THE ORTHOPAEDIC FORUM

One World Surgery

The Evolution of a Locally Run Surgical Mission in Honduras

Kelsey Overman, MD, Peter Nicholson, BS, Carl Nunziato, MD, Merlin Antunez, MD, Peter Daly, MD, and Michael Forseth, MD

Abstract: One World Surgery (OWS) is a medical mission organization that treats a variety of orthopaedic conditions and focuses on local partnerships, education, capacity-building, and high-quality care. OWS runs a Honduran ambulatory surgery center (ASC) with >50 full-time local staff; it operates year-round and accommodates visiting surgical teams bimonthly. Across its 12-year history, 8,703 surgical procedures have been performed and 54,940 total consults have been completed, with increasing autonomy of the local medical staff. From 2009 through 2021, OWS has provided 74 million U.S. dollars in surgical and consult patient care. By addressing global surgical disparities via life-enhancing surgical care in low- and middle-income country (LMIC) settings, the OWS ASC mission model may be a useful blueprint for other medical missions.

Five billion people lack access to comprehensive surgical care; the poorest third of the world receives <5% of the surgical procedures that are performed globally[1,2]. Much of this burden is a result of the fragmented health-delivery landscape of the private sector, the public sector, and nongovernmental organizations (NGOs). The crisis is also secondary to the exponential increase in traumatic injuries[3,4]. This trauma burden on the medical system secondarily displaces treatment and resources for nonemergency yet disabling surgically treatable conditions.

One response has been an increased interest in surgical outreach. Efforts include disaster relief, short-term volunteer missions, and local provider education. Annually, nearly 6,000 overseas trips sponsored by the United States yield 200,000 completed surgeries[5]. Yet, the ultimate solution to the global burden of surgical diseases involves the development of a strong local surgical workforce. Until then, there will be an ongoing need for volunteers from high-income countries (HICs) to help with medical operations, foundational support, and surgical education[6-8].

As described by Dr. Agnes Binagwaho, a fully integrated global surgical program includes long-term dedication by an external participant, a stable partnership with an in-country community entity, and both educational and economic commitments to keep medical talent in the country[9]. One World Surgery (OWS) is a global surgical program that is striving toward such integration. It is a medical mission NGO that is focused on local partnerships, education, capacity-building, and high-quality care in Honduras and the Dominican Republic. The OWS model differs from those of many global surgical missions. It applies HIC ambulatory surgery center (ASC) innovations to the low- and middle-income country (LMIC) setting. Using its own independently constructed and operated facility, it is operational year-round in Honduras and staffed full-time by local Honduran physicians. Volunteer medical teams from the U.S. consisting of surgeons, nurses, and anesthesia staff visit intermittently and augment care by providing subspecialty consultation, education, and

Disclosure: The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (http://links.lww.com/JBJS/H699).

additional staffing. A variety of surgical conditions are treated in a triaged manner.

The purpose of this paper is to outline the genesis, expansion, and impact of the OWS. By reflecting on our experiences and growth, we hope to provide an in-country-operated mission model, with increasing local health-care incorporation, that can be reproduced in other areas of need by groups from HICs.

OWS History

Access to surgical care in Honduras is a challenge. While public-sector orthopaedic care is available, it requires self-payment for most surgical supplies and implants, which is financially impossible for most patients. Lack of operating room (OR) availability for nonemergency disabling conditions adds to the barrier. Eighteen percent of Honduran citizens receive no health care; 90% are uninsured. There are 10 physicians and 3.8 nurses per 10,000 people in Honduras, compared with 26 physicians and 111 nurses per 10,000 people in the U.S.[10,11]. In 2019, per capita expenditure on health care was $188 in Honduras and $11,500 in the U.S.[12,13].

To help address this surgical access disparity, OWS began as a partnership between the senior author (P.D.) and Nuestros Pequeños Hermanos (NPH), a children's home in Honduras that raises and educates orphaned and at-risk children. In 2003, NPH had a small community outreach clinic. Additionally, a semi-truck trailer infrequently served as a single outpatient OR. The senior author worked with NPH leadership to construct an ASC located on the NPH campus that opened in 2008. Provided services were on a charitable basis with a hybrid staffing model that combined visiting medical volunteers and permanent local medical staff.

Initially, surgical teams from the U.S. would visit 2 to 4 times annually, performing principally orthopaedic procedures. The global surgical capacity-building efforts until 2014 have previously been reported[14].

In 2014, OWS hired its first full-time orthopaedic surgeon (M.A.). By 2015, OWS finalized a partnership with Surgical Care Affiliates (SCA), a U.S.-based corporation that operates numerous ASCs in the U.S. This collaboration dramatically increased patient access and streamlined logistics, expanding the impact on Hondurans.

The Current OWS Honduran Mission Model

Today, OWS Honduras has 3 ORs and 6 overnight bays. Services include primary care, a dental clinic, and an eye clinic. There are >50 full-time local staff, including 1 orthopaedic surgeon, 1 ophthalmologist, 5 general staff physicians, and nurses, as well as administrative, maintenance, dental, and hospitality personnel. OWS is primarily an outpatient surgical facility but has overnight capability to address complex cases, akin to the 23-hour observation status of U.S. ASCs. An illustrative ASC case example is total knee arthroplasty (TKA). The facility uses a U.S.-developed rapid recovery protocol, which previously has been reported by the senior author[15]. TKA postoperative rehabilitation is initiated with physical therapy (PT) but is largely home-exercise-driven.

OWS accommodates a U.S.-based visiting mission team in Honduras bimonthly. The Honduran medical team performs consults and operates independently between missions; the team then works alongside the visiting team during missions, allowing bidirectional learning. Regular pre- and post-trip communication occurs between the local and visiting teams to help anticipate pathology, which allows the coordination of proper mission specialty and subspecialty staffing. Mission frequency and volunteer numbers increased substantially

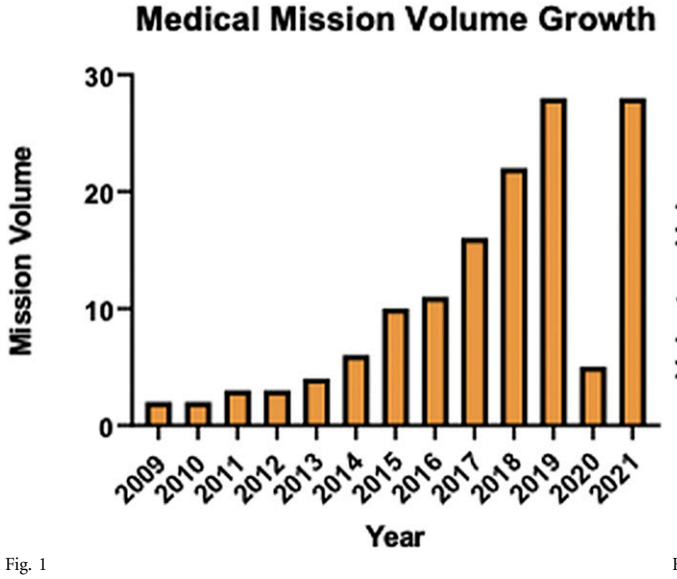

Fig. 1

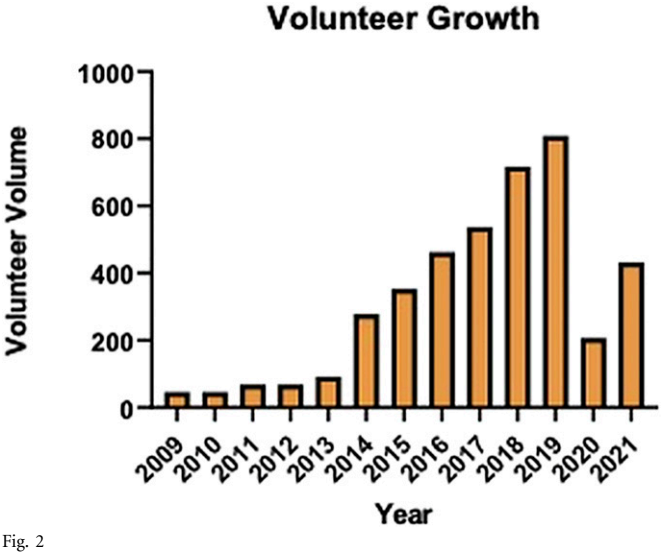

Fig. 2

Fig. 1 The medical mission volume has grown consistently over a period of 12 years since the creation of the facility. The significant drop in volume during 2020 was due to the COVID-19 global pandemic. **Fig. 2** The number of volunteers has increased substantially over a period of 12 years. 2020 marks the only year without a period of growth, secondary to the COVID-19 global pandemic.

TABLE I Average Trip Composition by Role

Role	Percentage of Volunteers
Surgeons	11%
Anesthesiologists	6%
Physicians	4%
Certified Registered Nurse Anesthetists	8%
Nurses	28%
Clinical and surgical staff	12%
Students and residents	5%
Nonclinical volunteers	25%

from 2009 to 2021 (Fig. 1 and Fig. 2). In each mission (typically 7 days), approximately 150 patients are evaluated in clinic and 40 surgeries are performed.

The overall governance structure of OWS has evolved as its mission has expanded. OWS is structured as a certified 501(c)(3) nonprofit organization; it is based in Deerfield, Illinois. Following best practice standards, OWS has a fully constituted board of directors (unpaid volunteers) that provides strategic direction and appoints the paid chief executive officer (CEO). The CEO reports to the Board and makes decisions and/or seeks approvals in accordance with organizational policies and bylaws. The CEO oversees the organization's departments, which include development, communications, programs, operations, and finance. While the OWS facility in Honduras is autonomous in day-to-day decisions, it is bound to the overarching strategy, policies, and financial management procedures of OWS. The surgical facility is licensed through the Honduran Ministry of Health, and subject to its regulatory oversight operationally; the Ministry also had a say in the original design of the facility. The medical director is a local Honduran orthopaedic surgeon. Visiting surgeon credentials are verified, including board certification, active surgical privileges, and active state medical licenses. Visitor credentials are shared with the Honduran Medical Society.

OWS Mission Model Performance

Following its establishment in 2008, OWS has demonstrated robust, effective, and manageable growth. It hosted 165 medical missions from 2009 through 2021. The number of medical missions has grown steadily over the years. In its first year of operation, there were 2 missions; in 2022, there were 28 missions. Most volunteers are clinical practitioners, although a smaller proportion includes friends, family, and students (Table I). Over 12 years, 4,241 volunteers participated. Approximately 37% of the volunteers returned for a second experience or participated regularly (1 to 2 times/year). The volunteer medical staff receive no compensation for their time or work. OWS started as an orthopaedic-focused facility, covering a wide spectrum of orthopaedic subspecialties (Table II). Services have expanded over the years and now include numerous surgical and nonsurgical specialties (Table III).

Patients referred to the center are seen and treated free of charge. They are triaged by surgeons and social workers based on surgical urgency and socioeconomic need. Patient coordinators fill the available OR slots accordingly. Regular follow-up care (including imaging studies) is provided according to typical standard-of-care guidelines by a combination of the local Honduran medical staff (including the full-time Honduran orthopaedic surgeon) and the visiting medical teams. OWS has performed a total of 8,703 surgical procedures: 7,107 (81.7%) have been performed by the visiting surgeons, and 1,596 (18.3%) have been performed by the Honduran surgical staff (Fig. 3). The number of orthopaedic procedures performed by the Honduran staff has mostly continued to increase substantially year after year (Fig. 3). The local Honduran surgical team has experienced a yearly growth of 85% in case load since initiating independent surgeries in 2013. The variety of surgical cases is shown in Table IV.

OWS has evaluated 54,940 total patient consults (Table V), 22,835 (41.6%) by visiting physicians and 32,105 (58.4%) by the Honduran team. On average, annual total patient consults by OWS have increased significantly, and the number of patients evaluated independently by the local Honduran team has increased at an even more rapid rate as demonstrated in Table V.

OWS Mission Model Financial Infrastructure and Impact

The cost-effectiveness and economic impact of the OWS ASC in the LMIC setting have been previously reported[16]. The economic benefit in 2017 was $17.9 million using the human capital approach and $328.4 million using the VSL (value of a statistical life) approach. These findings suggest that a multispecialty charitable surgical center in an LMIC setting can achieve similar outcomes, in addition to cost-effectiveness, when compared with HIC ASCs.

The cost of surgical care was estimated by applying an approximate Current Procedural Terminology (CPT) code to each surgical procedure performed at OWS since its inception. To reflect the cost by U.S. standards, each CPT code was correlated with a reimbursement estimate based on the current Physician Fee Schedule for Medicare and Medicaid[17]. The assigned procedure costs were summed for each year. An inflation rate of 4% was applied for each year prior to 2019 to reflect

TABLE II Orthopaedic Subspecialties That Provide Care at OWS

Foot and ankle
Hand and upper extremity
Total joint replacement/reconstruction
Pediatric orthopaedics
Orthopaedic spine
Sports medicine
Shoulder
Orthopaedic trauma

TABLE III Surgical and Nonsurgical Specialties That Provide Care at OWS

Orthopaedic surgery
General surgery
Ear, nose, and throat
Obstetrics/gynecology
Urology
Ophthalmology
Anesthesiology
Dental care
Primary care

value growth over the last decade. Utilizing this methodology, the total value of surgical care provided from 2009 through 2021 was $69,681,482. A similar methodology was applied to patient consults. Patient visits were categorized as "new patient" or "patient follow-up." A relevant CPT code affiliated with a cost estimate was applied to estimate the approximate value of care. The total value of consult care that OWS provided from 2009 through 2021 was estimated to be $4,002,460.

The estimated value of donated medical professional time was approximated by grouping medical mission volunteers into professional categories. The mean income for each profession, obtained from the U.S. Bureau of Labor Statistics, was multiplied by the number of participants in that respective category and the number of days spent on each medical mission[18]. These values were then summed by year. The total value of medical personnel provided by OWS from 2015 to 2021 was approximately $3,158,400.

Medical supply and technology donors are asked to submit the approximate value of donated medical supplies, equipment, and instrumentation to OWS. This value is then cross-referenced with existing SCA evaluation assessments, and a donation value report is produced according to 501(c)(3) guidelines. Donations include surgical supplies and instrumentation, along with clinical equipment. OWS began tracking medical supply donations in 2013. The total donated value of medical supplies for OWS from 2013 through 2021 was $6,053,357.46.

To maintain its model, OWS invested $14,508,213 through 2021. Of that, 85.5% was utilized directly for expenses related to program costs to operate and manage the ASC and medical missions. This included the salaries of the local Honduran team, hospitality costs, medical supplies, pharmaceutical supplies, and operational expenses for the ASC. The remainder was spent on the U.S.-based staff programs, including U.S. staff salaries, development, marketing, and fundraising costs. Table VI details the 2023 OWS budget. To fund these expenses, OWS received $17,771,899 in donations across 12 years. Donations are received from individual contributors, marketing and fundraising events, and corporate sponsors (Table VII).

To summarize, since its founding in 2008 OWS has been able to provide surgical and patient consult care at an estimated value of $74 million. This care has been funded by a direct financial investment of >$14 million across 12 years and has been supported by $27 million of cumulative monetary donations, equipment, and time. The estimated value of care provided represents slightly more than the amount invested, demonstrating a successful and cost-effective institution that delivers high-value care.

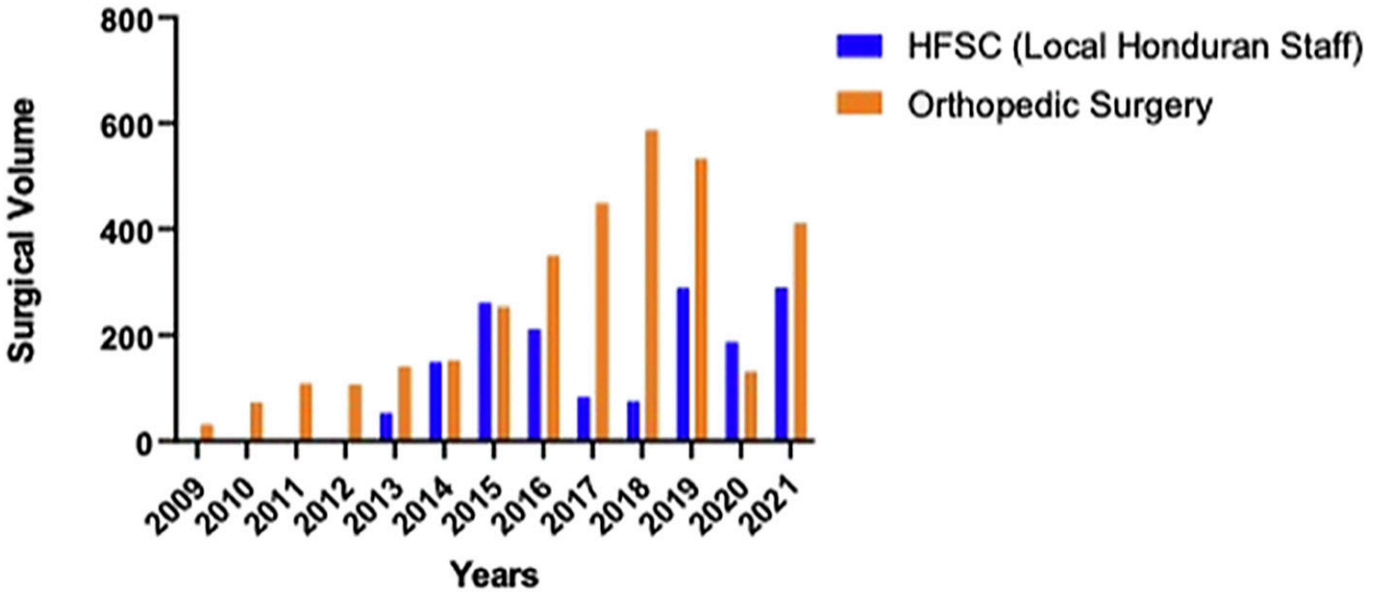

Fig. 3

The volume of surgical cases performed at the OWS facility has grown significantly over a period of 12 years. The volume of surgical cases performed by local staff also has grown consistently since 2018. This indicates an expansion of OWS's capability as an autonomous ambulatory surgery center that can operate outside of medical missions. HFSC = Holy Family Surgery Center.

TABLE IV Most Commonly Performed Orthopaedic Procedures at OWS*

Procedure	Percentage of Total Orthopaedic Procedures (No.)
Surgical debridement and hardware removal	16% (532)
ORIF of the femur	15% (497)
Anterior cruciate ligament reconstruction	15% (499)
Knee arthroscopy	13% (432)
Total knee arthroplasty	10% (332)
ORIF of the humerus	9% (299)
ORIF of the tibia/ankle	7% (235)
ORIF of the distal radius/ulna	7% (231)
Total hip arthroplasty	4% (134)
Rotator cuff repair	4% (132)

*ORIF = open reduction and internal fixation.

Patient Outcome Data Tracking

OWS recognizes the need for routine and standardized follow-up. Patients are seen at routine intervals for follow-up care, consistent with standard of care. These visits include pertinent imaging, laboratory tests, physical therapy, and other required services. Since 2017, trained Spanish-speaking volunteers have attempted to contact all surgical patients at 30 days postoperatively to administer an 8-question telephone survey. The survey screens for complications, such as emergency room or physician visits, readmission, revision surgery, infection, blood transfusion, and other complications. Of the 2,933 surgical cases performed since this survey was initiated, we were able to contact 2,004 patients. In this subset, patient-reported complications outside the surgery center were low, with only 35 (1.7%) of the 2,004 patients reporting an emergency department visit. Twenty-six patients (1.3%) reported that a post-surgical infection had been diagnosed, and 7 patients (0.3%) reported requiring a postoperative transfusion. Recently, OWS has implemented patient satisfaction questionnaires as well as validated condition-specific patient-reported outcome measures to improve postoperative patient tracking.

Growth and Future Directions

Resources and Supply Chain

The sustainability of the OWS model is predicated on a supervised supply chain. The majority of OWS resource costs are spent purchasing medications and medical/surgical supplies, while surgical instrumentation, equipment, and implant needs are primarily met through donations. Although locally sourced supplies may enhance independence, global supply competition yields improved materials and savings for nonprofit organizations. A formulary and inventory of medications are maintained, with oversight by a local Honduran pharmacist. Regular orders, monitored by local OWS personnel, are placed through partner organizations in the U.S. Surgical instrumentation is nearly completely donated by charitable partners (Table VIII). The total value of medical devices donated in 2021 was $1,922,224. The cost of purchasing and importing medical supplies and medications in 2021 was $595,378. To mitigate import costs and expand the local supply chain of the Honduran center, OWS has worked to increase the purchase of in-country medications to nearly 10%. Future efforts will be focused on modifying the supply chain by establishing more local avenues and seeking cheaper methods of importation.

Educational Programming

While direct patient care provides valuable impact, education further magnifies this impact well beyond the mission site. "Capacity-building" involves the training and educating of local providers to enhance their independence, improve patient care, and propagate medical knowledge. In recent years, educational programming has been a major and expanding focus

TABLE V Total Patient Consults from 2009 to 2021

Specialty of Provider	Year													Total No. of Patients
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Honduran providers														
All						948	4,386	4,083	3,153	4,443	7,137	2,316	5,639	32,105
Visiting providers														
Orthopaedic	650	420	700	640	870	330	733	575	1,365	2,774	985	381	407	10,830
General			150	340	577	315	525	342	589		308	68	231	3,445
Gynecology				80		90	95	141	294		96	60	159	1,015
Urology		75	90	80				114	149		35	0	57	600
Ear, nose, and throat			280	250	350	240	170	468	165		128	0	39	2,090
Ophthalmology					80	56	103	202	140		143	170	3,032	3,926
Dental									90		0	213	626	929
Total no. of patients	650	495	1,220	1,390	1,877	1,979	6,012	5,925	5,954	7,217	8,832	3,208	10,190	54,940

TABLE VI 2023 OWS Expense Budget

Expense Type	% of Expenses	Total Expenses
Labor and benefits	40%	$960,541
Medical supplies and pharmacy	18%	$427,520
Medical mission costs	11%	$266,137
Education costs	7%	$160,320
Minor equipment and repairs	6%	$132,520
Rent and utilities	5%	$113,080
Patient support	4%	$92,372
Shipping costs	3%	$61,852
Travel and transportation	3%	$60,689
Security	2%	$53,862
Information technology costs	1.5%	$38,586
Other expenses	0.5%	$23,014

TABLE VII 2022 OWS Fundraising Revenue Composition

Revenue Type	% of Revenue	Total Revenue
In-kind donations	61%	$11,250,000
Individual donations	26%	$4,827,000
Corporate donations	8%	$1,329,000
Mission participant fees	5%	$896,000

of OWS, with a cumulative Honduran audience of >1,500 individuals over the last 3 years (Table IX). Instructors include the visiting medical staff as well as their Honduran counterparts. Conferences focused on orthopaedic surgery, general surgery, surgical oncology, and anesthesia have been offered at the OWS meeting facilities in Honduras. Honduran youth are also participants of these educational initiatives, with the goal of early exposure to a variety of health professions to inspire local adolescents toward pursuing medical careers.

Medical Trainees

College students, medical students, residents, and trainees of other health professions have been traveling to Honduras with the volunteer teams since the inception of the facility. Recently, OWS and the University of Texas at Austin Dell Medical School Orthopaedic Surgery Residency program have partnered to establish a 6-week international elective rotation for fourth-year orthopaedic residents. The emphasis for U.S.-based medical trainees is to understand the needs of the community in which they are working as a guest.

OWS Fellowship

Another important development in the OWS educational initiative was the establishment of an orthopaedic fellowship for Honduran surgeons in 2022, the first of its kind in Honduras. It is a partnership among Summit Orthopedics (a private orthopaedic group in Minnesota), the University of Minnesota Department of Orthopedic Surgery, and OWS. Each year 2 Honduran fellows, having recently completed orthopaedic residency in Honduras, are selected to extend their training. The 1-year fellowship includes 6 months at the OWS facility in Honduras and 6 months in Minnesota. The Minnesota Board of Medical Practice allows a "physician-in-training" licensure in conjunction with the University of Minnesota Department of Orthopedic Surgery. This licensure allows the fellows to participate in hands-on patient care under direct faculty supervision by attending physicians. Important didactic and cadaver experience is provided through the

TABLE VIII OWS Supply Chain Donation Participants

- AccuMed
- Arthrex
- ConMed Linvatec
- DePuy Synthes
- Medline
- Ortho Development
- Smith & Nephew
- STERIS
- Stryker
- Summit Orthopedics
- Technical Life Care (biomedical)
- Zimmer Biomet

TABLE IX OWS Educational Programming Participants*

- HFSC staff
- Nurses
- Physicians
- Anesthesia
- Staff
- Technicians
- Students
- Community
- Local providers (medical and dental)
- NPH youth
- NPH family members
- Local youth
- Local community members
- Volunteers
- Brigade members
- Medical students
- University of Texas at Austin Dell Medical School
- Universidad Central del Este

*HFSC = Holy Family Surgery Center, NPH = Nuestros Pequeños Hermanos.

TABLE X OWS Challenges and Solutions*

Challenges	Solutions
International ASC & clinic licensing, permitting	• Construction plan incorporates regulatory requirements of in-country Ministry of Health for clinics and surgical facilities • ASC Governing Board of Physicians oversees clinic/ASC operations (i.e., business, financial, and clinical) • Medical Executive Committee oversees credentialing, peer review, and practice standards • Implement quality, infection prevention, and life safety programs to support high-quality, safe patient care • Obtain required facility licenses and permits to perform clinical and surgical care
Patient clinical access	• Choose an ASC site to allow for public transportation access; avoid bottleneck of overburdened urban public health centers • Choose an ASC site to maintain NGO governing control of facility • Perform medical outreach to remote areas
Appropriate clinical case mix	• Determine scope of clinical surgical services and ongoing treatment of findings and complications • Begin with focus on disabling yet essential (nonemergency) surgical conditions (i.e., no emergency room, no intensive care unit, the majority of trauma is subacute or chronic) • Acknowledge facility and staff limitations and stay within scope of practice and safety
Clinical follow-up/continuity of care	• Local medical staff employed by NGO • Oversight by combined U.S. and local Clinical Advisory Board • Follow-up facilitated by postoperative appointments and/or 30-day telephone interviews with documentation of complications
Maintaining HIC best-practice clinical standards	• Control the continuum of care to facilitate predictable quality and subsequent outcomes consistent with HIC standards by controlling facility development, sterilization standards, health resources, compliance and training standards, and Joint Commission certification standards • Develop routine policies and procedures according to the Centers for Medicare & Medicaid Services (CMS) regulations and standards • Visiting surgeon case mix tailored per mission and matched to his or her home delineation of privileges • Implement required annual training, competencies, and job descriptions for staff and providers • Electronic health record (EHR) implemented to assist data mining and promote a culture of continuous quality improvement (CQI) • Establish full-time OWS research coordinator and plentiful "gap-year" volunteers to assist data gathering • Coordinate appropriate follow-up
Relationship maintenance with in-country medical community	• Proactive transparency with information exchange and joint-venture educational initiatives with local medical providers (i.e., attend local provider conferences and meetings) • Provide only charity care to avoid competition with local medical community • Screen surgical patients with social worker consult to confirm that the impoverished demographic is served • Maintain program evaluation and performance metrics to validate credibility • Report outcomes
Increase impact via lasting educational initiatives	• Staff leaders adhere to and model best practice US standards for in-house education regarding patient safety • Visiting U.S. surgical experts share their surgical techniques for challenging and refractory LMIC pathology with Honduran surgeons, and vice versa, for continuous educational and technical improvement • Offer a joint venture with in-country medical educators • If there are excess regulatory or "control" obstacles for a joint venture, initiate NGO-led fellowship program with fully trained, licensed in-country orthopaedic surgeons training at the NGO facility • Affiliate with a U.S. academic program to facilitate fellows' academic certificate of completion • Explore U.S. state "physician-in-training" licensing to allow foreign-licensed orthopaedic surgeons to receive a temporary licensing permit that authorizes them to participate in clinical and surgical patient care under direct supervision of a U.S.-licensed orthopaedic surgeon at a U.S. site
Safety/security of facility/ volunteers/staff	• Obtain a security analysis by an outside U.S. firm expert in global health education programs, followed by implementation of recommendations

continued

TABLE X (*continued*)

Challenges	Solutions
Procuring quality ASC pharmaceuticals (narcotics/ anesthesia gases/routine ASC medications)	• Mentored via experienced ASC U.S.-based supply chain team (OWS) with purchasing of controlled substances in-country and non-controlled substances where least expensive • Hire in-country pharmacist oversight
Supply chain management	• Mentored via experienced ASC U.S.-based supply chain team (OWS) and assisted by in-country on-site inventory manager • International shipping and receiving facilitated by a community partner at local customs
Medical equipment procurement	• In-kind donations from aging U.S. facilities • Used medical equipment also purchased from third-party vendors • Maintain charity care status to qualify for corporate donations
Biomedical maintenance expertise	• Volunteer partnership with U.S. ASC biomedical technology professionals who provide technical advice and training
ASC equipment preventative maintenance	• Volunteer partnership with U.S. ASC technicians, in conjunction with training in-country facility management staff
Functional electrical supply	• Obtain back-up generator for brownouts and blackouts • Community partner can facilitate electrical grid availability (i.e., NPH)
Communication infrastructure	• Obtain IT hardware and acceptable Wi-Fi access (community partner)
Water quality/supply	• Facilitated with community partner (i.e., NPH)

*ASC = ambulatory surgery center, NGO = nongovernmental organization, HIC = high-income country, OWS = One World Surgery, LMIC = low- and middle-income country, NPH = Nuestros Pequeños Hermanos, and IT = information technology.

University of Minnesota Department of Orthopedic Surgery. Weekly conferences occur in person and also electronically to eliminate geographic barriers. The fellowship aims to broaden the fellows' exposure to specific areas of orthopaedic surgery, including upper-extremity surgery, arthroplasty, and sports medicine. Just as the fellows learn and gain experience, they also bring perspectives about orthopaedic surgery to the U.S. trainees and staff physicians.

Exit Strategy

The end goal of medical missions should be the creation of a self-regulating foundation in the host countries. The OWS Honduran staff have gained considerable independence over the last decade. This independence continues to grow through educational, operational, and financial support. The OWS Honduran Orthopedic Fellowship will continue to expand orthopaedic expertise in Honduras. Complete financial independence from external support, while providing free care to impoverished communities, is a laudable yet utopian goal.

Many LMIC (and HIC) governments struggle with political, regulatory, and economic stability that impedes their health-care financial independence. While that struggle continues, NGOs may provide a platform to which LMICs can bring their riches of intellect and will, despite a lack of supplies, equipment, and facilities. HICs bring their facility innovations (i.e., ASCs) and economic stability, but also their burdens of burnout and impaired altruism[19]. Hence, an exchange of each party's riches and burdens provides mutual sustenance. Adding educational discipline to the exchange raises program credibility and deepens clinical impact.

While our OWS model has not yet achieved a utopian exit strategy, Table X outlines the encountered challenges and proposed solutions. The sum of these efforts positions all parties toward more meaningful independence and acknowledges a current successful interdependence.

Summary

Increasing access to essential surgical care, especially for the poor and marginalized, is challenging in the LMIC setting. LMIC public health facility initiatives involving surgical access are hindered by financial, political, and infrastructure shortcomings. The OWS model is an ASC facility-driven solution to increase global surgical capacity. Through cross-cultural medical and surgical partnerships, medical industry support, adherence to social and ethical standards of medical mission activities, and education, the independently constructed and locally run Honduras ASC provides a controlled care continuum within a best-practice standards facility, which has been integrated into the local health-care system. We have seen considerable growth within our organization, including the increasing independence of our local Honduran team. While we are still far away from obtaining a completely independent and self-sufficient model, the framework of the OWS model may be a useful blueprint for other surgical mission endeavors. ■

Kelsey Overman, MD[1]
Peter Nicholson, BS[2]
Carl Nunziato, MD[3]

Merlin Antunez, MD[4]
Peter Daly, MD[5]
Michael Forseth, MD[1,5]

[1]Department of Orthopedic Surgery, University of Minnesota, Minneapolis, Minnesota

[2]University of Minnesota Medical School, Minneapolis, Minnesota

[3]Department of Surgery and Perioperative Care, Dell Medical School, Austin, Texas

[4]One World Surgery, La Venta, Honduras

[5]Summit Orthopedics, Eagan, Minnesota

Email for corresponding author: michaelforseth@gmail.com

References

1. Maraka J, Grimes C, Henry J, Cotton M. Cost-effectiveness of dental surgery procedures: a call for strengthening the evidence: reply. World J Surg. 2014 Sep; 38(9):2486.

2. Gyedu A, Gaskill C, Boakye G, Abantanga F. Cost-Effectiveness of a Locally Organized Surgical Outreach Mission: Making a Case for Strengthening Local Non-Governmental Organizations. World J Surg. 2017 Dec;41(12):3074-82.

3. World Health Organization. Global Status Report on Road Safety 2018. 2018. Accessed 2023 Aug 2. https://www.who.int/publications/i/item/9789241565684.

4. Alkire BC, Shrime MG, Dare AJ, Vincent JR, Meara JG. Global economic consequences of selected surgical diseases: a modelling study. Lancet Glob Health. 2015 Apr 27;3(2):S21-7.

5. Bido J, Ghazinouri R, Collins JE, Diez Portela D, Alcantara L, Thornhill TS, Katz JN. A Conceptual Model for the Evaluation of Surgical Missions. J Bone Joint Surg Am. 2018 Mar 21;100(6):e35.

6. DeWane M, Grant-Kels JM. The ethics of volunteerism: Whose cultural and ethical norms take precedence? J Am Acad Dermatol. 2018 Feb;78(2):426-8.

7. Pean CA, Premkumar A, Pean MA, Ihejirika-Lomedico R, Woolley PM, McLaurin T, Israelski R, Schwarzkopf R, Caplan A, Egol K. Global Orthopaedic Surgery: An Ethical Framework to Prioritize Surgical Capacity Building in Low and Middle-Income Countries. J Bone Joint Surg Am. 2019 Jul 3;101(13):e64.

8. Kim JY, Farmer P, Porter ME. Redefining global health-care delivery. Lancet. 2013 Sep 21;382(9897):1060-9.

9. Adams LV, Wagner CM, Nutt CT, Binagwaho A. The future of global health education: training for equity in global health. BMC Med Educ. 2016 Nov 21;16(1):296.

10. The World Bank. Physicians (per 1,000 people) – Honduras. Accessed 2023 Aug 2. https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?end=2017&locations=HN&start=1960&view=chart.

11. Papanicolas I, Woskie LR, Jha AK. Health Care Spending in the United States and Other High-Income Countries. JAMA. 2018 Mar 13;319(10):1024-39.

12. The World Bank. Current health expenditure (% of GDP) – Honduras. Accessed 2023 Aug 2. https://data.worldbank.org/indicator/SH.XPD.CHEX.GD.ZS?locations=HN.

13. Martin AB, Hartman M, Benson J, Catlin A; The National Health Expenditure Accounts Team. National Health Care Spending In 2021: Decline In Federal Spending Outweighs Greater Use Of Health Care. Health Aff (Millwood). 2023 Jan; 42(1):6-17.

14. Hottinger DG, Patel BM, Frechette RL, Walent W, Augustin ME, Daly PJ. Building surgical capacity in developing countries: lessons from Haiti and Honduras. J Health Care Poor Underserved. 2015 Feb;26(1):278-86.

15. Hoeffel DP, Daly PJ, Kelly BJ, Giveans MR. Outcomes of the First 1,000 Total Hip and Total Knee Arthroplasties at a Same-day Surgery Center Using a Rapid-recovery Protocol. J Am Acad Orthop Surg Glob Res Rev. 2019 Mar 19;3(3):e022.

16. Eblovi D, Antúnez M, Clitheroe K, et al. Effectiveness, cost-effectiveness, and economic impact of a multi-specialty charitable surgical center in Honduras. Int J Surg Open. 2019;20:7-14.

17. Center for Medicare & Medicaid Services. License for Use of Current Procedural Terminology, Fourth Edition ("CPT®"). Accessed 2023 Aug 2. https://www.cms.gov/medicare/physician-fee-schedule/search?Y=0&T=0&HT=0&CT=3&H1=10004&M=5.

18. U.S. Bureau of Labor Statistics. Occupational Outlook Handbook – Physicians and Surgeons. Accessed 2023 Mar 4. https://www.bls.gov/ooh/healthcare/physicians-and-surgeons.htm.

19. Shanafelt TD, Balch CM, Bechamps GJ, Russell T, Dyrbye L, Satele D, Collicott P, Novotny PJ, Sloan J, Freischlag JA. Burnout and career satisfaction among American surgeons. Ann Surg. 2009 Sep;250(3):463-71.