Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

The Journal of Arthroplasty 35 (2020) S85–S88

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Orthopedic Community Response

Humanitarian Needs: The Arthroplasty Community and the COVID-19 Pandemic

Harpal S. Khanuja, MD [a,*], Yash P. Chaudhry, DO [a], Neil P. Sheth, MD [b], Julius K. Oni, MD [a], Brian S. Parsley, MD [c], J. Craig Morrison, MD [d]

[a] Department of Orthopaedic Surgery, Johns Hopkins School of Medicine, Baltimore, MD
[b] Department of Orthopaedic Surgery, University of Pennsylvania Perelman School of Medicine, Philadelphia, PA
[c] Department of Orthopedic Surgery, University of Texas Health Science Center at Houston, Bellaire, TX
[d] Southern Joint Replacement Institute, Nashville, TN

ARTICLE INFO

Article history:
Received 17 April 2020
Received in revised form
17 April 2020
Accepted 17 April 2020
Available online 24 April 2020

Keywords:
COVID-19
humanitarianism
operation walk
arthroplasty
AAHKS

ABSTRACT

Background: As the world struggles with the COVID-19 pandemic, health care providers are on the front lines. We highlight the value of engaging in humanitarian medical work, contributions of the hip and knee arthroplasty community to date, and future needs after the resolution of the pandemic. We sought to understand how the arthroplasty community can contribute, based on historical lessons from prior pandemics and recessions, current needs, and projections of the COVID-19 impact.
Methods: We polled members of medical mission groups led by arthroplasty surgeons to understand their current efforts in humanitarian medical work. We also polled orthopedic colleagues to understand their role and response. Google Search and PubMed were used to find articles relevant to the current environment of the COVID-19 pandemic, humanitarian needs after previous epidemics, and the economic effects of prior recessions on elective surgery.
Results: Hip and knee arthroplasty surgeons are not at the center of the pandemic but are providing an invaluable supportive role through continued care of musculoskeletal patients and unloading of emergency rooms. Others have taken active roles assisting outside of orthopedics. Arthroplasty humanitarian organizations have donated personal protective equipment and helped to prepare their partners in other countries. Previous pandemics and epidemics highlight the need for sustained humanitarian support, particularly in poor countries or those with ongoing conflict and humanitarian crises.
Conclusion: There are opportunities now to make a difference in this health care crisis. In the aftermath, there will be a great need for humanitarian work both here and throughout the world.

The current COVID-19 pandemic has changed our understanding of the world and health care delivery and highlighted many global deficiencies. As orthopedic surgeons, it is in our nature to fix what is broken. These situations that are beyond our control can be frustrating, particularly for subspecialists with completely elective practices. Our clinical skills are best used in orthopedics, and many have continued to treat fractures and trauma in the current crisis. Although it may seem that there is little else we can do, there are many opportunities to make a difference. In a worldwide crisis of this magnitude, there will be many opportunities for humanitarian work, both home and abroad, within arthroplasty and outside of medicine.

Value of Humanitarian Medical Work

Many physicians enter the field of medicine to develop the skill to care for those afflicted by illness and disability and to serve those who cannot help themselves. Although physician burnout and increased cynicism in medicine have made it difficult at times for some to clearly envision this purpose, humanitarian medical work

This article is published as part of a supplement supported by the American Association of Hip and Knee Surgeons and by an educational grant from Aerobiotix.

Twitter Message: The Journal of Arthroplasty recognizes the humanitarian efforts of its community to date and how we can contribute further against COVID-19.

One or more of the authors of this paper have disclosed potential or pertinent conflicts of interest, which may include receipt of payment, either direct or indirect, institutional support, or association with an entity in the biomedical field which may be perceived to have potential conflict of interest with this work. For full disclosure statements refer to https://doi.org/10.1016/j.arth.2020.04.054.

* Reprint requests: Harpal S. Khanuja, MD, Department of Orthopaedic Surgery, Johns Hopkins School of Medicine, 601 N. Caroline St., Baltimore, MD 21287.

https://doi.org/10.1016/j.arth.2020.04.054
0883-5403/

offers benefit both to the practitioner and the patient in many ways [1]. This has led many physicians to participate in medical or surgical mission trips.

There has been a marked increase in interest in global health and recognizing and addressing the disparity of access to health care worldwide. According to the World Health Organization, the highest proportions of the global burden of disease and disabilities fall on the regions that also suffer significantly from physician shortages [2]. A growing group from high-income countries aims to address both medical and surgical needs in low- to middle-income countries through medical mission service. Although there is no central monitoring group or agency for medical mission organizations, conservative estimates that do not consider opportunity costs for the volunteers place the annual expenditures at $250 million in 2014 from the United States alone [3].

There may be little we can do with our clinical skills as hip and knee surgeons at the moment, but we can use our knowledge and compassion to make a difference for many around the world. In this time of pandemic, we are reminded that we are in this together. Regardless of income, education, or nationalities, we are all connected as humans and subject to the ravages of a disease that does not discern, discriminate, nor favor. Once this pandemic subsides, the impacts and the effects on those in greatest need will increase. As the global economy recovers, the poor will continue to suffer the most from longer-term impacts of this crisis.

While the focus of humanitarianism is outward, the benefits are felt inward. In an era of medicine defined by concerns of burnout, humanitarian work can help us rediscover our purpose. In addition, global mission work is transforming the way surgical care is delivered at home. It can teach surgeons how to conserve costs, work with less, and better listen to patients in considering their economic, social, and logistical needs when determining care.

In humanitarian work, we are in a unique position to tap into our empathic side and come to the aid of those less fortunate to give help and hope. This pandemic offers us that opportunity now, and its aftermath will require the aid of the international humanitarian community for years. These times are difficult for all. We have our own concerns for our families, friends, coworkers, and finances. However, there is also an opportunity to remember how much we have by helping those with less.

American Association of Hip and Knee Surgeons Membership Humanitarian Efforts

Although training in hip and knee arthroplasty did not prepare our community to care directly for patients affected with COVID-19, many American Association of Hip and Knee Surgeons (AAHKS) members and their partners have found ways to contribute. Orthopedic surgeons and practices have been offloading local emergency rooms (ERs) with nonurgent orthopedic problems to decompress the acute-care setting. Others have been partnering with local, national, and global organizations or volunteering their services on the front lines. Individuals are making and donating personal protective equipment (PPE) and helping protect those on the front lines. Operation Walk chapters across the country have donated more than 13,000 masks, 15,000 pairs of gloves, hundreds of gowns, disinfectant wipes, and head and shoe covers to hospitals here and abroad fighting COVID-19. Many of these donations come directly from supplies that had been donated or bought for future trips. More than one chapter had already shipped their equipment in preparation from an upcoming trip. These chapters have informed their partner countries that they can use the supplies for their own battle with COVID-19.

Denver's Operation Walk chapter has also found other ways to contribute to their local community and beyond. Team members have formed a community outreach for answering nonurgent phone calls about COVID-19 and other health concerns. Like many groups they are helping offload the local ERs by offering telehealth visits and even a drive up orthopedic "check" for nonemergent problems. Several of their nurse team members have deployed to work in the intensive care units in New York City. These team members as well as all nurses at their local hospital have been outfitted with Operation Walk Denver backpacks filled with hand sanitizer, lotion, nutrition bars, and bottled water. "The entire team has learned to adapt and improvise during Op Walk trips and this enable us to all proceed with confidence and find ways to provide excellent care under strained circumstances," noted Peggy Kettler, Logistics Coordinator for Operation Walk Denver. Dr. Victoria Brander, medical director of Operation Walk Chicago, was recruited to help coordinate the COVID-19 testing in an underserved area of Chicago given her experience with international humanitarian care.

Women Orthopaedist Global Outreach had to cancel their April Operation Walk trip to Guyana but donated their supplies to several hospitals across the country. They have partnered with Souls4Soles to assist in organizing locations to ship comfortable medical shoes to front-line health care workers. In Nashville, Walk Strong Foundation, in partnership with Project Cure, donated more than 30,000 gloves, 17,000 masks including 500 N95 masks, and other PPE. Project Cure is one of many partnerships forged by our members to assist in their humanitarian endeavors. They are the largest distributor of donated medical equipment globally. For the last four weeks they have redirected all their PPE to hospitals around the country, with over 110 donations to date including 15 ventilators.

More than 10 partner countries have been affected by the canceling or postponement of orthopedic mission trips. These include Nicaragua, India, Guyana, Panama, Honduras, Cuba, Guatemala, Ghana, Bolivia, Mexico, and Jamaica. These countries

Fig. 1. The nurses at the Specialty Hospital of Veracruz in Veracruz, Mexico, have created their own PPE to aid in the fight against the COVID-19 pandemic. They credited Walk Strong in helping them develop a "can do" attitude that has helped them so far. PPE, personal protective equipment.

have had to suspend nonurgent orthopedic cases, affecting their patients and their resident education. Although poorly equipped with the necessary PPE, Dr. David Samaroo, the head of orthopedic surgery at Georgetown Hospital in Guyana, believes his experience with Op Walk missions will help his team. “We are learning and doing new things. Our previous experiences dealing with numbers, large volumes, like we did in the past two Operation Walk missions has really helped.” In Vera Cruz Mexico, Dr. Octavio Amador says his team's experience working for years with Walk Strong Foundation has given them a “can do” mentality in any situation. His nurses have been confident creating their own PPE (Fig. 1).

The Role of the Hip and Knee Surgeon in COVID-19

Although we may not be in the front lines of this battle, as orthopedic surgeons, we still can fill a need in midst of this pandemic and resource shortage. As hip and knee surgeons we have experienced massive practice disruptions including cancellations of all elective procedures, almost nonexistent in-person office visits, and sparing use of ER services. Several health systemwide changes have been implemented across the United States, with a few themes having emerged as essential for orthopedics to manage the current situation.

Throughout this pandemic, we must focus on protecting patients and staff. For patients who still need to be evaluated in clinic, staggered visit times, and staggered X-ray schedules assisted with the mandate of social distancing. A detailed protocol including temperature and risk screening for all patients and staff was necessary to decrease the spread. Patients who screened in for COVID-19 were given a surgical mask and placed in a separate part of the clinic. Staff members who were symptomatic remained at home; if they presented for work and screened out for COVID-19, they wore a surgical mask and practiced standard hand hygiene at all times.

In addition to the precautions mentioned previously, the widespread use of telehealth services has been facilitated by the passing of the CARES act from the Centers for Medicare and Medicaid Services [4]. Most older patients have opted for connecting via telephone, whereas others were enthusiastic to download an application and video conference with their surgeon. Although a physical examination cannot be performed, patients have appreciated connecting with their surgeon during this time of uncertainty. As important as it has been to protect the health of our patients and keep them away from the hospital unless absolutely necessary, addressing the mental well-being of our patients has been just as important, as we are all enduring this together.

Requests have been made for surgeons and staff (including orthopedic trainees) to be redeployed throughout health systems in an effort to support our colleagues and to prepare for a potential surge of COVID patients. It has been heartwarming to see orthopedic surgeons and residents stepping out of their comfort zone to care for patients in any way necessary. However, a rise in the daily COVID burden does not obviate the need for orthopedic services, and it is equally important to shield a portion of our surgeons so they can maintain essential orthopedic functions. As it applies to arthroplasty, we needed to be available to treat patients with periprosthetic fractures, acute periprosthetic infections, and revision patients with severe osteolysis who are at risk of fracture without prompt treatment. Forging successful partnerships with the ED has been critical. Patients that have screened out for COVID-19 should be evaluated primarily in the orthopedic clinic so that beds could be available for COVID-19 patients; this collaboration has been very helpful for our ER colleagues.

The orthopedic community has come together like never before to adapt to the COVID-19 crisis. We are in hope that the marketplace will soon return to some semblance of normalcy, so that we could once again employ elective procedures to treat our patients with lower extremity degenerative joint disease. Although a contraction in the market is likely due to patient unemployment, loss of health care benefits, and inability to take time off, our subspecialty will continue to provide tremendous service to our patients when the time comes—and we will be ready.

Predicting Future Need After COVID-19

This current pandemic has crippled countries around the world. We are all stunned by both the magnitude of disruption to our technologically advanced society and our failure to prepare for what many called inevitable [5,6]. Our current battle against this virus entails slowing its spread and putting all possible health care resources into supportive care of the severely ill. At this point, the societal and financial impact are incalculable. Although we can learn from past experience and make projections when the disease will peak, this is a different virus and the world is a much different place than in past pandemics. As surgeons and citizens, we will need to help others in what is a humanitarian crisis.

Past pandemics including the Influenza of 1918 (the Spanish flu) and the SARs epidemic in 2003 demonstrated 2nd waves as precautions were lifted early [7]. Although the world is eager to move on, until we are certain of control, we will continue to have outbreaks. Here we will need to be vigilant as we resume elective cases. We will also have to be aware of the at-risk populations domestically and internationally. From a humanitarian perspective, those with fewer resources and access are hit hardest. Not only is this a historical worldwide perspective, but it is evident in today's crisis here in the United States, where a disproportionate number of infections and deaths are occurring in black Americans [8,9]. Immigrants and refugees within our own country have been known to be a vulnerable population; the native American population had a 4- to 5-times mortality rate from H1N1 [8,10]. The impact will be greater in developing countries. The drain on resources of already poor health care systems with weak infrastructures will be unsustainable. Hardest hit will be countries already in humanitarian crises with corrupt governments and those with refugees [11,12]. With the diversion of health care resources to the immediate need, the underlying disparities are widened. Refugees in many countries already are a humanitarian crisis. Given their close living spaces, poverty, and xenophobia, their conditions will worsen [12,13]. Areas of armed conflict are particularly susceptible to lack of resources and care. During the Ebola epidemic in West Africa, there were 11,300 deaths related directly to the outbreak and more than 10,600 attributed to reduced access for treatment of malaria, HIV, and tuberculosis [13].

The global economic impact is certain to be devastating, but without understanding where we are in the course of this pandemic, it is too early to forecast. In addition to the health care burdens and circumstances outlined previously, the interdependence of our global economy will remain disrupted as we recover from this initial outbreak. Disruptions to supply chains and borders closed to travel will continue to suppress economies as countries emerge from the crisis. A global recession is likely [14].

The economic effects in our country, on our patients, and on our practices will be evident and is discussed further in the supplement by Iorio et al. After the last recession in 2009, elective surgeries decreased, and the rate of cancellations of elective joint arthroplasty for financial reasons increased [15]. In a survey of AAHKS members, Iorio et al found a 30.4% decrease in surgical volume and a 29.3% in outpatient visits [16,17]. Lack of insurance, paid time off, and financial constraints will greatly impact access and volumes. It

will be necessary for us moving forward to consider how to care for the underinsured, to increase value in health care delivery, and to help those who will need to delay care. This can be accomplished with more efficient visits and evidenced-based practices [18]. The use of telemedicine offers an opportunity to deliver care at the least overall cost for some visits.

Because of the global economic crisis, nongovernmental organizations are currently overwhelmed and their pre-existing financial weaknesses will become increasingly problematic [19–21]. Those in the medical sector have difficulty obtaining PPE. As the burden of those infected across the world increase, financial and medical resources will become sparse. Limits on travel and lack of supplies from developed countries will add to this burden, and their recoveries will be slow.

We have seen the difficulties here in the United States at a very early stage in this pandemic. New York City's health care system has been overwhelmed. We can only guess the ultimate financial impact. It is clear that the COVID pandemic is and will continue to be a humanitarian crisis with far-reaching consequences [9]. Rapid spread of this virus is attributable to the interconnected nature of today's world. Just as the collaborative nature of our societies led us to this point, our best response would be a unified one, involving governments and private organizations all over the world to build an infrastructure for managing the current issues and to detect and avoid future pandemics. Developed countries will need to support less developed ones and share best practices and knowledge [9]. Although we see telemedicine and newer technologies as a means to care for our patients while social distancing, it can revolutionize the care for those without any access in underserved parts of the world both with direct care and education. Newer technologies, such as artificial intelligence, are currently being used to screen and identify patients [22].

As arthroplasty surgeons, we are not leading the fight in the front lines, but we can do our part now and in the future. The humanitarian needs during and after COVID-19 will be great and varied across the world. Given the compassion that brought us into medicine and the drive to fix things that took us into arthroplasty, as long as we remain aware of the need, our contribution will be a given.

AAHKS Commitment

The humanitarian efforts of our members, either as individuals or as part of organizations such as the multiple Operation Walk chapters, need to be recognized and appreciated by us all. In light of this, the AAHKS Humanitarian Committee will aim to identify and highlight the work of our "AAHKS Heroes" quarterly on the AAHKS Humanitarian Endeavors website. We will also continue to recognize the recipient of the AAHKS Humanitarian Award at the annual meeting. There are multiple ways to make an impact, and we ask our membership to tell us of those who are.

The AAHKS Board of Directors with membership approval recently established AAHKS Global Outreach which is pending 501 c(3) approval. The goal is to use this to assist our members and approved organizations in facilitating humanitarian work. This will include accepting and redistributing charitable contributions from sources such as other national foundations and implants and supplies from the medical industry. The foundation also could negotiate group contracts with airlines, shippers, and other suppliers for the benefit of all Operation Walk chapters and other similar ventures.

In an increasingly globalized world, the AAHKS remains committed to efficiently developing resources for humanitarian work as needed to address challenges in our local and international communities.

References

[1] Pearl R. 3 things U.S. medicine can learn from a global humanitarian nonprofit. Forbes; 2017. https://www.forbes.com/sites/robertpearl/2017/08/14/can-a-humanitarian-nonprofit-help-save-american-healthcare/#3a5988776a50 [accessed 11.04.20].

[2] Scheffler R. Forecasting the global shortage of physicians: an economic- and needs-based approach. Bull World Health Organ 2008;86(7):516.

[3] Maki J, Qualls M, White B, Kleefield S, Crone R. Health impact assessment and short-term medical missions: a methods study to evaluate quality of care. BMC Health Serv Res 2008;8:121.

[4] American Medical Association. CARES Act: AMA COVID-19 pandemic telehealth fact sheet. American Medical Association; 2020. https://www.ama-assn.org/delivering-care/public-health/cares-act-ama-covid-19-pandemic-telehealth-fact-sheet [accessed 11.04.20].

[5] Daugherty EL, Carlson AL, Perl TM. Planning for the inevitable: preparing for epidemic and pandemic respiratory illness in the shadow of H1N1 influenza. Clin Infect Dis 2010;50:1145.

[6] Fineberg HV. Pandemic preparedness and response — lessons from the H1N1 influenza of 2009. N Engl J Med 2014;370:1335.

[7] Vannabouathong C, Devji T, Ekhtiari S, Chang Y, Phillips SA, Zhu M, et al. Novel Coronavirus COVID-19: Current Evidence and Evolving Strategies. J Bone Joint Surg Am 2020. https://doi.org/10.2106/JBJS.20.00396.

[8] Yancy CW. COVID-19 and African Americans. JAMA 2020. https://doi.org/10.1001/jama.2020.6548.

[9] Jola-Sanchez AF. Humanitarian response to COVID-19. In: The Takeaway. College Station, TX: Mosbacher Institute; 2020.

[10] Control CfD, Prevention. Deaths related to 2009 pandemic influenza A (H1N1) among American Indian/Alaska Natives-12 states, 2009. MMWR Morb Mortal Wkly Rep 2009;58:1341.

[11] Flecknoe D, Charles Wakefield B, Simmons A. Plagues & wars: the 'Spanish Flu' pandemic as a lesson from history. Med Confl Surviv 2018;34:61.

[12] Lau LS, Samari G, Moresky RT, Casey SE, Kachur SP, Roberts LF, et al. COVID-19 in humanitarian settings and lessons learned from past epidemics. Nat Med 2020. https://doi.org/10.1038/s41591-020-0851-2.

[13] Parpia AS, Ndeffo-Mbah ML, Wenzel NS, Galvani AP. Effects of response to 2014–2015 Ebola outbreak on deaths from malaria, HIV/AIDS, and tuberculosis, West Africa. Emerg Infect Dis 2016;22:433.

[14] Fernandes N. Economic effects of coronavirus outbreak (COVID-19) on the world economy. SSRN; 2020. https://dx.doi.org/10.2139/ssrn.3557504 [accessed 13.04.20].

[15] Klein GR, Parcells BW, Levine HB, Dabaghian L, Hartzband MA. The economic recession and its effect on utilization of elective total joint arthroplasty. Am J Orthop (Belle Mead NJ) 2013;42:499.

[16] Iorio R, Davis 3rd CM, Healy WL, Fehring TK, O'Connor MI, York S. Impact of the economic downturn on adult reconstruction surgery: a survey of the American Association of Hip and Knee Surgeons. J Arthroplasty 2010;25:1005.

[17] Fujihara N, Fujihara Y, Sterbenz JM, Shauver MJ, Chung T-T, Chung KC. Impact of economic downturn on the surgical volumes of common hand procedures. Plast Reconstr Surg 2019;143:340e.

[18] Menendez ME, Jawa A, Haas DA, Warner JJP. Orthopedic surgery post COVID-19: an opportunity for innovation and transformation. J Shoulder Elbow Surg 2020. https://doi.org/10.1016/j.jse.2020.03.024.

[19] Institute of Fundraising. Coronavirus Impact Survey Results: Charities Cannot Meet the Surge in Demand for Services without Urgent Funding from the Government. Institute of Fundraising; 2020. https://www.institute-of-fundraising.org.uk/news/coronavirus-impact-survey-results-charities-cannot-meet-the/ [accessed 13.04.20].

[20] O'Connell S. How to reform NFO funding so we can deal with threats like COVID-19. In: World economic forum; 2020.

[21] Gharib M. Aid groups say they've never faced a challenge like the novel coronavirus. In: National public radio; 2020.

[22] Wittbold K, Carroll C, Iansiti M, Zhang HM, Landman AB. How Hospitals Are Using AI to Battle COVID-19. Harvard Business Review; 2020. https://hbr.org/2020/04/how-hospitals-are-using-ai-to-battle-covid-19 [accessed 12.04.20].