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Abstracts

Caustic soda for the manufacture of a local variety of soap — the cause of untold suffering in the lives of children in a developing country. ***Mohammed Bukari*, *Francis Abantanga*, *Michael Amoah*, *Abiboye Yifieyeh*, *Boateng Nimako*. From the Department of Surgery, Komfo Anokye Teaching Hospital, Kumasi, Ghana**

Background: Esophageal strictures secondary to accidental ingestion of caustic soda represents a catastrophic occurrence in children in our communities. Such children are usually referred very late for treatment. The aim is to report our attempts at limiting the damage done by this substance in the form of advocacy and our experience in managing the condition. **Methods:** We considered all children who had ingested caustic soda from March 2008 to March 2015 and were admitted to Komfo Anokye Teaching Hospital for management. A feeding gastrostomy is usually fashioned for all the children with various lengths of strictures. Colon replacement of the esophagus was performed for a few of them several months later. **Results:** For a period of 7 years, 66 children had corrosive strictures of the esophagus from accidentally swallowing solutions of caustic soda used in preparing local soaps. Only 60 folders were available for analysis. The mean age was 3.91 ± 2.95 (range 1.3–17) years and the male:female ratio was 1.6:1.0. Feeding gastrostomy was performed for all the children. To date, only 13 children have had colon replacement of the esophagus done, and 3 have died. **Conclusion:** The number of children with this condition is staggering and increasing yearly. Advocacy in government circles and education of people in communities where caustic soda is used to manufacture soap will go a long way to help curb this.

Barriers to care and patterns of congenital malformations in Eastern Democratic Republic of Congo. ***Luc Kalisya Malemo*. From HEAL Africa, Goma, Democratic Republic of the Congo**

Background: We sought to systematically assess a recent reported increase of congenital anomalies in Eastern Democratic Republic of the Congo (DRC). **Methods:** A retrospective chart review of all individuals admitted with a congenital anomaly to HEAL Africa Hospital (Goma, DRC) from 2002 to 2014 (n = 1301) was conducted. We analyzed patient demographics, including age, place of origin and use of mercy funds. **Results:** The number of congenital anomaly procedures increased from 49 cases per year in 2002 to 350 cases in 2014. Though delayed presentation of patients to HEAL was obvious (average age 8.2 yr), patient age has significantly decreased over time (p = 0.037). The average distance travelled to HEAL was 178 km, with more than one-third of patients travelling more than 350 km to reach the hospital. Use of mercy funds to cover the procedure costs was significantly correlated with distance travelled to the hospital (p < 0.001), and patients relying on mercy funds were also significantly younger (p = 0.004). The mortality for surgery averaged less than 1.5%. **Conclusion:** Distance and poverty are important barriers to obtaining care at HEAL. Increasing numbers of congenital anomaly procedures are being performed at HEAL, possibly due to increased awareness regarding HEAL's services in rural areas of DRC. Preventive and surveillance programs are urgently needed in rural areas, as are education and training programs for all health workers who handle neonates, to promote early diagnosis and prompt referral of congenital malformations as well as inform about the availability of mercy funds to cover travel and treatment costs.

Anesthesia capacity in rural hospitals in Enugu, Nigeria. ***Obinna Ajuzieogu*,[*] *Adaobi Amucheazi*,[*] *Jayne Ajuzieogu*,[*] *Chika Ikeani*.[†] From the [*]University of Nigeria Teaching Hospital, Enugu and the [†]Chukwuasokam Maternity Hospital, Enugu, Nigeria**

Background: Anesthesia and surgery in our rural areas are associated with high mortality owing to shortfalls in trained personnel, infrastructure and anesthesia equipment. Our objective was to determine the current state of anesthetic infrastructure in our rural hospitals compared with the university teaching hospital. **Methods:** Twenty-five rural hospitals and the Federal Teaching Hospital in the state were randomly selected for this study. Data regarding anesthesia personnel and infrastructure were collected and analyzed using the World Health Organization Tool for Situational Analysis. Data were collected on the availability of oxygen, water, electricity, types of anesthesia, categories of personnel and availability of anesthesia machines. Data on anesthesia-related deaths were also collected. **Results:** Nine (36%) hospitals had no access to oxygen. Twenty (80%) had no anesthesia machines and offered ketamine-only general anesthesia. Five facilities (missionary hospitals) employed a dedicated nurse anesthesia provider and had pulse oximeters. The teaching hospital had oxygen, 10 consultant anesthetists and 30 residents and offered both general and regional anesthesia with monitors. All the hospitals had electricity either from generating plants or national grid. There was poor documentation in most of the rural hospitals on anesthesia-related deaths. Estimated mortality was 1/1000, 1/350 and 1/250 in the teaching, missionary and rural hospitals, respectively. **Conclusion:** Most rural hospitals in the state had no staff or facility for safe anesthesia. Optimal facilities were concentrated in the teaching hospital. We recommend increased manpower development policy and government assistance in infrastructure in the rural areas.

Postcrash management of road traffic injury victims in Tanzania. ***Respicious Boniface*,[*] *Mabula Mchembe*.[†] From the [*]Muhimbili Orthopaedic Institute and the [†]Muhimbili University of Health and Allied Science, Dar es Salaam, Tanzania**

Background: Injuries due to road traffic accidents (RTAs) in Tanzania have been increasing since independence in 1961, whereas pre-hospital care is almost nonexistent and heath care service deliveries are poor. The objective of this study was to assess the capacity of the health and emergency systems to respond to RTAs along the north–south corridor route in Tanzania. **Methods:** In-depth interviews were conducted with medical services personnel, police officers, firefighters and some road users. We assessed the capacity of health facilities within a 2 km radius along the road from Dar es Salaam to Mbeya region using checklists of items contained in the WHO Guidelines for Essential Trauma Care for each hospital level. We applied a qualitative approach using grounded theory method to analyze the material gathered. **Results:** The survey revealed poor quality of postcrash management. Barriers to effective postcrash management were identified as involvement of untrained laypeople, lack

of coordination, inadequate prehospital services, absence of a well-established telecommunication system and lack of adequate equipment and trained staff for emergency trauma care in hospitals. **Conclusion:** Involvement of laypeople could be a key factor in making postcrash management more effective. System improvements, including the integration of the trauma system, are also crucial. Hospitals should be improved with training of health personnel on trauma care and ensuring availability of equipment and supplies for emergency trauma care.

A framework for the monitoring and evaluation of international surgical initiatives in low- and middle-income countries. ***George Ibrahim*, *David Cadotte*, *Mark Bernstein*. From the University of Toronto, Toronto, Ont.**

Background: An estimated 2 billion people worldwide lack adequate access to surgical care. To address this humanitarian emergency, an increasing number of international surgical partnerships are emerging between developed countries and low- and middle-income countries (LMICs). At present, there are no clear indicators that may be used to assess the effectiveness of such initiatives. **Methods:** We conducted an international qualitative study of 31 surgeons from developed countries and LMICs involved in international partnerships across a variety of subspecialties. Thematic analysis and grounded theory were applied in order to develop a practical framework that may be applied to monitor and evaluate global surgical initiatives. **Results:** Several themes emerged from the study: (i) there is a large unmet need to establish and maintain prospective databases in LMICs to inform the monitoring and evaluation of international surgical partnerships; (ii) assessment of initiatives must occur longitudinally over the span of several years; (ii) the domains of assessment are contextual and encompass cultural, institutional and regional factors; and (iv) evaluation strategies should explore broader impact within the community and country. Based on thematic analysis within the domains of inputs, outputs and outcomes, a framework for the monitoring and evaluation of international surgical initiatives, the Framework for the Assessment of InteRNational Surgical Success (FAIRNeSS) is proposed. **Conclusion:** In response to the increasing number of surgical partnerships between developed countries and LMICs, we propose a framework to monitor and evaluate international surgical initiatives.

Maternal near miss and mortality in a tertiary care hospital in Rwanda. ***Stephen Rulisa*,[*] *Immaculee Umuziranenge*,[†] *Maria Small*,[‡] *Jos Roosmalen*.[§] From the [*]University of Rwanda, College of Medicine & Health Sciences, and University Teaching Hospital of Kigali, Kigali, Rwanda; the [†]University of Leiden, Leiden, Netherlands; [‡]Duke University, Durham, NC; and [§]Leiden University Medical Center and Athena Institute, Leiden, Netherlands**

Background: We sought to determine the incidence and factors associated with severe ("near miss") maternal morbidity and mortality in the University Teaching Hospital of Kigali, Rwanda. **Methods:** We performed a cross-sectional study of all women admitted to the tertiary care University Hospital in Kigali with severe — near miss — maternal morbidity and mortality during a 6-month period using the WHO criteria for near miss maternal mortality. We assessed maternal demographic characteristics and disease processes associated with severe obstetric morbidity and mortality. **Results:** The prevalence of severe maternal outcomes was 11/1000 live births. The maternal near miss rate was 8/1000 live births. Most severe obstetric morbidity and mortality resulted from sepsis/peritonitis (30.2%), primarily following cesarean deliveries; hypertensive disease (28.6%); and hemorrhage (19.3%). Lower maternal socioeconomic status, referral from district hospitals to the tertiary care centre and residence in the eastern part of the country were risk factors for severe maternal morbidity and mortality. **Conclusion:** The study identified opportunities for improvement in clinical care to potentially reduce these adverse outcomes. The high incidence of peritonitis may reflect suboptimal intraoperative and intrapartum management of high-risk patients at district hospitals. More studies are needed to further clarify these findings.

The socioeconomic impact of lower extremity fractures in Uganda: 1-year results of a prospective case series. ***Rodney Mugarura*,[*] *Nathan O'Hara*,[†] *Jeffrey Potter*,[‡] *Trina Stephens*,[†] *Marit Rehavi*,[§] *Patrick Francois*,[§] *Piotr Blachut*,[†] *Peter O'Brien*,[†] *Bababunmi Fashola*,[†] *Alex Mezei*,[§] *Tito Beyeza*,[*] *Gerard Slobogean*.[†] From the [*]Makerere University, Wandegeya, Kampala, Uganda; the [†]University of British Columbia, Vancouver, BC; the [‡]Vancouver General Hospital, Vancouver, BC; and the [§]Vancouver School of Economics, Vancouver, BC**

Background: Trauma is a growing public health concern globally and is a major cause of death and disability worldwide. Road traffic accidents are the main cause of nonfatal injuries, with musculoskeletal trauma accounting for the majority of these injuries. Lower extremity fractures are the most common musculoskeletal injury. This study is the first to quantify the socioeconomic impact of lower extremity fractures in Uganda. **Methods:** All adult patients presenting acutely to Uganda's national referral hospital with a single long bone lower extremity fracture in October 2013 were recruited. Consenting patients were surveyed at admission and again at 6 months and 12 months postinjury. The primary outcome was the cumulative loss in income 12 months postinjury. Secondary outcome measures included the change in health-related quality of life (HRQoL) and the injury's effect on school attendance for the patients' dependents. **Results:** Seventy-four patients were recruited during the study period. Sixty-three (85%) of the patients were available for 12 months of follow-up. Compared with preinjury earnings, patients lost 88.4% (USD $1822) of their income in the 12 months following their injury. To offset this lost income, patients borrowed an average of USD $635. Using the EuroQol EQ-5D instrument, the mean HRQoL decreased from 0.91 before the injury to 0.39 ($p < 0.001$) at 12 months postinjury. Ninety-three percent of school-aged dependents missed at least 1 month of school during their guardian's recovery, and only 61% returned to school 12 months postinjury. **Conclusion:** This study demonstrates that lower extremity fractures in Uganda have a profound impact on the socioeconomic status of the individual as well as the socioeconomic health of the family unit.

Post–cesarean section pain control at Mbarara Regional Referral Hospital: a comparison of intrathecal morphine and transversus abdominis plane block. ***Andrew Kwikiriza*,[*] *Kiwanuka Joseph*,[*] *Stephen Ttendo*.[†] From the *Mbarara**

University of Science and Technology, and the †Mbarara Regional Referral Hospital, Mbarara, Uganda

Background: Mothers in the postoperative period following cesarean section usually experience a lot of pain. The use of intrathecal morphine (ITM) or transversus abdominis plane (TAP) block has been shown to be effective in postoperative pain management in the first 24 hours. This study was done to compare these 2 methods for post–caeserean section pain control. **Methods:** A prospective, randomized, double-blind, single centre trial was conducted. Patients were randomized to receive ITM (100 μg) and hyperbaric bupivacaine (10 mg) followed by a sham block after the operation or to receive plain hyperbaric bupivacaine (10 mg) followed by an ultrasound-guided TAP block after the operation. All patients received oral diclofenac (50 mg) and paracetamol (1 g) every 8 hours. A research assistant assessed patients at 8, 16 and 24 hours. **Results:** A total of 130 mothers were enrolled, with 65 mothers in each group. The mean numerical pain rating score (NRS) at rest for the ITM versus TAP groups were 2.5 versus 3.1 ($p = 0.04$) at 8 hours, 2.9 versus 3.1 ($p = 0.40$) at 16 hours and 2.9 versus 2.3 ($p = 0.01$) at 24 hours. At coughing, the mean NRS for the ITM versus TAP groups were 4.3 versus 4.8 ($p = 0.07$) at 8 hours, 4.8 versus 5.0 ($p = 0.33$) at 16 hours and 4.6 versus 4.2 ($p = 0.04$) at 24 hours. The mean NRS at movement for the ITM versus TAP groups were 3.6 versus 4.2 ($p = 0.06$) at 8 hours, 4.0 versus 4.3 ($p = 0.19$) at 16 hours and 3.9 versus 3.4 ($p = 0.02$) at 24 hours. **Conclusion:** Intrathecal morphine is a superior analgesic to the TAP block at 8 hours postoperatively, but analgesia from TAP block is better at 24 hours.

Pediatric plastic surgery in global health: a scoping review. ***Karen Chung,*[*] *Elizabeth Dale,*[†] *Claudia Malic,*[‡] *Louise Caouette-Laberge,*[§] *Steven Hanna,*[¶] *Scott Corlew,*[**] *Dan Poenaru.*[*] **From the [*]School of Medicine, Queen's University, Kingston, Ont.; the [†]Department of Plastic Surgery, UT College of Medicine, Chattanooga, TN; the [‡]Children's Hospital of Eastern Ontario, Ottawa, Ont.; the [§]Université de Montréal, Montreal, Que.; [¶]Queen's University, Kingston, Ont.; and the [**]Middle Tennessee Medical Center, Murfeesboro, TN**

Background: Plastic surgery efforts in low- and middle-income countries have traditionally focused on children; however, there has been no formal review of the literature to date. This scoping review aims to identify the key gaps left in the global pediatric plastic surgical literature in order to guide future research initiatives. **Methods:** This study involved a systematic search of EMBASE and MEDLINE. All studies published between 2000 and 2013 relevant to low-resource pediatric populations involving plastic/reconstructive surgery were included. Two independent investigators completed the primary review and 3 the secondary review. Descriptive demographic data were also collected. **Results:** A total of 106 studies satisfied the inclusion criteria. Their clinical domains were burns ($n = 50$), cleft lip/palate (CLP; $n = 32$), general plastic surgery ($n = 10$), craniofacial surgery ($n = 6$), flaps and grafts ($n = 3$) and hand trauma ($n = 1$). Burn research gaps included prevention (64%) and public education (54%). Research needs for CLP included monitoring and evaluation of current programs (19%), increasing public awareness (19%) and identifying risk factors for prevention (16%). General plastic surgery research emphasized the need for further investigating environmental hazards to children (60%). International agencies ($n = 25$) invited research in developing local health care infrastructure and monitoring and evaluation of current projects. **Conclusion:** Most global pediatric plastic surgery reports focus on pediatric burns and CLP, which would benefit from systematic reviews. Other craniofacial anomalies, flaps, grafts and hand trauma are significantly underreported. The recent surge in publications emphasizing the ethics of international volunteer missions is welcome. The significant gaps remaining in the global pediatric plastic surgical literature constitute opportunities for future international projects.

Using local theatre to reduce the surgical burden of childhood burns in East Africa. ***Anne Kuijs,*[*] *Katrina B. Mitchell,*[†] *James J. Gallagher,*[†] *Uyanjo Nkumbi.*[*] **From the [*]Paediatric Burn Unit, Sekou Toure Regional Referral Hospital, Mwanza, Tanzania; and the [†]Weill Cornell Medical College, New York, NY**

Background: The majority of burns (69%) presenting to our East African pediatric burn unit are unintentional scalds occurring in the home among children aged 0–3 years. Harmful first aid administered by parents includes flour, egg, urine, toothpaste and rabbit fur; children treated this way present with deep burns that are likely to necessitate surgical closure. Our rural, tribal population maintains a strong oral tradition with limited understanding of written material. We established a unique system of theatre outreach to disseminate information regarding burn injury. It was hypothesized that this culturally sensitive prevention strategy would decrease the surgical burden of burns in our region. **Methods:** We initiated a 6-month pilot period of 4 seminars targeting 100 villages in the 9467 km^2 referral area for our burn unit. The outreach sought through local theatre to educate villagers on burn prevention and appropriate first aid. We conducted seminars and distributed pictorially oriented posters and brochures to the community. **Results:** A total of 430 seminar participants learned strategies for burn prevention. They received 1600 posters and 8000 brochures to distribute, reaching an audience of more than 10 000 villagers. Through song, drama and dance the theatre depicted dangerous fire and hot water situations and illustrated appropriate burn first aid. **Conclusion:** Community education using local theatre has received excellent reception by the local community and warrants further exploration as a unique vehicle for primary burn prevention in an oral tradition East African culture. We hypothesize that this ultimately would decrease burn injury and decrease the rate of referrals requiring surgical intervention.

Meeting local needs in neonatal anesthesia to improve outcome in surgery. ***Obinna Ajuzieogu,*[*] *Adaobi Amucheazi,*[*] *Chika Ikeani.*[†] **From the [*]University of Nigeria Teaching Hospital, Enugu, Nigeria, and the [†]Chukwuasokam Maternity Hospital, Enugu, Nigeria**

Background: Inadequate pediatric surgeons and anesthesiologists have been cited as reasons for poor surgical outcomes in Africa. Thus, basic neonatal surgical procedures are not carried out in many hospitals. Attempts to improve this situation have been hampered by poor socioeconomic conditions and government

policies. Few available adult anesthesiologists have anesthetized children and neonates. The outcome was often less satisfactory. On this background, a dedicated pediatric anesthesiology unit was created in our hospital. Our aim was to provide safe pediatric anesthetic care in the hospital/region. This led to referrals of major neonatal surgical cases to our hospital. The aim was a comparative audit of complexities of neonatal surgery/anesthesia in the last 5 years compared with the previous 5 years. **Methods:** We examined the theatre records and outcome of all neonatal surgeries 5 years before (Period A) and 5 years after (Period B) specialization. Capacity-building, local adaptation, funding and sustainable development were studied. **Results:** There were no demographic differences of the patients seen. The number of cases of tracheoesophageal atresia, biliary atresia, cloacal anomalies, imperforate anus, hydrocephalus and conjoint twins increased from Period A to Period B. The number of pediatric surgeons increases from 2 to 4. **Conclusion:** The formation of a local pediatric surgery team inclusive of specialization in pediatric anesthesiology has improved the complexity and outcome of our neonatal surgeries.

Context-specific challenges faced by Rwandan surgeons: development of an evidence-based resident curriculum in nontechnical skills to overcome resource variability. *[*]Zeta Mutabazi*, *[†]John Scott*, *[†]Doug Smink*, *[†]Robert Riviello*, *[†]Steve Yule*, *[*‡]Georges Ntakiyiruta*. **From the [*]School of Medicine and Health Sciences, University of Rwanda, Kigali, Rwanda; the [†]Center for Surgery & Public Health, Brigham & Women's Hospital, Boston, MA; the [‡]University Teaching Hospital, Kigali, Rwanda**

Background: As surgical training and surgical capacity increase in low- and middle-income countries (LMICs), new strategies for improving surgical education and improving care in resource-poor settings are required. Although failures in nontechnical or behavioural aspects of performance contribute to half of all surgical errors, traditional models of surgical education primarily focus on development of technical expertise. **Methods:** The aim of this pilot study was to identify the context-specific challenges confronting surgeons in Rwanda as well as identifying the nontechnical skills (NTS) used by surgeons to overcome these challenges. The 4 hospitals in our study comprise the teaching sites for surgical residents training in Rwanda. Context-specific challenges and surgeon behaviours were identified through both operating theatre observations and critical incident interviews with surgeons, anesthetists and theatre nurses who were considered context experts. Line-by-line coding was used to identify specific behaviours that were then clustered into skill categories. **Results:** Initial analyses revealed 4 primary context-specific challenges: (1) resource variability, (2) dynamic provider roles, (3) trilingual communication in theatre and (4) diminished capacity for rescue. The NTS categories of situation awareness, decision-making, communication and leadership are shared across contexts. However, behaviours specific to understanding, anticipating and navigating variability in resources and personnel are heavily relied upon to deliver safe surgical care. **Conclusion:** These pilot data will serve as the basis for development of a context-specific NTS curriculum for surgical trainees as well as an NTS evaluation and teaching tool specifically tailored to the unique challenges and solutions in the LMIC setting.

Using data to drive prehospital quality improvement in trauma: a mixed-methods analysis of the Rwandan experience. *Jeanne d'Arc Nyinawankusi*,[*] *John Scott*,[†‡] *Sam Enumah*,[†] *Eric Uwitonze*,[*] *Rebecca Maine*,[†] *Robert Riviello*,[‡] *Jean Claude Byiringiro*,[§] *Sudha Jayaraman*,[¶] *Ignace Kabagema*.[*] **From the [*]Service d'Aide Medicale Urgente, Ministry of Health, Rwanda; [†]Program for Global Surgery, Harvard Medical School, Boston, MA; the [†]Center for Surgery & Public Health, Brigham & Women's Hospital, Boston, MA; [§]University Teaching Hospital, Kigali, Rwanda; [¶]Virginia Commonwealth University Medical Center, Richmond, VA**

Background: Injury is a major cause of premature death and disability in East Africa, and high-quality prehospital care is essential for optimal trauma outcomes. The Rwandan prehospital emergency care service, SAMU, uses an electronic database to evaluate and optimize prehospital care through a continuous quality improvement (QI) program. **Methods:** The SAMU database was used to assess prehospital quality metrics, including supplementary oxygen for hypoxia, intravenous fluids for hypotension, immobilization and pain management for fractures, and cervical collar placement for head injuries. Targets were set for each metric, and monthly updates were provided to address opportunities for QI. Database completion rates and prehospital quality metrics were assessed before and after implementation of this QI program. For the subsequent qualitative analysis, we performed semistructured interviews of SAMU leadership staff, drivers, nurses and anesthetists to understand attitudes toward care delivery, the electronic database and research before and after implementation of the QI program. **Results:** During the 24-month period, SAMU managed 3340 injured patients. Over the course of 8 months of continuous feedback to the SAMU providers, all 5 quality metrics have reached an implementation rate of 85% or greater. Among the 3 metrics starting below 85%, the relative improvement in implementation rates ranged from 11% to 16% ($p < 0.05$ for each). Qualitative analyses revealed themes of intrinsic and extrinsic motivators behind these QI efforts. **Conclusion:** The SAMU experience demonstrates the utility of a data-driven QI program to yield significant improvements in prehospital care in trauma. Efforts are currently underway to link these improvements in prehospital care to trauma outcomes.

Surgical follow-up rates at HEAL Africa Hospital in Eastern Democratic Republic of Congo. *Maeve O'Neill Trudeau*,[*] *Sylvain Mumbere Kwiratuwe*,[†] *Etienne ECHI BAKE*,[†] *Luc Kalisya Malemo*.[†] **From the [*]University of Toronto, Toronto, Ont. and [†]HEAL Africa, Goma, Democratic Republic of the Congo**

Background: We sought to systematically assess current postoperative follow-up rates and practices at a hospital in Eastern Democratic Republic of the Congo (DRC) as part of a larger project to improve surgical accountability in low-resource settings. **Methods:** A retrospective chart review of all individuals who underwent a surgical intervention at HEAL Africa Hospital between October and December 2014 was conducted. A total of 171 charts were included, and demographic data, including surgical intervention, length of stay and follow-up rates, were extracted for analysis. **Results:** In total, 90.6% of patients whose

charts were reviewed did not see a surgeon after being discharged from hospital. At HEAL, a surgeon will request follow-up only if the patient requires a further intervention (e.g., drain removal, wound dressing). Of the 39 patients for whom follow-up was requested, 14 (35.9%) returned for follow-up and were seen by a surgeon. Patients seen by a nurse instead of a surgeon would not have had their follow-up documented. Excluding day surgeries (n = 21), the median length of stay was 7 days for general surgery procedures, 4 days for orthopedic procedures and 5 days for obstetrical/gynecological procedures. An important limitation of the study is that only 24.8% of postoperative charts could be retrieved. **Conclusion:** Postoperative follow-up with a surgeon is not routinely done at HEAL; prolonged patient hospitalization partially accounts for this. Postoperative follow-up in low-income and humanitarian settings is a longstanding concern involving complex issues, such as incapacity of patients to return to hospitals owing to a lack of funds and limited availability of overextended surgeons.

Proof of concept methodology: feasibility of postoperative follow-up using cellular phones at HEAL Africa Hospital in the Eastern Democratic Republic of Congo. ***Maeve O'Neill Trudeau,*[*] *Etienne Echi Bake,*[†] *Sylvain Mumbere Kwiratuwe,*[†] *Luc Kalisya Malemo.*[†] **From the [*]University of Toronto, Toronto, Ont. and [†]HEAL Africa, Goma, Democratic Republic of the Congo**

Background: Postoperative follow-up in low-income and humanitarian settings is a longstanding issue: a 2010 review of Médecins Sans Frontières's experience in 13 countries notes, "Long-term outcomes were especially challenging for surgical care in these settings. Patients lived far away, communication was poor and follow-up was not routinely done." Given the increased cell phone presence in many of these settings (DRC was estimated to have 44 cell phones per 100 capita in 2013), we propose a proof of concept study assessing feasibility of contacting patients postoperatively in complex settings as part of a larger project to improve surgical accountability in low-resource settings. **Methods:** A research protocol was developed, which involved obtaining as many cell phone numbers as possible from a patient on either the day of surgery (if day surgery) or the first day possible after surgery using a standardized electronic data collection system involving a tablet and the open-access KoBoToolbox FormBuilder. On postoperative day 7 (day surgeries) or postoperative day 14 (inpatient surgeries), attempts to contact the patient via cell phone were made at predetermined times (approximately 7 am and 1 pm). Results were again entered using a standardized electronic form, allowing rapid analysis and forgoing the need for manual entry of the data collected. If cell phone contact was established with the patient, a predetermined questionnaire was used to assess surgical site infection and overall patient morbidity and mortality. **Results:** The study is ongoing. **Conclusion:** We believe this represents a new methodology worth discussing in the context of increased patient accountability in low-income settings.

Developing a critical care (CC) curriculum fit for purpose for the College of Surgeons of East, Central and Southern Africa (COSECSA). ***Jacob Dreyer,*[*†] *David R. Ball,*[†] *Joseph Musowoya,*[‡] *Abebe Bekele,*[§] *Laston Chikoya.*[‡] **From the [*]International Federation of Surgical Colleges, London, UK; [†]NHS Dumfries & Galloway, Nithbank, Dumfries, UK; the [‡]College of Surgeons of East, Central and Southern Africa, Arusha, Tanzania; and [§]Addis Ababa University, Addis Ababa, Ethiopia**

Background: Training in critical care (CC) was identified as a priority by COSECSA council members. A CC teaching portfolio was developed, consisting of taught courses, reading material, thorough assessment and feedback for surgical trainees in COSECSA countries. **Methods:** The CC training course for residents in East/Central Africa was developed over a 4-year period from established principles of teaching CC, with contents and delivery adapted to local needs. Course developers and tutors were experienced CC tutors from the United Kingdom, with continuous input from COSECSA colleagues. Review articles were written and published through an established open source resource, leading to an electronic handbook. Feedback opportunities were created through informal sessions, end-of-course and 6-month postcourse evaluation forms. Local tutors were trained and a faculty handbook developed. **Results:** Since 2011, 9 courses have been completed in 5 COSECSA countries by more than 100 residents and more than 20 new tutors. The curriculum was constantly revised according to need. Feedback confirmed good predictive and face validity, reliability and feasibility; 95%–100% of participants indicated that the course improved practice. The COSECSA council decided to make this a designated CC course, compulsory before fellowship exams from 2016. **Conclusion:** The CC teaching for COSECSA goals was delivered through a small group of visiting tutors, with input from local surgeons and course participants, with high validity, reliability and feasibility ratings. This course fills a specific need not available previously, improving clinical decision-making, teamwork and communication. It will be managed further by COSECSA faculty, with support from United Kingdom tutors when requested.

WHO Surgical Safety Checklist to reduce cost in a rural community. ***Obinna Ajuzieogu,*[*] *Chika Ikeani,*[†] *Adaobi Amucheazi.*[*] **From the [*]University of Nigeria Teaching Hospital, Enugu, Nigeria, and the [†]Chukwuasokam Maternity Hospital, Enugu, Nigeria**

Background: Cesarean section is a common surgery in Nigeria, with more than 40% preventable complications. In the rural community, resources are limited. We took a campaign of the WHO Surgical Safety Checklist (SSCL) to 4 rural hospitals with the aim of reducing morbidity. The SSCL consist of a series of checks that occur during surgery. We hypothesized that implementation of the SSCL would reduce complications. In order to convince the facilities on the benefit of the checklist, data were collected on cases adhering to the SSCL and those not. **Methods:** This was a prospective study of women who had cesarean sections in 4 rural hospitals between January and December 2014. We prospectively collected data on all cases done over this period and their outcomes. The primary end point was the rate of surgical site infection (SSI) and duration of hospitalization. **Results:** A total of 576 cesarean sections were recorded in these hospitals. We implemented the SSCL in 276 cases (group A), while in 300 cases, the medical practitioners did not, (group B).

The SSI rate was 3.5% in the group A patients versus 32% in group B patients. The cost of antibiotics in group A was $50 versus $170 in group B. Total stay in hospital was also longer in group A, with a higher cost. **Conclusion:** Implementation of the checklist was associated with reduced SSI rate, cost of antibiotic and hospital stay.

Facilitation of surgical skills acquisition by interns through simulation at UITH, Nigeria. ***Lukman Abdur-Rahman,*** [*] ***Olanrewaju Oyedepo,*** [*†] ***Abdulrasheed Nasir,*** [*] ***Gbadebo Ibraheem,*** [*] ***Majeed Adegboye,*** [*] ***Aishat Saka,*** [*] ***Wahab Johnson,*** [*] ***Olajide Olatinwo.*** [*] **From the *University of Ilorin and †Department of Anaesthesia, University of Ilorin Teaching Hospital, Ilorin, Nigeria**

Background: Internship provides knowledge translation under the supervision of experts. Basic surgical skills are learned by medical graduates through practice on live patients. The clinical skills and simulation laboratory (CSSL) facilitates skills acquisition to high proficiency and limits risk and injuries to patients. The aim of our study was to evaluate the skills and knowledge acquired during training of newly employed interns at the CSSL of University of Ilorin, Nigeria. **Methods:** Validated questionnaires were administered to determine the proficiency of interns in basic surgical skills pre- and posttraining to assess level of skill transfer at the CSSL. Instructors' observations were also documents to validate claims of participants. **Results:** Sixty-six interns aged 22–35 (mean 26.05 ± 2.08) years participated; the male:female ratio was 2:1. Between 7 (10.6%) and 31(47.0%) of participants had done basic surgical procedures (i.e., suturing, digital rectal examinations, nasogastric tube passage, incision and drainage, scrubbing and gowning) during training. However, only 8 (12%)–16 (24.2%) had self confidence of high proficiency. Urethral catherterization done most by participants (47 [71.2%]) was associated with only 42.4% proficiency. Posttraining, 65 (98.2%) participants agreed that lectures and demonstrations were adequately delivered and integrated into practice. Participants' expectations were met (89.7%). Insight was gained into the deficiency in participants' medical knowledge (85.3%). The CSSL provided a relax and fast learning approach (64.7%) and boosted confidence (86.7%). Practical demonstrations and hands-on learning were preferred (82.4%) to lectures and problem-based learning (58.8%). **Conclusion:** The CSSL facilitated skills verification and acquisition by newly employed interns. We recommend that the CSSL should be used for basic surgical skill acquisition.

Innovations in minimally invasive surgeries for rural areas. ***Gnanaraj Jesudian.*** **From the Samiti for Education Environment Social and Health Action, Chennai, India**

Background: Minimally invasive surgeries (MIS) are relevant for the poor and marginalized in rural areas where the patients need to get back to work as soon as possible as often they are the sole bread winners of the family. Unfortunately, the high costs make MIS unaffordable for the poor. We describe the innovations that we made to make MIS possible in remote rural areas in India over the last 2 decades. **Methods:** The data of patients operated in remote rural areas of North and Northeast India were analyzed, and the papers published by the author regarding the various MIS techniques were reviewed and compiled. **Results:** The following were the significant MIS techniques that were used: (1) ureterorenoscopic removal of renal stones with no C-arm fluoroscopy unit; (2) transuretheral vaporization of the prostate; (3)uterine endometrial vaporization for dysfunctional uterine bleeding; (4) low-cost topical vacuum therapy for nonhealing ulcers and diabetic foot; (5) modifications for laparoscopic surgeries, such as using an EMO ether machine for anesthesia, using a dental compressor for insufflation, and reusing laparoscopic disposables; (6) lift laparoscopic or gasless laparoscopic surgeries that are carried out under spinal anesthesia with traditional open surgical instruments; and (7) the diagnostic and surgical camp model. **Conclusion:** The 3 major problems with respect to accessibility, availability and affordability were addressed by the diagnostic and surgical camp model and the various low-cost modifications.

The low-cost topical vacuum therapy unit: salvaging diabetic foot. ***Gnanaraj Jesudian.*** **From the Samiti for Education Environment Social and Health Action, Chennai, India**

Background: Fifteen percent of diabetic patients develop foot ulcers and 11% have a risk of lower limb amputation during their lifetime. Topical vacuum therapy is a proven technology that dramatically improves wound healing. However, the current available units are very expensive and out of reach of the poor and the marginalized in the rural areas. **Methods:** A low-cost vacuum therapy unit was developed in association with the Karunya University, and the various models were used to treat patients with diabetic foot at the 45-bed hospital in the campus. The records of these patients were analyzed. The patients who the referring doctor or the surgeon at the hospital posted for lower limb amputation during the last 3 years were included in the anlaysis. **Results:** During the review period 23 patients with diabetic foot were either referred for amputation or advised to undergo amputation by the doctor at the Casualty/OPD. They underwent treatment with the low-cost vacuum therapy for 1 or 2 days and were reviewed. Five of them underwent amputation while rest had radical débridement and continued with topical vacuum therapy. All of them recovered, with some of them requiring skin grafting. **Conclusion:** The low-cost vacuum therapy unit helps prevent amputation of the lower limb or foot. The changes made in the unit included increasing the number of vacuum pumps to prevent them from burning, adding the temperature sensor that shuts the pump if the temperature is high and the pressure sensor to indicate the level of vacuum.

Engaging communities in influencing quality of health care services. ***Emmanuel Batiibwe.*** **From Soroti Regional Referral Hospital, Soroti, Uganda**

Background: In order for health care organizations to continuously offer high-quality services, they must engage the populations they serve through the clientele by acting upon feedback. The clientele represent the service population. Hospitals develop policies that are responsive to the needs of their patients communicated in surveys. Soroti Regional Referral Hospital serves a population of about 2 million people, and its mission is increasing their access to quality general and specialized health care. Our hospital conducts regular surveys among clients geared toward informing decision-making that aims at quality improvement (QI). **Methods:** Over a period of 2 years we sought and analyzed

opinions from sample clients with varying ailments from all departments, and hence different localities of the catchment population, on aspects of a continuum of health care they received while in hospital. We tried to ascertain whether these eventually constituted QI projects at the facility. **Results:** Clients were from 6 districts localities (75%). Over the study period, there was an upward trend of opinions in quality of service in terms of pleasantness of health workers, access to drugs, environmental neatness and promptness of care. Thirty-one QI projects were set up in the last year alone of study in response to views expressed. **Conclusion:** Client communities provided a fair representation of the catchment population. When engaged, clients can be useful in causing QI in hospitals. Continuous QI must be centred in patient and family feedback.

Safety and efficacy of oral ketamine for premedication in children undergoing day surgery. ***Olanrewaju Oyedepo*,[*†] *Abdulrasheed Nasir*,[*] *Lukman Abdur-Rahman*,[*] *Benjamin Bolaji*,[‡] *Israel Kolawole*,[‡] *Olufemi Ige*.[‡] From the [*]University of Ilorin, [†]Department of Anaesthesia, University of Ilorin Teaching Hospital, and the [‡]University of Ilorin, Ilorin, Nigeria**

Background: Oral premedication in the pediatric age group is an uncommon practice among anesthetists in Nigeria. Both parents and the child therefore experience some form of emotional or psychological distress. This study aimed to determine the safety and effectiveness of oral ketamine as oral premedication for pediatric day surgeries. **Methods:** Seventy-three children with American Society of Anesthesiologists (ASA) physical status I–II aged 1–6 years were prospectively studied. They were assigned randomly to 3 separate groups that received either 5 mg/kg (group A), 10 mg/kg (group B) or no ketamine (group C). The children were observed for acceptance of premedication, sedation and anxiolysis at 10-minute intervals after administration of premedication. Behaviour/response of children was assessed at the time of separation from parents, time of venipuncture and time of applying the mask for ventilation. Any untoward effects were documented. **Results:** The groups were comparable in age. The studied agent was tolerated by both groups that received premedication, with no significant difference ($p = 0.73$). Adequate sedation and anxiolysis was observed in both group A and group B (52%, 84%) and (68%, 88%), respectively. However, more children in group B (82.6%) had satisfactory behaviour at separation from parents and a better acceptance of anesthetic face mask (64%) at induction than those in groups A and C (33.3%, 21.7%, respectively). No side effect was recorded in either of the premedication groups. **Conclusion:** Oral preparation of ketamine is an acceptable and safe premedicant drug suitable for children undergoing surgery. It gives good sedation, relieves anxiety in children and has no side effect at the studied dose.

Surgical device innovation for low-resource settings: an alternative for bone drilling. ***Justin Lam*,[*] *Lawrence Buchan*,[*] *Jeffrey Potter*,[†] *Marianne Black*,[*] *Jeremy Kooyman*,[*] *Michael Cancilla*,[*] *Elise Huisman*,[*] *Nathan O'Hara*,[*] *Peter O'Brien*,[*] *Piotr Blachut*.[*] From the [*]University of British Columbia, and the [†]Vancouver General Hospital, Vancouver, BC**

Background: Owing to limited access to surgical power drills, orthopedic surgeons in low-resource settings commonly use manual drills or nonsterile hardware drills. We propose the use of a drill cover solution: a sterilizable fabric bag plus sealed surgical chuck adaptor to permit the safe use of hardware drills for orthopedic surgery. The purpose of this study was to compare the drilling performance of covered hardware drills with manual drills and standard surgical power drills. **Methods:** Orthopedic surgeons ($n = 20$) and laypeople ($n = 6$) each drilled 21 holes in a cylindrical bone model (acetal), randomly alternating between hardware (DeWalt DCF610S2, maximum 1000 RPM), surgical (ConMed PRO6202M, maximum 1250 RPM) and manual drills. A custom drill cover with sealed chuck interface enveloped the hardware drill. We measured plunge depth using a sliding caliper platform and time per hole. **Results:** Mean differences in plunge depth between the hardware (6.73 ± 3.24 mm) and surgical drill (5.68 ± 2.44 mm) were not significant ($p > 0.05$; linear mixed models plus Sidak correction), but mean plunge depth was significantly greater with the manual drill (11.83 ± 8.37 mm) than with both powered drills ($p < 0.001$). Differences in time per hole between the hardware (4.8 ± 2.6 s) and surgical (4.6 ± 2.41 s) were not significant ($p > 0.05$), but time was significantly greater with the manual drill (15.7 ± 6.2 s) than with the powered drills ($p < 0.001$). **Conclusion:** Modern surgical drilling systems are cost-prohibitive for use in low-resource settings. This study demonstrated no difference in time or plunge between the hardware and surgical power drills. A drill cover system presents a viable, low-cost alternative to surgical drills.

Developing an effective surgical skills simulation program for surgical residents in a resource-constrained setting. ***Birhanu Kotisso*,[*] *Amezene Tadesse*,[*] *Abebe Bekele*,[*] *Lara Oyetunji*,[†] *Brant Oelschlager*,[†] *Andrew Wright*.[†] From the [*]Addis Ababa University, Addis Abba, Ethiophia, and the [†]University of Washington, Seattle, WA**

Background: It is estimated that 11% of the global burden of disease is surgical. The greatest burden of surgically treatable diseases falls on people in resource-constrained settings. As resource-constrained countries address a shortage of surgeons by increasing the number of trainees, a major barrier is the lack of surgical educators. **Methods:** This program consisted of 1) faculty development, 2) curriculum development and 3) implementation. Formal agreement was developed creating an international simulation fellowship. This 3-week intensive training program had a specific curriculum, including observation, mentoring and practice in surgical simulation. A specific measurable outcome was defined as development of specific training curricula applicable in both training environments. This was followed by implementation of a surgical skills course in the resource-constrained country. **Results:** At completion of the fellowship, the faculty had developed 8 written training curricula with formal performance metrics: instrument identification, knot-tying, suturing, laparotomy, intestinal anastomosis, colostomy, basic laparoscopy and basic chest procedures. These were then used as the basis for a surgical skills course held in the resource-constrained environment. Each session included local faculty assisted by experienced educators from the established program. Thirty-four incoming surgical residents were enrolled and successfully completed the course.Two of these curricula have since been introduced as new offerings at the established simulation centre, including use of the low-cost materials that were felt to be superior to commercial models. **Conclusion:** Our experience confirms that this model is effective in establishing a surgical simulation program in a resource-constrained training

program. Key lessons learned were the importance of relationship-building between institutions, a focus on faculty development and support and the importance of formal deliverable outcomes.

Bridging the communication gap between communities and health facilities using modern accessible technology with information power for improved care of vulnerable mothers and newborns: a case of 4 rural hospitals in Uganda. ***Eve Nakabembe,*[*†] *Jean Chamberlain,*[*‡] *Mary Ssonko,*[*] *Florence Mirembe,*[*†‡] *Dan Scott,*[*] *and Topi Agutu.*[*] **From [*]Save the Mothers, Uganda Christian University, Bishop Tucker, Mukono, Uganda; [†]Makerere University, Wandegeya, Kampala, Uganda; and [‡]McMaster University, Hamilton, Ont.**

Background: Key barriers to improving maternal/newborn health in the developing world are well documented and proposed solutions widely known. A maternal/perinatal death audit in Malawi demonstrated lack of communication as a clear gap that compounds the 3 delays that result in maternal/newborn death. The purpose of this study was to improve communication between mothers/communities and the health facilities using toll-free hotlines. **Methods:** Our study involved (1) identification of 4 pilot hospitals based on a baseline survey done within Greater Mukono-Buikwe District; (2) a site survey by information and communications technology engineers to choose the most reliable network in the catchment area; (3) meetings with community members, village health teams (VHT), district leaders and health workers regarding toll-free service installation and use of drama, radio, religious gatherings, police and information, education and communication (IEC) materials; and (4) on-site mentoring (initial and ongoing) of communities and health workers on communication etiquette and clinical directives in using a toll-free line. **Results:** Secured and stationed toll-free hotlines were installed in 4 maternity sections, and ongoing onsite mentoring of health workers on effective use of hotlines was established. More than 6300 phone calls from expectant mothers, husbands, new moms and traditional birth attendants were received in 8 months. About 123 emergency referrals to higher centres of care and 42 emergency laboratory consultations took place. Midwives felt they were better able to prepare for patients when they called before coming. **Conclusion:** Introducing toll-free hotlines in health facilities for rural communities contributed to improved communication, timely care and general improvement in the quality of care provided at the health facilities.

From community laywomen to breast health workers: a successful training model for implementing a clinical breast exam screening program in Malawi. ***Lily Gutnik,*[*] *Christopher Stanley,*[*] *Agnes Moses,*[*] *Satish Gopal,*[*] *Clara Lee*[†]**. From the [*]UNC Project Malawi, Kamuzu Central Hospital, Lilongwe, Malawi, and the [†]UNC School of Medicine, Chapel Hill, NC**

Background: Breast cancer burden is high in low-income countries. Inadequate early detection contributes to late diagnosis and increased mortality. We describe Malawi's first clinical breast exam (CBE) screening program. **Methods:** Laywomen were recruited as breast health workers (BHW) by engaging local staff and breast cancer advocates. The 4-week training consisted of lectures, online modules, role-playing, case discussions, CBE using simulators and patients, and practice presentations. Ministry of Health trainers taught health communication, promotion, and education skills. Breast cancer survivors shared their experiences. Surgeons taught breast cancer epidemiology, prevention, detection and clinical care. Surgeons and research staff taught research ethics, informed consent, data collection and professionalism. Breast cancer knowledge was measured with pre- and post-training surveys. Concordance between BHW and surgeon CBE was assessed. Breast cancer talks by BHW were evaluated on a 5-point scale in 22 areas by 3 judges. **Results:** We interviewed 12 women, and 4 were selected, including 1 breast cancer survivor. Training was dynamic, with modification based on trainee response and progress. A higher than anticipated level of comprehension and interest led to inclusion of additional topics, such as breast reconstruction. Pretest knowledge increased from 49% to 91% correct ($p < 0.001$), 17% versus 8% incorrect ($p = 0.018$), and 34% versus 1% uncertain ($p < 0.001$). Surgeon and BHW CBE had 88% concordance (κ 0.43). The mean rating of BHW educational talks was 4.4 ± 0.7. **Conclusion:** Malawian laywomen successfully completed training and demonstrated competency to conduct CBE and deliver educational talks. Knowledge increased after training, and concordance was high between BHW and surgeons' CBE.

Improving intra- and interhospital communication using caller user groups (CUG) for health service providers for material newborn health. ***Eve Nakabembe,*[*] *Jean Chamberlain.*[†] **From [*]Save the Mothers, Makerere University, Wandegeya, Kampala, Uganda, and [†]McMaster University, Hamilton, Ont.**

Background: A poor working environment with poorly motivated health service providers is a key barrier to improved maternal and newborn health. In many cases where there is a maternal death, poor intrahospital communication between hospital staff contributes to the delays within the health facilities, as many communicate by word of mouth. Most health workers have a mobile phone, yet this essential resource is not optimally utilized, as the airtime for clinical care is not provided, leading to a failure to call for help or obtain a more senior opinion. The objectives of this study were establishing a functional communication system among health workers within a health facility (intrahospital) and among health facilities within the same catchment area (inter-hospital). **Methods:** We conducted a survey on the most common network utilized by health service providers (nurse–midwife, anesthesia, administration, lab, security) in 4 rural hospitals within the same region. We educated the health service providers on the caller user groups (CUGs) mode of operation, and obtained informed consent to have them be part of a network where they can call each other and colleagues within the other hospitals in case of emergency, such as availing blood and referrals. A CUG of health providers was establishd. **Results:** The CUGs led to improved intrahospital communication with cost savings, enhanced communication between hospital laboratories in urgent cases of blood transfusion, and faster and more efficient interhospital transfers. **Conclusion:** The CUGs are an inexpensive, cost-effective method of improving inter- and intrahospital communication, a motivating factor for health workers, and contribute to a favorable working environment.

Assessing access to surgical care in Nepal via a countrywide survey. ***Marissa Boeck,*[*†‡] *Neeraja Nagarajan,*[§] *Shailvi Gupta,*[‡¶] *Reinou Groen,*[**] *Sunil Shrestha,*[††] *Susant Gurung,*[‡‡] *Adam Kushner,*[*] *Benedict Nwomeb,*[§§] *Mamta Swaroop.*[¶¶] **From the**

[*]Johns Hopkins Bloomberg School of Public Health, Baltimore, MD; [†]Columbia University Medical Center, New York, NY; [‡]Surgeons OverSeas, San Francisco, CA.; [§]Johns Hopkins University School of Medicine, Baltimore, MD; [¶]University of California, San Francisco, East Bay, San Francisco, CA; [**]Johns Hopkins Hospital, Baltimore, MD; the [††]Nepal Medical College, Jorpati, Nepal; the [‡‡]Kathmandu Medical College, Kathmandu, Nepal; [§§]The Ohio State University, Columbus, OH; and [¶¶]Northwestern University Feinberg School of Medicine, Chicago, IL

Background: Adequate surgical care is lacking in many low- and middle-income countries (LMICs). Even when available, diverse barriers prevent patients from reaching providers. We sought to assess surgical access in Nepal using the Surgeons OverSeas Assessment of Surgical need (SOSAS) tool. **Methods**: Fifteen of 75 Nepali districts were selected proportionate to population, with 1350 households responding. Household heads answered questions regarding access to primary, secondary and tertiary care facilities, including modes of transport, travel times and transport costs. Two household members were interviewed for medical history. Continuous and categorical variables were analyzed using the Wilcoxon rank-sum test and Pearson χ^2 test, respectively. Multivariable logistic regressions for independent predictors of care access were performed, controlling for age, sex, location and literacy. **Results:** Of respondents with a surgical problem (n = 1342), 650 (48.4%) accessed care and 237 (17.7%) did not, with the remainder not responding. Unadjusted analyses showed higher median travel times to all facilities ($p < 0.001$) and greater median transport costs to secondary and tertiary centres ($p < 0.001$) for those who did not access care versus those who did. Literate respondents were more likely to access care across all facilities and access variables in adjusted models (odds ratio 1.66–1.80, $p \leq 0.005$). Those without transport money were less likely to access care at any facility in all analyses ($p \leq 0.006$). **Conclusion:** Our data show individuals who did not access care had lower literacy and fewer transport resources than who did. Promoting education, outreach programs, transportation access, and improved road infrastructure could lessen barriers, but require further exploration for applicability to different Nepali regions.

Management of bladder exstrophy using the mainz II procedure in a resource-limited setting: a multisite study. ***Danielle LeBlanc*,[*] *Ken Muma*,[†] *Frebun Ayele*,[‡] *Robert Baird*,[§] *Erik Hansen*,[†] *Safwat Andrawes*,[¶] *Dan Poenaru*.[†‡§¶] From [*]Memorial University, St. John's, Nfld.; [†]BethanyKids, Kijabe Hospital, Kijabe, Kenya; [‡]BethanyKids, MyungSung Christian Medical Hospital, Bole, Addis Ababa, Ethiopia; [§]Montreal Children's Hospital, McGill University, Montreal, Que.; [¶]Coptic Hospital, Nairobi, Kenya**

Background: We sought to evaluate the safety and efficacy of the Mainz II ureterosigmoidostomy procedure in the treatment of bladder exstrophy in resource-limited settings. **Methods:** We conducted a retrospective review of all patients who underwent the Mainz II continent urinary diversion for definitive treatment of bladder exstrophy at 3 nongovernmental tertiary hospitals in Kenya and Ethiopia between 2002 and 2014. **Results:** Forty patients were included in the study, 28 males (70%) and 12 females (30%). The mean age was 7.6 years (range 7 months–24 years). Twelve patients (30%) had undergone an average of 1.6 (range 1–3) previous procedures. Following a standard Mainz II ureterosigmoidostomy, complications were encountered in 34 children (85%). These included vomiting in 7 (17%), mild metabolic acidosis in 10 (25%), acute kidney injury in 4 (10%), wound infection in 8 (20%) and dehiscence in 2 (5%); 1 patient (2%) died of postoperative complications. The average hospital stay was 16 (range 8–31) days, and follow-up extended up to 4 years. Mid-term continence data were available for 16 (48%) of the 33 patients who reached age of continence. In this group 100% reported adequate continence. **Conclusion:** Despite frequent complications, our experience using the Mainz II procedure in the treatment of bladder exstrophy has been positive, achieving a very high continence rate through a single definitive procedure. This appears to be a good option in the management of bladder exstrophy in resource-limited settings. Further studies are needed for long-term results and to compare it to single- and multistaged bladder closure procedures in similar settings.

Addressing the value equation in global surgery: Connecticut's experience with surgical care in low- and middle-income countries. ***Christopher Hughes*,[*] *Beata Lobel*,[*] *Aaron Gilson*,[†] *Jacob Campbell*,[*] *Swagoto Mukhopadhyay*,[*] *Alan Babigian*,[‡] *Scott Ellner*,[§] *David Shapiro*.[§] From the [*]University of Connecticut, Farmington, CT; [†]Waterbury Hospital, Waterbury, CT; [‡]Hartford Hospital, Hartford, CT; and [§]St. Francis Hospital and Medical Center, Hartford, CT**

Background: Surgery is a critical component of global health care. While surgery has become a substantial issue in some horizontal health systems development projects, most global surgical experiences entail vertical, short-term "missions." Many Connecticut surgeons engage global surgery through this model, but little is known about the scale, scope or outcomes of their involvement. The goal of this pilot survey project was to delineate participation in global surgery activities among surgeons in Connecticut. **Methods:** An online survey and iterative participation encouragement were sent directly to practising surgeons in the state of Connecticut. **Results:** Seventy-four surgeons affiliated with multiple surgical specialties completed surveys. Nineteen (25%) respondents participated in global surgery activities. Most (56.3%) participated yearly for 1–4 weeks/experience (94.5%). More than half reported no formal surgical outcomes measured during their experiences (52.9%), but 17 (89.5%) respondents regarded outcomes measurement as beneficial to these efforts. About 89% reported a willingness to participate in a surgical quality and outcomes database, although only 11% would be willing to pay for a program. **Conclusion:** A substantial portion of surgeons in Connecticut participate in global surgery activities. Most surgeons value quality in surgical care in resource-poor settings, and yet outcomes are not routinely measured as part of these activities. This discordance may be addressed through the development of a standardized quality improvement program for global surgery. Future, larger surveys will help identify national trends in global surgical practice, open conversation about the importance of outcomes measurements, and may highlight the need for a formalized global surgery quality collaborative.

Inguinal hernia repair in Rwanda: a survey of the surgical residents. ***Ryan Rochon*,[*] *David Hakizimana*,[†] *Gwen Hollaar*.[*] From the [*]University of Calgary, Calgary, Alta.; and the [†]National University of Rwanda, Butare, Rwanda**

Background: The modified Bassini repair is the most common repair technique used by African surgeons. Tension-free mesh repair is the preferred surgical technique performed in higher-income countries. In Africa, less than 5% of all inguinal hernias are repaired using mesh, as it is unaffordable for patients and/or unattainable for surgeons. Low-cost mesh, including mosquito-net mesh, is available in low-income countries but rarely used. **Methods:** A site visit was completed in Rwanda. A knowledge, attitude and practice assessment survey was distributed to the residents at the Centre Hospitalier Universitaire de Kigali. The survey explored how the surgical residents approach and manage inguinal hernias. **Results:** The survey was completed by 18 surgical residents. All of the residents ranked the tension-free mesh repair as the best technique for inguinal hernia repair. The majority of residents felt that mosquito-net mesh could be safely sterilized and they would consider using it. The perceived barriers to using mosquito-net mesh for hernia repair were risk of infection, lack of skill in the repair technique, patient refusal, rejection of the mesh, accessibility, strength of the mesh, hernia recurrence and safety. **Conclusion:** The surgical residents in Rwanda believe that tension-free mesh repair for an inguinal hernia is superior. Most residents thought that mesh would be safe and appropriate for their health care environment. The main barriers to using mesh are the cost to the patients and the experience of the surgeons with the surgical technique.

Completeness and utility of surgical data capture at a rural Ugandan regional referral hospital: a foundation for quality improvement initiatives. ***Johanna Riesel,*** [*] ***Gerald Tumusiime,*** [†] ***Adam Was,*** [‡] ***Mark Preston,*** [*] ***Stephen Ttendo,*** [†] ***Paul Firth.*** [*] **From the [*]Massachusetts General Hospital, Boston, Mass; the [†]Makerere University, Kampala, Uganda; and the [‡]Stanford Hospital, Standford, CA**

Background: There are little primary data available on the delivery or quality of surgical treatment in rural sub-Saharan African hospitals. To initiate a quality improvement (QI) system we characterized the completeness and potential use of existing data capture at a Ugandan regional referral hospital. **Methods:** We examined the surgical ward admission (January 2008 to December 2011) and operating theatre logbooks (January 2010 to December 2011) at Mbarara Regional Referral Hospital. We estimated distanced travelled by direct distance from home district to hospital. We compared the operating logbook with the contemporary ward register using 2-sample t and χ^2 tests. **Results:** Leading causes of admission were trauma (n = 2041, 32%), general surgical conditions (n = 1979, 31%), infectious complications (n = 925, 15%) and cancer (n = 718, 11%). Distance travelled to hospital was less than 50 km (n = 3265, 51%), more than 50 km (n = 2504, 39%), or unknown (n = 577, 9%). Of 1351 patients undergoing operations, 193 (14%) were missing from the ward logbook. Missing patients were more likely to be emergency cases (60.5% v. 53.5%, p = 0.037), sicker (American Society of Anesthesiologists status > 1, p < 0.01), and younger (18.5 v. 26.3 yr, p < 0.001). Of ward patients, 5295 (83%) were discharged, 96 (2%) were referred, 148 (2%) died and 687 (11%) left without discharge. **Conclusion:** Existing records contain potential measures of access to (disease type, distance travelled, proportion of emergencies) and quality of (perioperative mortality) care. Improved detail and completeness of recording are needed to determine outcomes. While incomplete records limit the interpretations of this study, the large population size allows for broad conclusions, and the data elucidate areas of development for future QI initiatives.

Building perioperative nursing capacity in Ethiopia through education. ***Stephanie de Young,*** [*] ***Miliard Derbew Beyene.*** [†] **From the [*]Hospital for Sick Children, Toronto, Ont.; and the [†]Addis Ababa University, Addis Ababa, Ethiopia**

Background: Improving access to safe high-quality surgical care in low- and middle-income countries (LMICs) requires investments in education across health disciplines. The Surgical Society of Ethiopia (SSE) has a long history of facilitating continuing education for surgeons. Similar opportunities for OR nurses in Ethiopia are very limited. Building on an international collaboration with the Hospital for Sick Children (SickKids) in Toronto, the SSE launched a paediatric perioperative nursing education course in 2014 aimed at strengthening capacity within Ethiopia to train and retain pediatric perioperative nurses. **Methods:** Since 2008 teams from SickKids visited Ethiopia to provide surgical care and bedside teaching. In 2013 owing to local institution and international partner factors as well as a changing context for international development, a new focus for the partnership on capacity-building through education was formalized. Nurses were identified as a target for perioperative training, and the Department of Nursing, Addis Ababa University, was engaged alongside the SSE and SickKids to deliver a 1-month competency-based course focused on clinical and leadership skill development. A train-the-trainer model was used to develop local faculty responsible for coteaching and sustaining the course. **Results:** The course was delivered 3 times over the pilot project to 65 nurses from facilities across Ethiopia. Learner outcomes were assessed through skills checklists and pre- and posttesting by SickKids and Ethiopian faculty. **Conclusion:** The Federal Ministry of Health will be integrating the course curriculum into its new Bachelor of Science in Nursing specialization in perioperative nursing. Evaluation of sustained practice changes and patient outcomes as a result of perioperative nursing training will further inform strategies to scale up the program across Ethiopia.

Development of a combined surgery/oncology breast clinic in Rwanda. ***Ainhoa Costas Chavarri,*** [*] ***Pacifique Mugenzi.*** [†] **From [*]Boston Children's Hospital, Boston, MA, and Human Resources for Health Rwanda; [†] Rwanda Military Hospital, Kigali, Rwanda**

Background: Breast cancer is the most common of all cancers and the leading cause of cancer deaths in women worldwide. It is estimated that by 2020, up to 70% of all new cancers will occur in the developing world. The Breast Health Global Initiative (BHGI) pioneered international guidelines for breast cancer care best practices in LMICs, including recommendations for improvements in health care systems (HCS). **Methods:** In consideration of BHGI guidelines, a collaboration between the general surgery and oncology departments at the Rwanda Military Hospital led to the development of a weekly, combined surgery and oncology breast clinic, beginning in April of 2014. This clinic provides centralized breast care services by a multidisciplinary team, consisting of a general surgeon and a medical/radiation oncologist. **Results:** From April 2014 to April 2015, the combined breast clinic saw over 460 total breast related visits. Of 262 unique breast patients, 46% (119) were diagnosed

with cancer, 27% (71) with a breast mass, 16% (43) with breast pain, and 11% (29) with other common breast complaints. While complete staging was only available for 52% (62) of patients with a confirmed cancer diagnosis, of these, 42% (26) were stage II, 39% (24) were stage III, and 13% (8) were stage IV, highlighting the late stage presentation of disease in our setting. The clinic has become a well-established referral center for benign and malignant breast disease, filling a key gap in the HCS network. The first of its kind in Rwanda, the clinic provides patient value by streamlined care and educational value by acting as a teaching venue for medical students and surgical postgraduates, who previously had limited exposure to the evaluation and management of breast disease. **Conclusion:** The need for collaborative management and organized networks for breast health care is imperative. We present our experience with a combined surgery/oncology clinic that has been successful in the setting of Rwanda.

Surgical education partnerships: a socially responsible approach to augment surgical capacity. ***Leandra Galloro, Julia Pemberton, Brian H. Cameron.*** **From McMaster International Surgery Desk, Department of Surgery, McMaster University, Hamilton, Ont.**

Background: North–south postgraduate surgical training partnerships are building momentum in the international surgical community as a model to bridge the gap between unmet need for surgical care and local workforce capacity in many low-resource settings. This literature review aimed to explore and summarize current surgical education partnerships, including definitions and fundamental principles, to delineate socially responsible practices. **Methods:** We reviewed publications and official websites of Canadian academic medical centres, professional societies and nongovernmental organizations via PubMed and Google. All full-text, English-language publications between 2004–2014 that reported on international cooperation within the domain of surgical education, organization/administration and/or manpower were included. Title and abstract screening was followed by hand searching of cited references. We also reviewed the Partnership Assessment Toolkit (PAT) developed by the Canadian Coalition for Global Health Research. **Results:** Out of 447 titles and abstracts screened, 56 underwent full-text review and 14 were included. Hand searching revealed an additional 3 titles for a total of 17 publications included in the final analysis. Of the 17, 4 (24%) outlined definitions and 6 (35%) outlined reflection-driven experiences (i.e., values, priorities, considerations). The most common principles were prioritizing local and national needs, shared accountability and local sustainability. **Conclusion:** The definition and principles of surgical education partnerships should be discussed and formalized among the international surgery community. Prior to undertaking projects and in addition to educational needs assessment, it is critical for partners to formally consider objectives, governance structures and anticipated outcomes of partnerships. This warrants development of a surgical education partnership tool via adaptation of the PAT.

Community needs assessment for prehospital trauma care in Northwestern Cambodia. ***Brittany Dingley,[*] Emilia Hermann,[†] Phillip Summers,[‡] Richard Siegrist.[§]*** **From the *University of Calgary, Calgary, Alta.; [†]University of Pennsylvania, Philadelphia, PA; [‡]UC Davis School of Medicine, Sacramento, CA; and the §Harvard T.H Chan School of Public Health, Boston, MA**

Background: In Cambodia, road traffic fatalities have doubled over 3 years. The frequency of road traffic accidents (RTAs) is more than 10 times that of developed nations. The total cost annually is greater than US $116 million. Despite this, no formal prehospital care system exists. We aimed to develop a program to decrease RTA mortality that is feasible and sustainable based on bottom-up methodology. **Methods:** A chart review was conducted at World Mate Emergency Hospital and identified all RTAs. In-hospital interviews were conducted with all RTA inpatients. Structured community-based interviews were conducted to identify themes regarding prehospital trauma care. **Results:** Average prehospital transportation time via taxi was 2 h, 51 min. Patients were charged an average fare of $68.57 (range $25–$200). A chart review examining 829 patient entries revealed locations with a high burden of road traffic–related injuries. Using a weighted scoring system we selected a list of potential pilot communities. Interviews revealed an engaged population with a profound concern about RTAs and poor access to care. A key theme was the complete lack of first aid knowledge in the communities, but a strong desire to help. Currently, neither an emergency number nor transportation are available to the public. **Conclusion:** Based on our community needs assessment we proposed 2 pilot communities for a prehospital trauma care program in areas with a high incidence of RTAs. This would include community-based first aid training, first responder training and the development of a motorcycle ambulance model given the availability of such transportation.

Shumba Medical Society: practising pro-African medicine. ***Norman Fenton.*** **From Shumba Medical Society, Calgary, Alta.**

Background: Our organization began as a Calgary group dedicated to augmenting the work of existing hospitals in southern Africa. It incorporated in 2009 as Adopt A Hospital Zimbabwe Foundation, subsequently became a Canadian registered charity, and changed its name to Shumba Medical Society. It has since expanded into helping other institutions outside of Zimbabwe. **Methods:** We encouraged medical personnel to volunteer for 3 weeks or more at our partner institutions, with whom we have a specific agreement. With multiple visits of 1 or more personnel at a time appropriate to the situation and transported materials, we aim to become a part of and advance the work of the local hospital. **Results:** Partnerships were established at 3 health institutions: 1 each in Zimbabwe (Mt. Selinda Hospital, 2012), Zambia (Zambian Italian Orthopaedic Hospital, 2013) and Malawi (St. Anne's Hospital, Nkhotakota, 2015). With each hospital, there is a 4-year term agreement, with respect to placing volunters and supplying medical materials for the clinical work. I have visited all 3 sites and done some volunteer work at the hospitals in Zimbabwe and Malawi. This year, we hope to send at least 1 orthopedic surgeon to Lusaka and doctors and nurses to the other 2 sites. **Conclusion:** Shumba is attempting to augment a few hospitals in southern Africa in order to improve the standard of care with respect to clinical help and medical materials. Subjectively, we have already improved the care somewhat at Mt. Selinda Hospital and at least met certain material needs at St. Anne's Hospital. Hopefully, this will translate into improved care for the institutions after the 4-year terms are completed.

