84 patients in whom it

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