

Title: Developing Capacity for Sustainable Orthopedic Treatment in Haiti

Abstract: After the 2010 earthquake that devastated Haiti, medical professionals and volunteers raced from every corner of the world to provide aid for the wounded. Since this tragedy and the outpouring of support that followed, the international community has learned many important lessons in the wake of disasters in developing nations. One crucial area is how to create capacity for sustainable medical treatment in Haiti and especially the improvement of orthopedic care. This review covers a brief history of orthopedic surgery in Haiti, examines the ethical considerations of foreign physicians and personnel operating and practicing in Haiti, highlights influential physicians currently making a difference in Haiti, and analyzes the lessons learned for building a sustainable foundation of orthopedics. The methodology utilized in this project is a comprehensive review of the scholarly literature and popular press. These findings suggest that a more permanent and stable orthopedic presence is required in Haiti both for the future of the citizens and in preparation of another natural disasters. This presence will be accomplished in part through increased global assistance and better pay and conditions for natural-born Haitian orthopedists.

Introduction: On January 12, 2010, devastation struck when an earthquake with a magnitude of 7.3 on the Richter scale struck Haiti, leaving desolation in its wake. This earthquake claimed the lives of 222,750 people, left over 300,000 injured, 1.5 million displaced, and more than 3 million impacted (Doocy et. al., 2013), and ruining infrastructure and livelihoods. There was a tremendous international humanitarian response including from orthopedic surgeons, who rushed from all corners of the world to respond to the injured and assist in the mass casualty catastrophe (Chu et. al, 2011).

Following this fatal disaster, the world's eyes turned towards the Haitian health care system. Prior to the earthquake, the island nation experienced some of the poorest health conditions in the Western Hemisphere, including the highest infant and maternal mortality rates (Brown and Ripp, 2012). This is partially due to the government's limited capacity or willingness to provide health services, and additionally due in part to geographical separation of available physicians. Orthopedic surgeons in Haiti were largely focused in the capital of Haiti, Port-au-Prince, and other dense urban areas. The ratio of physicians to citizens is woefully lacking, and between 2005 and 2008, nearly 30% of all health-care professionals left the Haiti

for the U.S. or Canada (Country profiles, 2003). These factors have had a distinctly negative impact on orthopedic standards in Haiti, and the country continues to suffer from a lack of many modern medical resources that are taken for granted in developed nations like the United States and the United Kingdom. Of course, the earthquake further exacerbated these conditions, making it necessary to advance the surgical techniques and medical opportunities in Haiti.

Innumerable crucial steps have been made to advance the orthopedic community in Haiti. The Haitian Annual Conference on Orthopaedic Traumatology is one of these steps. This conference is an international orthopedic symposium conducted each year in Haiti. The mission of this conference is to educate surgeons and orthopedic faculty, share knowledge, and build a community of Haitian orthopedic surgeons as well as connecting them to overseas resources and allies. This community building conference has quickly become a keystone in aiding and cultivating the advancement of orthopedic surgery in Haiti.

Given that Haiti is considered globally as a low or middle-income country, the ethical considerations of orthopedic surgery by high-income country practicing surgeons also need to be taken into account. Though the current systems of care in developing nations are undoubtedly insufficient, the moral justification of practicing orthopedics is a slippery slope. When overseas surgeons reach out to try and provide orthopedic help in developing countries, it is important to understand that the culture of the low to middle-income country may be at odds with Western ideology. Additionally though foreign emergency aid is often essential, it is a commonly unrealistic for care to continue once foreign medical aid is withdrawn (Normore et. al., 2017). International orthopedic programs and humanitarian efforts should be focused at their core on promoting of health while employing culturally sensitive practices. The ethical framework of abroad orthopedic surgeons will be examined further in this review.

This scholarly review allows us to take stock and review, a decade later, the strengths and shortcomings of the international response. Though the earthquake of 2010 left absolute devastation, it is important to learn from this horrific incident how to be better prepared for the next time mother nature mercilessly strikes. Improved communication between agencies, the expedition of supplies, and training for volunteer surgical personnel are all essential for responding to a disaster, such as Haiti. This review will look in-depth at the steps recommended for surgeons and faculty in the future who respond to disasters. Findings from this review, which have been obtained predominantly via scholarly literature and research articles, suggest that a more permanent and stable orthopedic presence is required in Haiti both for the future of the citizens and in preparation of another natural disasters. This presence can be achieved partially through enhanced global assistance and better salary and conditions for natural-born Haitian orthopedists who choose to stay in Haiti once completing their training.

Methods

A History of Orthopedics in Haiti and Current Issues

Orthopedic surgery in Haiti has a fascinating history, though it is very seldom discussed. Orthopedics began in Haiti during the colonial period, which is defined as the time period between 1492 and 1803. During this time, slaves were given the responsibility of repairing fractures and dislocations and were known as “bonesetters” (Bordes, 1979). It is thought that these slaves most likely derived these skills from experiences in Africa and from interacting with European surgeons. Once Haiti gained its independence from France in 1804, it was decided that only foreign doctors and pharmacists who were not slave owners were authorized to stay in the country to practice medicine. This of course limited the number of practicing physicians in Haiti. Following this doctor drought, leaders in Haiti began to build medical schools in Cap-Haïtien in

1817. The organization of Haitian medicine was inevitable, and fees for orthopedic services were enacted (Bernard et. al., 2018).

Almost a decade and a half after these medical schools were created, Professor Antenor Miot formed the first orthopedic department in 1949. Professor Miot, a born Haitian who held the orthopedic chair at the state medical school in Port-au-Prince, is known as the father of Haitian orthopedics. After expanding his medical knowledge in France and the US, Professor Miot returned to Haiti and became the head of the general surgery department at Justinien Hospital of Cap-Haïtien in 1946. He subsequently began building an orthopedics department in the university hospital in Port-au-Prince in 1949. In spite of the money shortage in the hospitals in Haiti, Professor Miot created "...a customized orthopaedic traction table and skeletal traction systems. He was able to modify nails, pins, plates, and other orthopaedic implants in order to adapt them effectively to the needs of his patients." (Bernard et. al. 2018). Despite his incredible contributions, Professor Miot could not create money out of thin air, and Haiti's orthopedic department soon found itself without the specialized equipment and implants that were rapidly becoming essential to the field.

Decades and too many influential and incredible physicians to mention later, two additional university hospitals have built teaching programs run by Haitian orthopedic surgeons. These residency programs, which boast about 40 residents, are supported by many surgeons who travel from overseas to teach and share their experiences (Bernard et. al., 2018). Aside from the aspiring and current orthopedic surgeons in Haiti, attending physicians travel to Haiti on a regular basis for a week at a time to provide care, and Haitian orthopedic residents often travel with them to their hospitals for training and observing. In the aftermath of the tragic earthquake of 2010, the orthopedic training in Haiti has focused primarily on musculoskeletal complications

seen after trauma and infections like tuberculosis and poliomyelitis. Though this is distinct from the orthopedic emphasis in developed countries, which focuses more heavily on trauma and deteriorating joint conditions, the incidences of infections such as those discussed above are much greater in Haiti and therefore must be addressed more regularly. One of the greatest issues in the advancement of Haitian orthopedics is the lack of access to the rapidly developing instruments and implants regularly used by developed nations (Bernard et. al., 2018). Though surgeries are still being done, with comparatively good outcomes, this is certainly one area that could be addressed in the mission to advance Haitian orthopedics.

Currently, since the 2010 earthquake, many Haitian orthopedic surgeons have become members of global communities such as the Orthopaedic Trauma Association, the American Academy of Orthopedic Surgeons, and the French Society for Orthopaedic Surgery as well as others, which has allowed physicians in Haiti to play a bigger role in global orthopedics (Bernard et. al., 2018). However, Haiti still does not offer formal orthopedic fellowships, which makes it challenging for Haitian surgeons to be viewed as equally educated and experienced in the eyes of many other nations. Additionally, many of the Non-Government Organizations (NGO's) in Haiti may have good intentions in providing free care for all, but they inadvertently create difficult living situations for doctors. In part to the low wages of surgeons created by the NGO's free care for all plans as well as the political and economic instabilities of Haiti's government, many residents who graduate from Haitian medical schools leave the country. The dean of the State Medical School indicated in a 2017 article that 40% of Haitian medical school graduates leave the country after graduating in search of a brighter future with better wages and conditions (St. Juste, 2017). Of the rare residents who stay in Haiti to practice medicine, many are unemployed

and are therefore unable to practice. Taking steps to ensure that Haitian residents stay in the country is a major step in advancing the standard of care for orthopedics in Haiti.

Efforts to Create an Orthopedic Community in Haiti and Beyond

The devastating earthquake of January 2010 in Haiti brought about many changes in the medical community, and the Haitian Annual Conference on Orthopaedic Traumatology, abbreviated HAAOT, is one such program that arose to educate both Haitian citizens and foreign allies about the state of orthopedic medicine in Haiti. As it is known in Haiti, The Assemblée Annuelle Haitienne de Traumatologie Orthopedique is conducted every year in Haiti's capital city, Port-au-Prince, in the springtime, which is presented in both French (the official Haitian language) as well as English. The majority of Haiti's practicing orthopedic surgeons, as well as trainees from the three Haitian residence programs join in attendance with visiting medical personal from all over the globe.

The Haitian Annual Conference on Orthopaedic Traumatology arose from the destruction and disrepair following the devastating earthquake of 2010 in Haiti, as aforementioned. The conference was formed as an ongoing endeavor to "...participate in the long-term education of Haiti's own orthopaedic surgeons, foreign volunteers could help meaningfully to build medical capacity there." (Agarwal-Harding et. al., 2016). The organizers of the conference strove to create a way to reach larger audiences, both overseas and in Haiti, and to enhance relationships between Haitian orthopedic surgeons. Though the conference was created in response to the 2010 earthquake, the first HAAOT was organized in 2012 and subsequently initiated in 2013 (Dyer, 2018). The first year of the conference boasted 53 participants, which was almost doubled in the following year. The conference was later expanded to 3 days and included practical demonstrations and as well as a session on clinical research methods. Topics for the conference

are decided by asking the Haitian participants what they want to learn about. These topics often include managing open fractures, osteomyelitis, treatment options for delayed or neglected injuries, and national preparedness in case of another disaster (Dyer, 2018).

Given the developing status of Haiti's economic state and the importance of frugality in a country with an average per capita income of \$1,750 U.S (Population Reference Bureau, 2014), sponsorship is a critical part of the conference. Since the purpose of the conference is to further educate and build a community among medical professionals, the goal of the conference has continually been to make attendance free or virtually free for participants from Haiti. Important sponsors of HAAOT include SIGN Fracture Care International, the American Academy of Orthopedic Surgeons, the US Agency for International Development through Project Hope, Partners In Health, the Foundation for Orthopedic Trauma (which is currently the principal sponsor) , Boston Children's Hospital, and the Institute for Global Orthopedics and Traumatology (Dyer, 2018). In accordance with the overall goal of the conference, the HAAOT has been efficient in expanding participation in surgeons who would otherwise not be interacting, strengthening the orthopedic community in Haiti.

Within the conference, a major success point has been both in learning what Haitian participants feel are their own knowledge gaps and proceeding to bridge those gaps. Learning priorities are identified every year via an anonymous electronic audience response system (Dyer, 2018) so that understanding and retention of participants can be accurately gauged. The first conference used a combination of educational presentations by foreign guests and case reports from Haitian physicians. Improving on this, the second conference included Haitian presentations which featured a retrospective series of relevant cases, practical demonstrations, and a clinical research methods session (Dyer, 2018). Conferences since have included video

teaching sessions, an increased presentation participation by Haitian attending surgeons and faculty, demonstrations of emerging orthopedic surgical techniques, and instruction of how to perform surgeries using resources at the Haitian surgeon's disposal (Dyer, 2018).

The HAAOT has had immense success in contributing to the sense of a Haitian orthopedic community. By creating an atmosphere of learning, experience, and shared knowledge, the HAAOT offers Haitian physicians an opportunity to learn from overseas allies and work together to produce new techniques and practices to improve care. All orthopedic surgeons in Haiti, though especially the residents, have benefitted from this sharing of ideas and improvement of orthopedics in Haiti. Prior to the HAAOT conferences, there was very little opportunity to continue medical education for orthopedic surgeons in Haiti, and almost no chances for physicians and trainees to gather (Dyer, 2018). The Haitian Annual Conference on Orthopaedic Traumatology has provided this and will continue to contribute to the advancing of orthopedic surgery in Haiti for years to come.

Is Outreach Morally Justified?

In countries termed low or middle-income countries, also known as LMICs, there is no question that access to surgical care is substantially more difficult than it is in high income countries, dubbed HICs. In fact, in LMIC countries, the death toll from trauma surpasses the combined mortality of malaria, HIV/AIDS and tuberculosis (Pean et. al., 2019). There is no question that this is an issue to be confronted, and many well-meaning surgeons, often orthopedic surgeons, from HICs travel to LMICs, such as Haiti, to attempt to be part of the solution. These surgeons, who often view these ventures as humanitarian efforts, have increased in the years since the 2010 earthquake, many of whom look to learn as well as provide services and care to the locals they operate on. However, the obvious discrepancy of the resources

available in HICs compared with those available in LMICs can be a hurdle for these altruistic doctors, most of who have not been exposed to the resource deprived hospitals found in many LMICs and do not have the training or experience to handle these incongruities. Technology that is available in LMICs are often not the state-of-the-art tools that are available to physicians and patients in HICs, and, combined with a hospital faculty who may not be trained in the current standards determined by HICs, orthopedic surgeons may have a difficult time providing a high quality of care to patients in LMICs during their philanthropical efforts (Pean et. al., 2019). Because of this, the question becomes how to minimize damage while maximizing benefits from these visiting surgeons.

Of course, orthopedic surgery requires the surmounting of specialized burdens, such as unique tools and implants, which change in the field rapidly as advancements are made. Orthopedics is also a unique field, as it operates not only to provide life-saving treatments, but also operations only to improve the quality of life for the patients. Orthopedic surgery has one of the highest rates of potential infection, and correct technique and follow up is extremely important. This may be hindered in LMICs with fewer resources and surgeons who are only in the country for a short time. Many of the barriers that impede the successful implementation of overseas surgeons contributing to orthopedics in LMICs include equipment and communication, which can be hindered by language barriers. Even so, why might the question of moral justification be raised when North American doctors embark on surgical missions to LMICs like Haiti?

In a 2019 study by Pean et. al, the benefits of HIC surgeon intervention in LMICs are weighed against the drawbacks. This study suggests that surgeons from HICs who do not contribute their skills where they are undoubtedly needed are allowing harm and potential

mortality to come to their patients in LMICs by not doing anything at all. So, even if the standard of care provided by the visiting orthopedic surgeons is less than optimal when compared to the standard of care expected in their high-income country, the act of doing anything at all to help is better than doing nothing in LMICs. However, the study also notes that the presented ideas of surgeons' omission versus help plays into an ethically questionable and unsustainable victim-savior archetype, which needs to be addressed so that the best possible standard of care can be provided by physicians.

In the same study as previously mentioned, Pean et. al. have developed a preliminary 20-point ethical framework, which is intended for use by physicians and institutions from high-income countries who are to venture on a humanitarian effort in a low or middle-income country. The study notes that, understandably, every single point on the checklist might not always be achievable. However, the framework is a starting point for HIC groups and simply gives an outline for a successful standard of care. Each item corresponds to 1 of 5 ethical principles which should be considered when applicable: (1) justice, or distributing resources of health in a fair manner; (2) beneficence, or acting with intent to accomplish maximum good for the patient; (3) autonomy, to allow the patient to make informed decisions which are free from coercion as well as working to overcome language and cultural barriers; (4) nonmaleficence, doing no harm to the patient or society; and (5) solidarity, feeling social unity or union with established community ideals (Pean et. al., 2019).

The framework mentioned in Pean et. al. is applicable for all efforts in LMICs, but there are some ethical considerations that are relatively specific to orthopedic surgery that should be taken into account. Firstly, fractures are a significant part of treatment in orthopedics, and fractures can take months, sometimes even years, to heal. In HICs, patients who undergo

orthopedic surgery because of fractures usually have multiple follow-ups with their surgeon, who monitors their progress over a period of time. Infections are also a significant risk in orthopedic surgery, since many of the implants used are highly susceptible to infection. Since most HIC surgeons who operate in LMICs are only there for about one week, it is difficult to continue the longitudinal patient relationship necessary for orthopedics. Monitoring musculoskeletal functions and healing post-op when then surgeon is back in his or her home country is also a sizable challenge. Pean et. al. suggests that orthopedic surgery on a global scale should prioritize enablement of longitudinal care through transitions of care, to provide the best standard of care possible for their patients in LMICs.

Solidarity is also considered in the framework by Pean et. al. in their 2019 study. They posit that physicians care for any patient in their home country or when working overseas, the surgeon is obliged to adopt a sense of connection and responsibility for the patient they are operating on. In any sort of a global orthopedic endeavor, the study suggests, the ethical approach of unity fosters a sense of responsibility to facilitate longitudinal care for their patients. This principle is in the framework put forward by Pean et. al., which notes that the orthopedic surgeon acquires a sense of solidarity with the local people prior to the surgeries through gaining familiarity with the LMIC language, culture, and experience of the locals. The tenet of solidarity among orthopedic surgeons is particularly important for ethical practices in LMICs, and the implementation of solidarity is crucial for success in surgery and providing an optimal level of care.

The final question that must be considered when looking at the ethical justification of orthopedic surgeons operating in LMICs is whether the quality of care that can be provided in these countries is equivalent to the care that would be considered acceptable in the surgeon's

home high-income country. Because much of the technology and equipment for imaging and operating is not available in low or middle-income countries, the quality of care can never be exactly the same in LMICs as it is in HICs. Given that many of the methods HIC surgeons rely on are less than the “best available” in these low or middle-income countries, the actions of surgeons abroad “...can only be justified by satisfying the moral obligations for all parties and being deemed superior to the alternative means of care.” (Pean et. al., 2019). For example, without intervention from HIC orthopedic surgeons, many LMIC patients would forgo treatment all together or die from lack of treatment. This is often seen in Haiti due to the lack of orthopedic surgeons and the extremely limited funds of the citizens. In a situation such as this, a standard of care which differs from the HIC from which the surgeon hails may eventually be deemed acceptable and still manage to fulfill the principles put forward by Pean et. al. In the end, ethical considerations must be weighed by both the LMIC host physicians and patients as well as the HIC surgeon. There are no black and white moral answers to HIC surgeons practicing in LMICs. However, so long as the goal of the operating orthopedic surgeon is providing the highest standard of care, taking into account the culture and experiences of the LMIC patients, and doing only good without doing harm, the prospect of orthopedic outreach in LMICs such as Haiti remains a viable ethical option.

What We’ve Learned Since the 2010 Earthquake

Following the 2010 Haiti earthquake, the Médecins sans Frontières (MSF) rushed to aid those who had been physically impacted by the natural disaster. MSF implemented the largest surgical team in the organization’s 40-year history and, in 10 weeks, over 55,000 patients were treated as well as over 4,000 surgical interventions performed (Chu et. al., 2011). Given the rapidity of the MSF’s response, as well as the efforts of innumerable other nations and

organizations, there were bound to be obstacles in the application of care to the thousands of Haitians impacted. Supply delays, a lack of experienced faculty, and a difficulty coordinating with other agencies compounded with the already lacking resources in Haiti made it extremely difficult for surgeons, physicians, and nurses to help people accurately and efficiently. In an article from Chu et. al. in 2011, four major topics are put forth in the consideration of future planning for natural disasters, and how we can keep the chaos felt by health care workers in the Haitian earthquake from happening again.

The first of these topics is improving collaboration between organizations and services. Surgery was one of the primary needs after the earthquake, and surgeons from every corner of the world rushed to Haiti to assist. Most of the injuries that needed treatment were orthopedic in nature, such as crush injuries, open and closed fractures, and compartment syndromes (Sonshine et. al., 2012). Though these altruistic physicians are commendable in every way, many lacked the relevant experience or capacity to be efficient in emergency surgical services. A deficiency in the communication between organizations resulted in too many agencies attempting to provide the exact same care in the same area while other areas had no emergency care at all (Chu et. al., 2011). As discussed earlier in this review, after humanitarian efforts had performed surgeries and treatments, they left for their home countries again, leaving many thousands of patients to overwhelmed rehabilitation hospitals, who struggled to keep up with the sheer number of post-ops and follow-ups. Of the organizations who stayed in Haiti, communication was inadequate and many worked isolated from each other, not sharing basic information of standard databases and total number of operations, which is still unknown, according to the study by Chu et. al. Poor coordination among agencies is not unique to the Haitian earthquake of 2010 and can be seen in many disasters from the Rwandan genocide to the 2004 Asian tsunami (Chu et. al., 2011). A

study by Sonshine et. al. also highlights that group organization represents the most major opportunity for improvement in future orthopedic disaster relief. Given that better coordination and communication seems to be an enduring issue across all sorts of disaster efforts, steps must be taken to ensure more efficient interactions. However, the study by Chu et. al. does not offer solutions in this area.

Proximity of the responders to the natural disaster is also vital. By reducing response times, the extremely high mortality that follows a disaster can also be reduced. Naturally, disasters are unpredictable. However, there are experienced agencies which can identify some regions of the world that are known to be prone to conflicts, like central Africa, or especially susceptible to natural disasters like earthquakes and cyclones, such as Central America (Chu et. al., 2011). These agencies can establish some small-scale medical projects to sustain the local networks and emergency supplies of materials and medications. Proximity and supply go hand-in-hand, and the ability to swiftly import essential materials is paramount to efficiency following disasters. If materials are able to be pre-positioned, or readily available before disaster strikes, arrival of relief can be accelerated. Directly following the 2010 earthquake, airport-related delays considerably hindered resource distribution, therefore slowing down treatments and medical aid. Due to this delay, the study by Sonshine et. al. also recommends pre-positioning medical and surgical supplies, though this study specifies that the supplies should be stored at airfields with pre-clearance through international customs to further expedite their arrival.

Finally, Chu et. al. recommends listing the specialists needed following emergencies, such as surgeons, anesthesiologists, traumatologists, and emergency medicine doctors experienced in treating, and sharing those the listing of these qualified specialists among relief agencies. The study also recommends that other medical personnel like scrub technicians, peri-

operative nurses, wound nurses, physiotherapists, and psychologists be listed for easy access to the essential staff needed following a disaster. Training for disaster relief in these specialties can also be used, not only to prepare the personnel, but also to improve the skills of inexperienced and untrained volunteers, who are usually urged to stay home (Sonshine et. al., 2012). It is also very important that surgical personnel who want to volunteer for humanitarian efforts are prepared or have prior experience in the field.

It is recommended that, prior to a disaster, four major bullet points are followed (Chu et. al., 2011). Having emergency prep kits, which the Emergency Surgery Coalition would maintain, be established in a nations or regions that are prone to disaster. Secondly, prior import agreements should be established, where the Emergency Surgery Coalition and the World Health Organization work directly with governments in an attempt to minimize delays of supplies and workers to emergency medical sites. Training of surgical personnel is also crucial prior to a disaster, and the Emergency Surgery Coalition would facilitate surgical training for volunteers in humanitarian situations and share lists of qualified personnel among its members. Finally, defining a surgical mass disaster plan for surgical resources to be allocated to their correct locations. During the disaster, the study by Chu et. al. recommends inter-agency coordination, where the Emergency Surgery Coalition coordinates emergency and referral care in a clear and concise way that reduces communication failures, and supply delivery, where the Emergency Surgery Coalition would work with government and the World Health Organization to safeguard the delivery of supplies efficiently. This study also recommends monitoring and evaluation by the Emergency Surgery Coalition following the disaster.

Influential Orthopedic Humanitarians In Haiti

A few massively influential individuals distinguish themselves from other humanitarians and doctors in Haiti for their incredible contributions. One such person is Dr. Paul Farmer. Dr. Farmer began his journey as an American born physician, obtaining a bachelor's degree from Duke University, then an MD and a PhD from Harvard University (Harvard Medical School). Paul Farmer, Jim Yong Kim, Ophelia Dahl, Thomas J. White, and Todd McCormack co-founded Partners In Health in 1987. Partners In Health, widely known as PIH, strives to bring modern medical science to rural areas and those in need. PIH provides healthcare in the most deprived and poorest parts of developing nations, including Haiti. Additionally, this foundation builds hospitals and associated medical facilities, trains hospital and medical staff, and provides healthcare. In many areas, Partners in Health also eliminates barriers to provide access clean water and food. Since its foundation, Partners in Health has expanded to eleven countries: Haiti, Sierra Leone, Navajo Nation, Mexico, Peru, Lesotho, Malawi, Rwanda, Liberia, Russia, and Kazakhstan. Of course, all of these countries are equally important in their health care needs but, since Haiti is the main focus of this literary review, it will focus on the impact of Dr. Farmer and Partners In Health in Haiti.

Currently in Haiti, PIH employs more than 6,300 staff to offer primary care, maternal and child health care, HIV and tuberculosis services as well as advanced secondary and tertiary care (Partners In Health). Impressively, Partners In Health were the first to come up with using community health workers to provide health care to patients with chronic diseases like HIV and tuberculosis. In 1998, Partners in Health initiated the first program in the world to provide free and comprehensive HIV care in a developing nation, which is now a model globally for treatment of disease in communities. Because Haiti has the highest maternal mortality rate in the

entire Western Hemisphere, this field is highly focused on in the medical community. According to Every Mother Counts, an organization which raises awareness for maternal care and mothers, the mortality rate in Haiti is 521 deaths for every 100,000 live births and approximately one out of every eighty women in Haiti will die from childbirth and pregnancy related causes. Any number of course is too high, and this statistical is incredibly alarming. The PIH naturally noticed this tragedy, and PIH's women's health division in Haiti emerged as the first program in Haiti's Central Plateau to provide services like prenatal care, family planning, and sexually transmitted disease detection, treatment, and prevention. Labor and delivery care are provided by Partners in Health to an average of 1,500 women a month as well as prenatal and pediatric care, psychosocial services, and home visits (Partners In Health).

In a nation like Haiti where severe poverty is widespread, one can expect to see the tragedy of malnutrition take hold, especially among children. According to the Global Hunger Index, 1 in 5 children in Haiti experience malnourishment and 21.9 percent of children are stunted in their growth due to a lack of sufficient food, causing long-term developmental issues. Partners In Health developed a response to the hunger crisis in Haiti by creating malnutrition clinics across 13 clinics and hospitals. In these clinics, children are screened for malnutrition and prescribed a highly important medicine called Nourimanba. According to Partners In Health, the prescription of Nourimanba is in concordance with World Health Organization standards. Nourimanba is described as a high-calorie and high-protein paste which is made from peanuts and combined with vital vitamins and minerals. Nourimanba is produced at Partners In Health's own Nourimanba Production Center, and is crucial in helping children gain weight and improve growth over weeks of use. Over 7,800 children are enrolled in malnutrition services every year by PIH, making this a crucial service to Haiti and other underdeveloped nations (Partners In

Health). Humanitarians like Dr. Paul Farmer and his organization make it possible for health and social justice to be improved upon in developing nations such as Haiti.

This review would be remiss if it did not mention Haiti Bones, an orthopedic surgery flagship program at the Hôpital Adventiste, located in the Carrefour suburb of Port au Prince. In the days following the earthquake of 2010 in Haiti, Haiti Bones was established to care for those who sustained orthopedic injuries during the earthquake and subsequent destruction. Dr. Jim Matiko, a surgeon operating out of Loma Linda, California, founded the organization and continues to support it. Additional influential people include Dr. Scott Nelson, who was working for Cure International in the Dominican Republic at the time, and Dr. Terry Dietrich began building Haiti Bones from the cracked foundation up. Their mission was to create a sustainable orthopedic program in Port Au Prince which could provide services even after all of the emergency doctors and personnel left following the earthquake. In 2011, Dr. Francel Alexis, a Haitian born nationally and internationally acclaimed Haitian orthopedic surgeon, joined the Haiti Bones team full-time and now runs the orthopedic services at the Hôpital Adventiste with Dr. Nelson.

This author had the life-changing opportunity to work side by side with Dr. Nelson in the operating room in the Hôpital Adventiste in Port Au Prince, Haiti. In the spring of 2019, I was given the opportunity to accompany two incredible American born surgeons, Dr. Paul Burton and Dr. Travis Scudday, as they flew to Haiti for a week-long surgical mission trip. The main goal of the trip was to operate on as many full hip replacement patients that could be done safely and properly. Prior to this trip, I had never left the North American continent, let alone gone to a developing nation. Naturally, when we arrived, I was astounded by the level of poverty experienced by the citizens of Haiti, and of course was shocked by the cultural differences

between Haiti and America. However, nothing could have prepared me for the tragedies I would see once arriving at the Hôpital Adventiste. After experiencing a warm welcome from Dr. Nelson and Dr. Alexis, the doctors met with a few of the patients who needed new hips. During this time, I watched from across the room as the x-rays of patients were examined, and I think many doctors in the United States would be astounded to see such tragedies. Nine years later, many of these patients were still suffering from hip and bone issues caused by the earthquake. Multiple patients were in fact experiencing issues because they had experienced bone breaks or dislocations during the earthquake that had never been reset or treated, and healed in the broken or dislocated issues, causing long term issues for these people. It was then that I truly understood the importance of sustainable orthopedic treatment in Haiti. Often, it is so easy to speak of improvements or shortcomings of doctors and organizations in other countries but, when you are there, experiencing the humanity and meeting these people who are in pain, you truly understand the necessity of humanitarian and medical efforts in developing nations. It was also during this time that I experienced the philanthropic and compassionate nature of Dr. Nelson, who lived among this incredible culture and wonderful people every day. The medical community in developed nations could and should learn from people such as Dr. Nelson, Dr. Burton, and Dr. Scudday, and the world ought to look to Haiti Bones and their work in the Hôpital Adventiste in Port Au Prince for all future foreign medical aid.

Findings and Recommendations

Considerable strides have been made since the 2010 earthquake devastated Haiti, but more still needs to be done. The research and information given in the methods section provides guidelines to improve upon the current situation, and findings suggest that an orthopedic presence which is more permanent is required in Haiti and other developing nations. In this review, ‘permanent’

refers to the time period in which a medical personnel or organization remains in the same place to treat. Ethical considerations, the loss of Haitian-born doctors, advancing sustainable collaborations, and the advancement of ally groups and organizations will all contribute to this stability and, therefore, improvement.

Dealing with Ethical Issues in Orthopedic Care in Haiti

Though this paper speaks extensively on the confusing ethics of care, altruistic and humanitarian doctors and health care personnel should not be dissuaded from volunteering their time, talents, and resources to those in low-income nations. On the contrary, it is because of philanthropic individuals who donate their time and technologies from high-income nations that has improved orthopedics in Haiti and cared for hundreds of thousands following the earthquake of 2010. However, bringing innovations and talent to low-income nations like Haiti should provide relief, and not stresses of post-op concerns and lack of follow-up care. Earlier in this review, ethical concerns regarding orthopedics in Haiti were examined. One important ethical consideration is offering the best standard of care possible, regardless of the political or economic state (DeWane and Grant-Kels, 2018). There is no way to avoid the simple fact that high-income nations will always provide more access to the newest technologies and most sterile techniques to both doctors and patients. However, if a doctor does not feel that he or she can provide the absolute best level of care they possible can, no matter what tools or techniques are at their disposal, then they most likely should not work or volunteer in a low-income orthopedic setting, such as Haiti. Contrastingly, if one feels that they are equipped and eager to offer the most excellent medicine they can provide, then their contributions to orthopedics in Haiti is necessary and appreciated.

Solidarity, or the responsibility that a doctor feels for their patient and the culture surrounding them, is also an ethical consideration not to be taken lightly (Pean et. al., 2019). Doctors who volunteer their time and efforts in Haiti and other low-income nations must have a deep respect for the citizens who live there and the culture that these people produce and share. Sensitivity to patients is of course crucial in high-income nations as well, but culture often has a much larger role in developing nations (Modern Ghana, 2012). Given this, unless medical personnel have an appreciation for the way that their patients live, they cannot offer them the most optimal level of care and should not attempt to do so. If these important ethical considerations can be considered and provided, the aid of foreign orthopedic doctors and medical personnel is a welcome presence in Haiti.

Addressing the Loss of Haitian Doctors

Naturally, orthopedics cannot exist without orthopedic surgeons. As wonderful as it is that so many high-income doctors visit and assist many Haitian residents with their orthopedic needs, the gap in care that stays behind when they return to their home nation leaves post-operative complications and Haitian patients with more questions than answers. As examined above, as long as ethical considerations are in place, it is better to operate and do quality work and leave than to never operate. However, a rather simple solution to this issue of departing orthopedic surgeons is to have more Haitian-born orthopedic surgeons who never leave. As it stands today, a substantial amount of medical school graduates in Haiti leave the country after obtaining their degree (St. Juste, 2017). They go in search of better pay and living conditions in other countries, leaving Haiti in the hands of a few great Haitian orthopedic surgeons and the aid of foreign doctors. A substantially more stable orthopedic environment could be created in Haiti by offering these medical school graduates better pay. This is difficult considering Haiti is one of the poorest

nations in the world, so financial assistance from the government would be especially beneficial in creating sustainable orthopedic care. It is very likely that many of the medical school graduates in Haiti would rather stay close to their family and friends in their home nation, so offering better conditions for them would entice them to stay.

Additionally, Haiti currently does not have an orthopedic fellowship. Orthopedic fellowships are seen in many high-income nations as a necessity for practicing orthopedic surgeons. Not only are the Haitian patients at a disadvantage in being treated by doctors without fellowships, but many other nations also view Haitian orthopedic surgeons as less practiced or equipped without them. Implementing fellowships in Haiti would further contribute to the orthopedic stability in Haiti. By creating better conditions and wages for doctors and executing orthopedic fellowship, more Haitian-born medical school graduates would stay in Haiti and create a more permanent orthopedic foundation for the nation and its people.

Group Organization

In 2010, the world looked towards Haiti and those who risked their lives to provide aid for the hundreds of thousands of residents who needed medical assistance. Today, we build from the lessons learned in Haiti about how to better care for injured people during a disaster. The methods section of this review explored how countries, especially low-income nations like Haiti, can be more prepared in the event of a future disaster. Emergency prep kits should be prepared and ready prior to a disaster. It is suggested that the ESC (Emergency Surgery Coalition) would maintain the necessary emergency supplies globally (Chu et. al., 2011). In addition, WHO (World Health Organization) and ESC should identify at-risk regions of the world and establish multiple local small-scale medical projects which would be maintained as to create local relationships and supply chains. This would effectively create a closer proximity for a reduced

response time. Prior import agreements should also be established by WHO and ESC. These organizations should work with governments in these at-risk regions so that the delay of medical supplies can be as short as possible in a disaster setting. Training of surgical personnel is another important factor in the preparation of disaster. Ideally, the ESC would facilitate surgical training for a multitude of humanitarian settings, especially these at-risk regions. Organizations should also have a collective database of qualified personnel so that they might share information about these skilled individuals more quickly and easily. Finally, prior to a disaster, a defined surgical mass disaster plan should be created and shared among WHO, UN (United Nations), and the ESC. If previously agreed to priorities and plans are already in place, resources can be better allocated in a disaster when patients need surgical attention. If these steps are taken prior to a disaster, surgical operations will run much smoother, and more lives will be saved as a result.

During the disaster, there are a different set of regulations to be considered. Coordination is often a major issue during disasters. Organizations do not talk to each other enough, and consequently too many resources end up in one place while there are not enough in another. Inter-agency coordination is a massive step in the right direction during a disaster. If possible, the ESC, UN, and WHO would collaborate and coordinate emergency and surgical care so that duplication and fragmentation are avoided and as many patients are treated as possible (Chu et al., 2011). Supply delivery will also be crucial in creation order out of chaos in a disaster for medical personnel. The ESC and WHO should operate in tandem with the government of the affected area so that supplies are delivered efficiently and effectively. If the efforts described above for preparation are followed, this should already be in place and easy to follow. These suggestions are guidelines to how to more efficiently streamline orthopedic surgeons and medical personnel to be more efficient in a disaster and help as many people as possible.

Building on the Foundation of Allies

Partners In Health and Haiti Bones are two major humanitarian orthopedic organizations in Haiti. These groups and the incredible people who work for and with them help thousands of Haitians every year and lend to the stabilization of orthopedics in Haiti. Funding is often a major issue for these organizations, as is finding volunteers. Haiti can be a dangerous place, and many surgeons and medical personnel are afraid to venture to a nation with such a tumultuous economic climate and an unknown group of individuals. Gaining surgeons, especially orthopedic surgeons, as volunteers in Haiti would help allies such as PIH and Haiti Bones tremendously. Some residency programs offer incentives for their residents if they spend time and practice in low-income and developing nations (Belding et. al., 2019). This is a great way to help these organizations and contribute to the stability of orthopedics in Haiti. If one does not happen to be a doctor or surgeons, or simply cannot volunteer, donating to orthopedic organizations like Haiti Bones and PIH can also have a substantial impact on both doctors and patients. Often, the government does not provide care for citizens or good conditions for doctors. By assisting humanitarian programs financially, every single person can make a dramatic difference in the lives of Haitians in regard to orthopedics and medicine. This is how a more permanent and stable orthopedic presence can be created in Haiti.

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