Implementation of an Emergency Response Protocol for Overseas Surgical Outreach Initiatives

Foot

Raj M. Vyas, M.D.
Kyle R. Eberlin, M.D.
Usama S. Hamdan, M.D.

Boston, Mass.

Background: Many health organizations sponsor overseas surgical outreach initiatives, yet none has published a standardized protocol to prevent and manage unforeseen emergencies. Surgeons, anesthesiologists, nurses, and administrators—working together on a brief overseas humanitarian initiative—benefit from education and training to maximize their collective emergency responsiveness. This article outlines the emergency response protocol instituted by the Global Smile Foundation, a 501(c)(3) nonprofit global outreach organization providing comprehensive cleft care for the past 25 years.
Methods: The Global Smile Foundation emergency response protocol was constructed to provide all team members resources and training needed to emulate the high emergency response standards of developed nations. In this article, the authors share their education/training strategy, emergency "crash" cart inventory, site-specific safety checklist, and team member roles and responsibilities during various emergencies.
Results: The authors' protocol emphasizes equipment portability, location-specific adaptability, clear workflow/communication, and standardized team roles. On-site training is likewise portable, standardized, reproducible, efficient, and adaptive to each setting. These characteristics make the authors' protocol widely adoptable.
Conclusions: Most morbidity and mortality during overseas surgical outreach initiatives result from unfamiliarity with the host hospital and other team members during operative (e.g., airway, bleeding, circulatory, anesthetic) or location-based (e.g., power outage, fire, oxygen shortage) emergencies. These complications are prevented and managed with aggressive team education and training. The Global Smile Foundation protocol adapts to the uncertainties of providing medical care in underresourced settings and reflects experience accumulated over the past quarter century. It is the authors' hope that other humanitarian outreach groups will adopt, customize, and build on these basic tenets. (*Plast. Reconstr. Surg.* 131: 1, 2013.)

An expanding number of global health organizations now sponsor overseas surgical outreach initiatives. Despite their overall humanitarian success, several experienced volunteer organizations have become concerned about the quality and safety of the care provided. Few data have been reported on the frequency of emergency scenarios, near-miss events, or adverse outcomes encountered by this multitude of providers. In 1999, Operation Smile reported 18 deaths while treating 50,000 patients (0.04 percent mortality).[1] In 2002, the International Task Force collectively evaluated 10 large overseas cleft surgery organizations that had treated 3500 total patients and reported that seven groups experienced notable morbidities (unspecified), whereas two reported a combined four mortalities (0.11 percent mortality).[2] It was in response to these concerns that quality control protocols have re-

Disclosure: *None of the authors has a financial interest in any of the products, devices, or services referenced in this article. None of the authors have a conflict of interest with the aforementioned products, devices, or services or with any of the recommendations made in this article.*

cently been adopted by several leading global health outreach organizations.[3] In fact, large organizations such as the American Society of Plastic Surgeons and the Plastic Surgery Foundation, and many anesthesia groups, have recently put forth protocols aimed at ensuring the delivery of safe, sustainable, high-quality care.[4,5]

Although the focus on quality control measures is just now gaining traction, to our knowledge, no overseas surgical outreach organization has established or published a standardized emergency response protocol to help prevent and manage unforeseen emergency scenarios. This article outlines the emergency response protocol instituted by the Global Smile Foundation, a 501(c)(3) nonprofit global outreach organization composed of multispecialty medical volunteers providing comprehensive cleft care overseas for the past 25 years. In this article, we analyze multiple facets that must be considered to avoid adverse situations, manage emergent scenarios, and ensure patient and team safety.

EMERGENCY RESPONSE PROTOCOL

In most developed countries, credentialed hospitals have instituted established protocols to ensure that physicians, nurses, and hospital staff are prepared to optimally manage patient and hospital emergencies.[6,7] Designated emergency response teams are composed of several members with clearly defined roles and necessary built-in redundancy.[8] Familiarity and facility with such emergency response protocols are considered a prerequisite for all hospital staff, and mandatory training modules are often instituted to ensure compliance for all credentialed personnel. The goal of the Global Smile Foundation emergency response protocol is to ensure that all members of our overseas surgical outreach initiative have the requisite resources and training needed to emulate the high emergency responsiveness mandated by developed nations.

The challenge is clear: to effectively educate and train a group of surgeons, anesthesiologists, nurses, and administrators—coming together for only a brief overseas humanitarian initiative—to optimize their collective emergency responsiveness. Furthermore, this education and training must be portable, standardized, reproducible, efficient, and adaptive to each unique setting. Most morbidity and mortality on overseas surgical outreach initiatives result from unfamiliarity with both the host hospital setting and other team members during an operative (e.g., airway, bleeding, circulatory, anesthetic) or location/resource-

based (e.g., power outage, fire, oxygen shortage) emergency. Clearly, the need to formally train health care personnel to coordinate and manage emergency scenarios is nowhere more important than on an overseas surgical outreach initiative. Team members are unfamiliar with the layout of operating rooms, recovery rooms, and intensive care units. Furthermore, the location and availability of blood banks, fire extinguishers, and backup power generators can be variable. Valuable medications and operating room resources are often sparse, and language and cultural barriers can impede a coordinated emergency response amidst even highly talented host and visiting medical/nursing personnel. In this article, we outline the main features of our emergency response protocol to demonstrate the fundamental components necessary to ensure optimal patient safety during overseas surgical outreach initiatives.

Equipment Portability

Depending on the locale, surgical outreach teams typically travel with a large amount of equipment. Therefore, a practical emergency response kit must be organized logically with maximal ergonomic attention that minimizes confusion and baggage. We now travel with a comprehensive Global Smile Foundation emergency "crash" cart (Fig. 1, *left*). This is a single, clearly marked piece of heavy-duty, trauma-resistant luggage with wheels allowing a compact, portable means of handling emergency situation in various locations (postanesthesia care unit, operating room, or hospital floor). The bag is unlocked on arrival to the host nation and then left unlocked for the duration of the trip. The cart's contents are clearly enumerated on the inside cover (Table 1) and include all instruments and equipment needed to (1) establish and protect an emergent airway, (2) resuscitate a patient according to Pediatric Advanced Life Support protocols (including Pediatric Advanced Life Support medications and laminated Pediatric Advanced Life Support algorithms), and (3) counteract adverse anesthetic complications (i.e., malignant hyperthermia with dantrolene and local anesthetic toxicity with intralipid). Before departure, all crash cart contents are inspected for adequate supply and expiration status and restocked as necessary. In the emergency crash cart, we pack a Global Smile Foundation emergency crash cart shoe holder that organizes critical emergency equipment (Fig. 1, *right*). A large laminated spreadsheet lists the equipment stored within the

F1

T1

Fig. 1. (*Left*) Global Smile Foundation emergency crash cart and contents. (*Right*) Global Smile Foundation emergency crash cart shoe holder and contents.

Table 1. List of Global Smile Foundation Emergency Crash Cart Contents

Ambu Bags (×3)
PALS shoe holder
PALS med box (×2)
AED
IV tubing 2
IV fluids (on site)
Intralipid
Tracheostomy tubes: sizes 3-0, 4-0, 5-0
Tracheostomy instruments
MH box
Pulse oximeter
Suction, Surgicel, flashlight
Broselow and other charts

PALS, Pediatric Advanced Life Support; AED, automated external defibrillator; IV, intravenous; MH, xxx.

AQ: 1

shoe holder and is structured to be spatially congruent with all equipment within the shoe holder. (**See Table, Supplemental Digital Content 1,** which shows Global Smile Foundation emergency crash cart shoe holder contents, ***http://links.lww.com/PRS/A696***. The structure of the spreadsheet visually imitates the structure of the Global Smile Foundation emergency crash cart shoe holder to allow for quick identification of needed supplies. This spreadsheet is printed and laminated for easy dry/erase marking and therefore allows for quick replenishment of any used supplies.) Any equipment used is recorded on this spreadsheet at the end of an emergency situation, facilitating replenishment. All members of the team are formally introduced to the Global Smile Foundation emergency crash cart after unpacking team equipment and after becoming familiar with the layout of the hospital/operating suite (morning of the first full day) but before patient selection (morning of the second full day) (Fig. 2). Subsequently, the emergency crash cart is kept clearly visible in the postanesthesia care unit during the entire operative day before being transferred to the possession of the on-call anesthesiologist each evening.

F2

Location-Specific Adaptability

An effective emergency response protocol must be adaptive to each hospital setting's unique structural and resource limitations. We now use a multiphase approach to maximize the flexibility of the team's emergency responsiveness. One month before departure, a slideshow presentation is sent to all team members, providing a virtual location-specific hospital tour. The focus of this presentation is to familiarize the team with the layout of operating rooms, postanesthesia care units, intensive care units, and hospital floors, and the location of backup power generators, blood banks, oxygen supplies, and fire extinguishers. An accompanying checklist for site-specific emergency preparedness is also distributed to all team mem-

Fig. 2. Team introduction to the Global Smile Foundation emergency crash cart (Guayaquil, Ecuador).

bers. (**See Appendix, Supplemental Digital Content 2,** which shows a checklist for site-specific emergency preparedness, *http://links.lww.com/PRS/A697.*) These materials are reviewed during a routine mandatory videoconference held with all team members 2 weeks before departure. On arrival to the host hospital, all team members participate in an on-site walk-through of the hospital facilities featured before and the team leader manages the completion of the checklist for site-specific emergency preparedness. This ensures location-specific familiarity and coordination among all team members in the case of an emergency.

Workflow and Communication

To guarantee maximal emergency preparedness, a safe, reliable, and clear infrastructure that guides daily workflow and team communication must be established and maintained daily. Establishing an on-call schedule is important to ensure sufficient and accountable staff is present to properly initiate and complete the emergency response protocols. This also reassures local medical personnel of the team's complete availability. Call schedules should include multiple specialists so that each night the following persons are available: administrator (who can contact local administrators and additional team members as needed), surgeon, anesthesiologist, pediatrician, postanesthesia care unit nurse, and operating room nurse. Once the call team is established, the mode of communication should be clarified. Depending on how remote the location is, pagers, personal phones, rented phones, or walkie-talkies are made available to each on-call member. A call tree is designed so that all on-call personnel are efficiently notified of any emergency situation. Each evening, the on-call team confirms that the mode of communication among themselves and those providing overnight patient care is functioning properly. If the location of the lodging for the team is at a distance from the site of patient care, there must also be a plan for transportation to and from the hospital after working hours. If team members are not fluent in the local language, it is imperative to always have a translator available to assist with routine and emergent scenarios. This is especially important when active issues arise at night and local nurses must speak with on-call doctors and nurses. Each workday should begin with a daily briefing by the team leader to the entire team. The daily workflow is discussed, any concerns are addressed, and all team questions are answered. A subset of surgeons, anesthesiologists, pediatricians, and nurses participate in daily morning ward round to identify any active patient concerns and facilitate proper postoperative care. All overnight cellular phones, pagers, and walkie-talkies are recharged. At the end of each working day, daily evening ward rounds are performed and one operating room is set up to prevent any delay if a patient requires an emergent overnight return to the operating room. Taking these additional safety steps not only reduces the risk of adverse outcomes and maximizes emergency preparedness, it also builds trust and confidence among host medical personnel and confirms the team's collective dedication to safe and excellent patient care.

Standardization of Team Roles

Each overseas surgical outreach initiative is composed of a unique combination of physicians, nurses, and administrators. Therefore, any sus-

4

rich3/zpr-prs/zpr-prs/zpr00413/zpr6576-13z | xppws | S=1 | 2/26/13 | 5:30 | 4/Color Figure(s): F1-3 | Art: PRS205280 | Input-nlm

Volume 131, Number 4 • Overseas Emergency Response Protocol

tainable emergency response protocol must rely on standardized roles and easily reproducible training techniques. Regardless of how talented the team is, it is crucial to clearly delineate each team member's role in any emergency. We offer our Global Smile Foundation emergency response protocol team roles and responsibilities as a starting point for each team to adopt and/or modify as needed. (**See Appendix, Supplemental Digital Content 3,** which shows the Global Smile Foundation emergency response protocol team roles and responsibilities, *http://links.lww.com/PRS/A698.*) These roles are distributed 1 month in advance of the outreach initiative and discussed at length during the mandatory videoconference 2 weeks before departure. On arrival to the host country, mock simulations are held after all supplies are unpacked and before patient selection begins (usually the evening of the first full day). Simulations are performed for each of the following emergency situations: power outage; fire; oxygen failure; need for emergent transfusion; and all medical/surgical adverse events in the operating room, postanesthesia care unit, and floor (airway, respiratory, cardiac, and anesthetic-related). Successful emergency responsiveness relies on all team members participating in the mock simulations and executing their standardized roles in a reproducible manner. With prior review by all team members, completion of the mock simulations usually requires only a few hours. The team leader, ideally the person most familiar with the emergency response protocol, is able to observe the simulations to identify and resolve any potential issues that might obstruct delivery of efficient and rapid care. The Global Smile Foundation emergency response protocol team roles and responsibilities is not only distributed to all team members but is also clearly posted within each operating room, postanesthesia care unit, and patient floor. In addition, standardized protocols for managing malignant hyperthermia and local anesthetic toxicity, including step-by-step administration/dosing guidelines, are posted in each operating room for facile review if needed (Fig. 3).

DISCUSSION

Little has been reported on the exact frequency of adverse events, near-misses, and emergencies encountered during overseas surgical outreach initiatives. Still, it is clear that no humanitarian team operating in an unfamiliar setting and with limited resources is immune from these scenarios. Most morbidity and mortality on surgical outreach initiatives result from emergen-
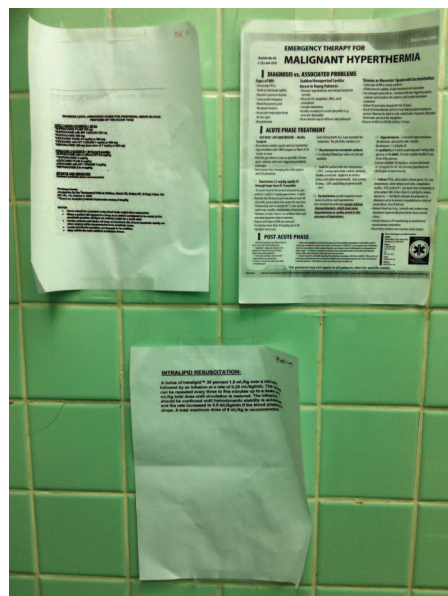
Fig. 3. Protocols for management of malignant hyperthermia and local anesthetic toxicity are posted in each operating room (Guayaquil, Ecuador). All needed equipment is found in the Global Smile Foundation emergency crash cart.

cies involving loss of airway, bleeding, anesthetic toxicity, and unfamiliar settings/resources. Despite seemingly formidable odds, these complications are largely preventable and can be overcome with aggressive team education and training protocols. Optimal emergency preparedness requires more than just talented personnel and good intentions; it demands proper equipment, individual responsibility, group preparation, team coordination, and a collective dedication to patient safety.

In this article, we have outlined the first comprehensive emergency response strategy aimed at efficiently and practically achieving the proper dynamic needed to attain the same high level of patient care now standard in developed nations. Regardless of the exact details, an effective emergency response protocol must be portable, adaptive, efficient, standardized, and reproducible. Our protocol has been structured to function with the limitations and uncertainties inherent in providing medical care in resource-limited settings and reflects a wealth of experience accumulated over the past 25 years. It is our hope that other groups participating in overseas surgical outreach initiatives will use the basic tenets and principles of our safety checklists and protocols (provided here as available supplements) and customize them to fit the unique dynamic of their teams and host locations.

rich3/zpr-prs/zpr-prs/zpr00413/zpr6576-13z | xppws | S=1 | 2/26/13 | 5:30 | 4/Color Figure(s): F1-3 | Art: PRS205280 | Input-nlm

Plastic and Reconstructive Surgery • April 2013

The Global Smile Foundation has brought together a host of specialists to provide comprehensive cleft care for the past 25 years. The organization's annual service to the same locales has allowed for long-term patient follow-up by the same team members and has created an opportunity to provide ongoing intraoperative and out-of-hospital teaching to local providers, thereby mimicking continuity-of-care standards set forth by craniofacial teams in the United States. This dedication has built trust and fostered confidence among local physicians, sponsoring hospital staff, and crucial government agencies. In fact, by leveraging these trusted local relationships, the Global Smile Foundation recently succeeded in establishing the first comprehensive cleft center in Latin America. For all of these reasons, we believe that the natural next step in ensuring the highest possible delivery of overseas surgical care is the wide adoption of an emergency response protocol. With pretrip coordination and preparation, on-site emergency preparedness training is not overly cumbersome and can usually be achieved in 2 to 3 hours if there is full team commitment. Certainly, this protocol continues to be modified and will require more experience to refine and validate. Still, we believe that implementing such an initiative has intangible positive externalities that go far beyond the primary goal of improving patient outcomes. The dedication to patient care inherent in optimal emergency preparedness delivers a strong message of compassion to host nations that builds trust and provides additional credibility to surgical outreach teams. As an increasing number of humanitarian groups reach out to additional underresourced regions, these measures create a new paradigm that strengthens new partnerships and bolsters existing international relationships.

Raj M. Vyas, M.D.
165 Pleasant Street, Suite 114
Cambridge, Mass. 02139
rvyas@partners.org

REFERENCES

1. Magee B. Operation Smile. In: Mars M, Habel A, Sell D, eds. *Management of Cleft Lip and Palate in the Developing World.* 1st ed. West Sussex, England: Wiley; 2008:59–69.
2. Yeow VK, Lee ST, Lambrecht TJ, et al. International Task Force on Volunteer Cleft Missions. *J Craniofac Surg.* 2002;13: 18–25.
3. Eberlin KR, Zaleski KL, Snyder HD, Hamdan US; Medical Missions for Children. Quality assurance guidelines for surgical outreach programs: A 20-year experience. *Cleft Palate Craniofac J.* 2008;45:246–255.
4. Schneider WJ, Politis GD, Gosain AK, et al. Volunteers in plastic surgery guidelines for providing surgical care for children in the less developed world. *Plast Reconstr Surg.* 2011; 127:2477–2486.
5. Politis GD, Schneider WJ, Van Beek AL, et al. Guidelines for pediatric perioperative care during short term plastic reconstructive surgical projects in less developed nations. *Anesth Analg.* 2011;112:183–190.
6. Ziv A, Wolpe PR, Small SD, Glick S. Simulation-based medical education: An ethical imperative. *Acad Med.* 2003;78:783–788.
7. Spunt D, Foster D, Adams K. Mock code: A clinical simulation module. *Nurse Educ.* 2004;29:192–194.
8. LeRoy Heinrichs W, Youngblood P, Harter PM, Dev P. Simulation for team training and assessment: Case studies of online training with virtual worlds. *World J Surg.* 2008;32:161–170.

AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES   1

AQ1: AUTHOR—Footnote to Table 1: Please spell out MH