

Orthopaedic Outreach: Getting Involved

Theodore Miclau, M.D.

Department of Orthopaedic Surgery
University of California, San Francisco



The Problem: Disproportionate Burden

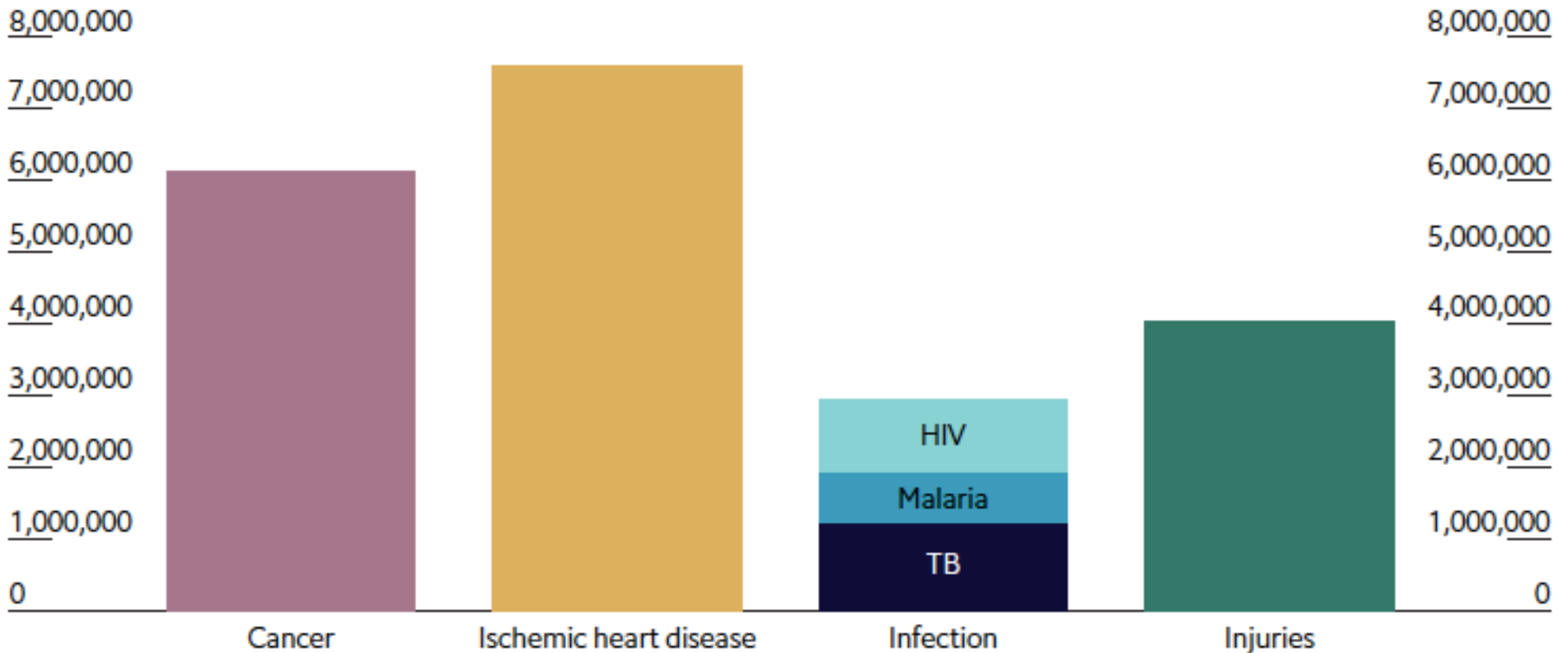
Global burden of musculoskeletal conditions disproportionately affects LMICs



The Problem: Mortality

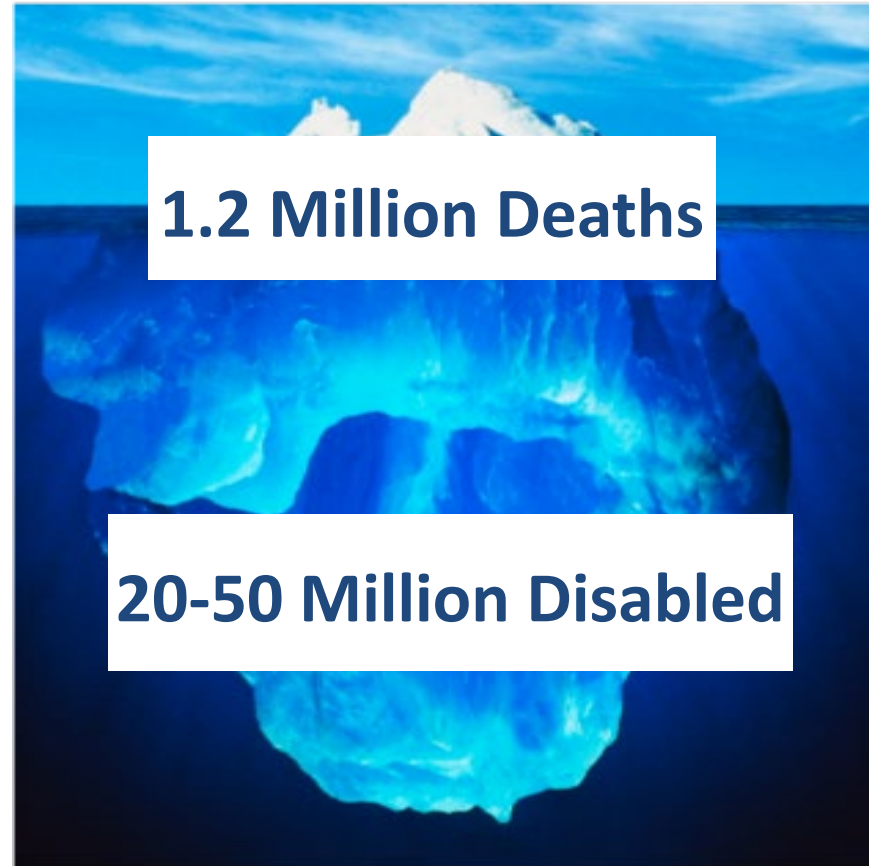
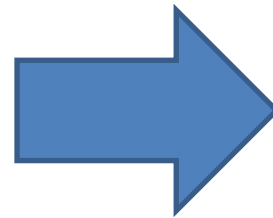
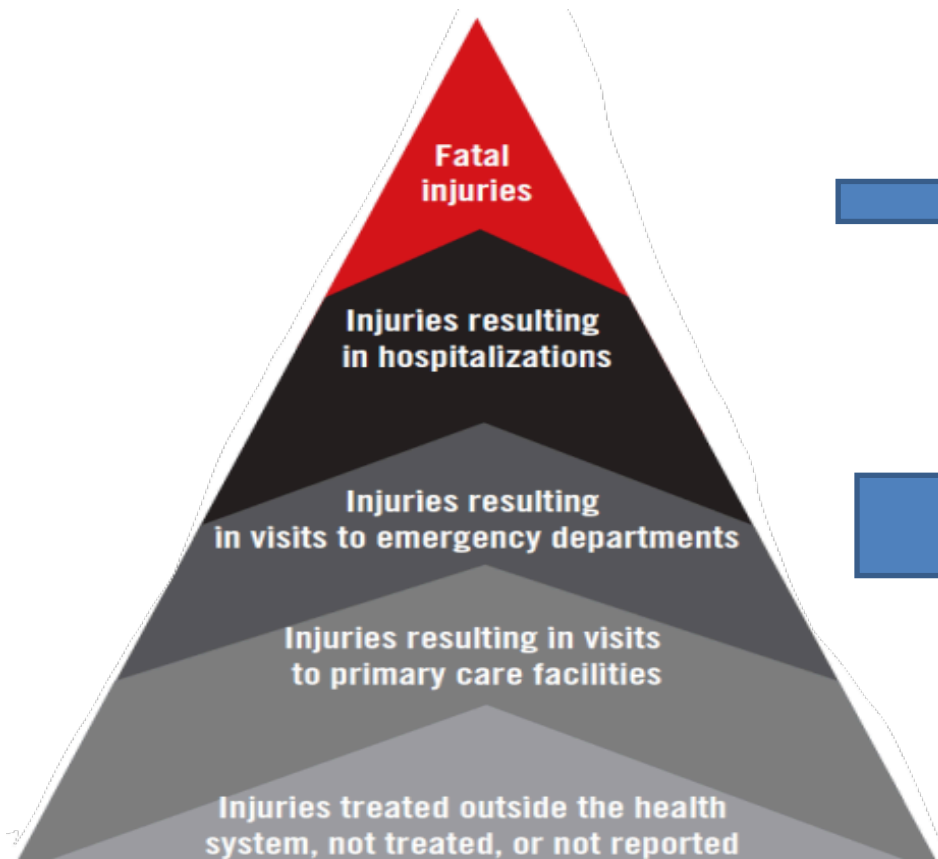
Figure 1: Total number of deaths caused by injuries, infection (HIV, malaria & TB), ischemic heart disease and cancer in LMICs in 2016

(number)



Source: Global Burden of Disease, IHME 2016.

The Problem: Disabilities



WHO, 2018

The Problem: Lack of Access

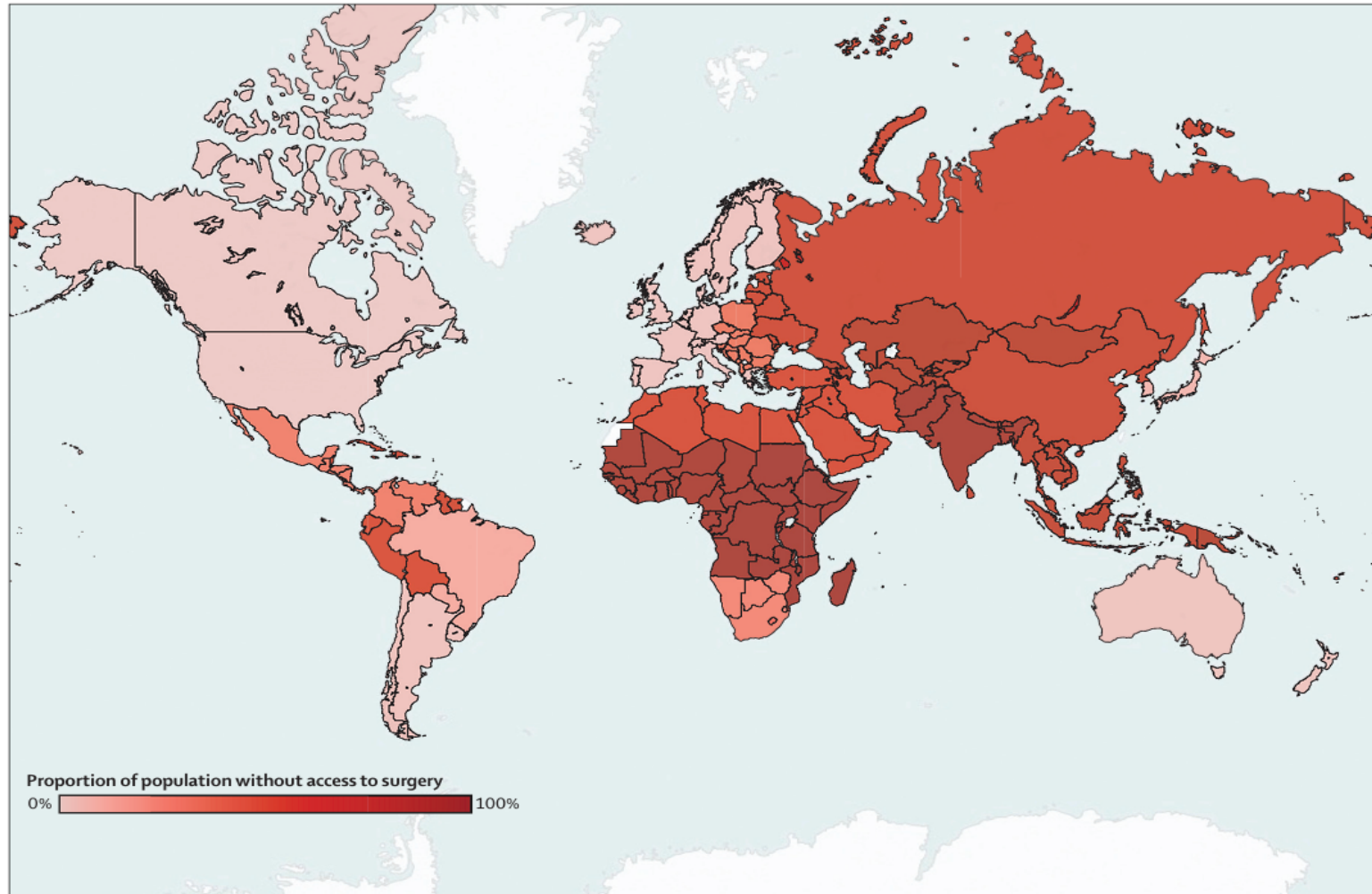
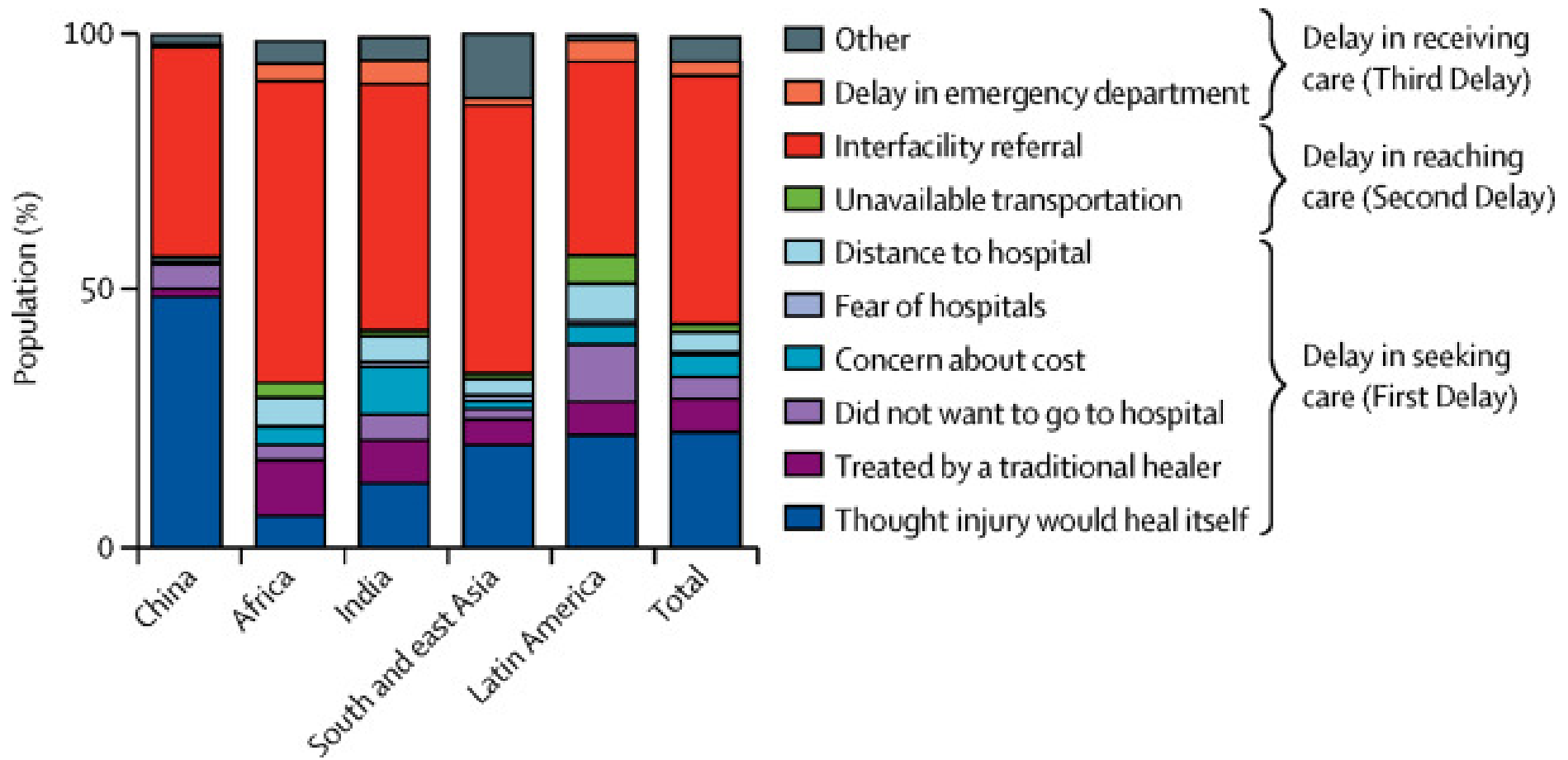


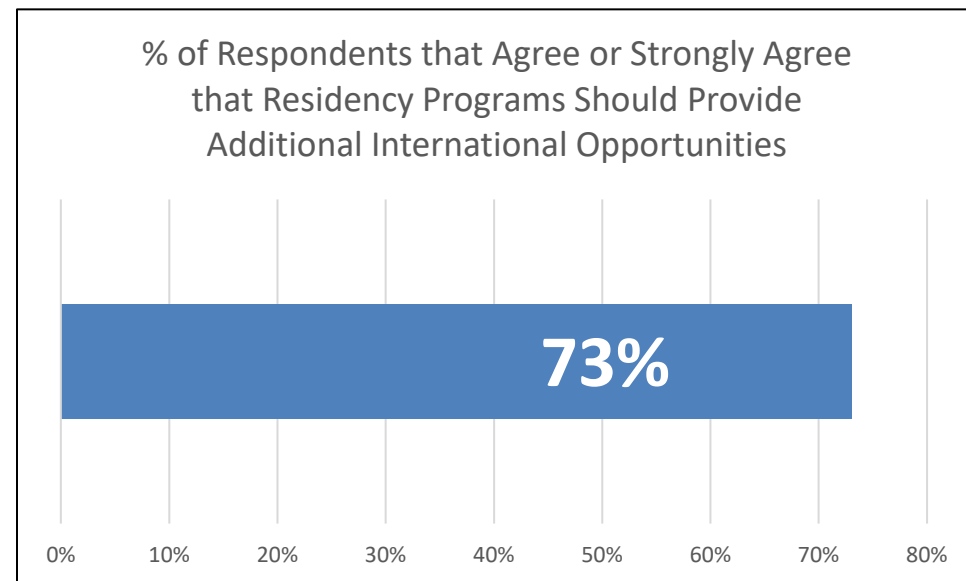
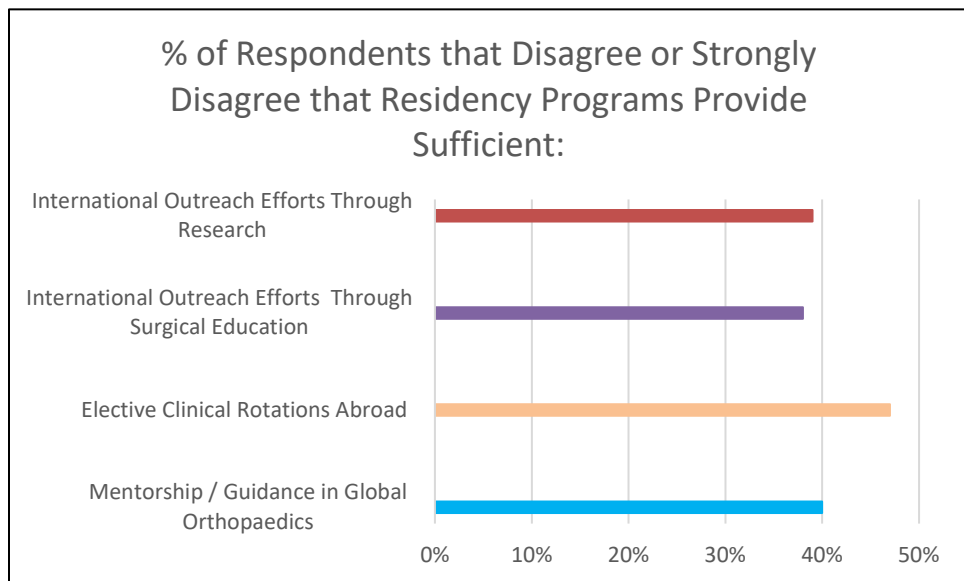
Figure 2: Proportion of the population without access to safe, affordable surgery and anaesthesia by Institute for Health Metrics and Evaluation region (selective tree)^{25,29}

The Problem: Delays in Care



Desire to be Part of the Solution

Assessing Resident Perceptions and Needs: Global Orthopaedics Opportunities in Residency Programs



N=300 residents from 30 US & Canadian Residency Programs – Identified Through COACT



Objectives

Getting Involved

(Challenges, Solutions, Considerations):

- Clinical Care
- Disaster Response
- Surgical Education
- Clinical Research
- Advocacy

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THE ORTHOPAEDIC FORUM

International Orthopaedic Volunteer Opportunities in Low and Middle-Income Countries

Theodore Miklau, MD, Madeline C. MacKechnie, MA, Christopher T. Born, MD, Michael A. MacKechnie, MD, CM, FRCS, George S.M. Dyer, MD, Brandon J. Yuan, MD, John Dawson, MD, Cassandra Lee, MD, Chad R. Ishmad, MD, Verena M. Schreiber, MD, Nirmal C. Tejwani, MD, FRCS, MPA, Todd Ulmer, MD, David W. Shearer, MD, MPH, Kiran J. Agarwal-Harding, MD, MPH, Herman Johal, MD, MPH, FRCS, Sariah Khormae, MD, PhD, Sheila Sprague, PhD, Paul S. Whiting, MD, Heather J. Roberts, MD, Richard Coughlin, MD, Rich Gosselein, MD, Melvin P. Rosenwasser, MD, Anthony Johnson, MD, FAAOS, FACS, FAOA, Jacob M. Babu, MD, MHA, Myles Dworkin, MD, MPH, Melvin C. Makhni, MD, MBA, Trigg McClellan, MD, Chinenye O. Nwachuku, MD, FAAOS, Elizabeth Midau, and Saam Morshed, MD, PhD

Investigation performed at the University of California, San Francisco, San Francisco, California

Abstract: Globally, the burden of musculoskeletal conditions continues to rise, disproportionately affecting low and middle-income countries (LMICs). The ability to meet these orthopaedic surgical care demands remains a challenge. To help address these issues, many orthopaedic surgeons seek opportunities to provide humanitarian assistance to the populations in need. While many global orthopaedic initiatives are well-intentioned and can offer short-term benefits to the local communities, it is essential to emphasize training and the integration of local surgeon-leaders. The commitment to developing educational and investigative capacity, as well as fostering sustainable, mutually beneficial partnerships in low-resource settings, is critical. To this end, global health organizations, such as the Consortium of Orthopaedic Academic Traumatologists (COACT), work to promote and ensure the lasting sustainability of musculoskeletal trauma care worldwide. This article describes global orthopaedic efforts that can effectively address musculoskeletal care through an examination of 5 domains: clinical care, clinical research, surgical education, disaster response, and advocacy.

The rising burden of musculoskeletal conditions worldwide continues to disproportionately affect low and middle-income countries (LMICs), with >95% of all injury-related deaths occurring in low-resource settings. Because LMICs often lack resources,

infrastructure, and health-care capacity to effectively manage complex injuries, the ability to meet these orthopaedic surgical care demands remains a challenge¹⁻³. While North America-based humanitarian outreach and volunteer service missions

Disclosure: The Disclosure of Potential Conflicts of Interest forms are provided with the online version of the article (<http://links.lww.com/JBJS/G840>).

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THE ORTHOPAEDIC FORUM

Opportunities for International Orthopaedic Volunteerism

An Exploration of United States and Canada-Based Nonprofit Organizations

Kelsey E. Brown, BA*, Rafat H. Solaiman, BA*, Michael J. Flores, BS, Haley Nadone, BS, Maddine C. MacKechnie, MA, David W. Shearer, MD, MPH, and Theodore Miclau, MD

Investigation performed at the University of California San Francisco, San Francisco, California

Background: In low and middle-income countries (LMICs), there are often not enough orthopaedic surgeons to treat musculoskeletal conditions. International volunteerism is 1 way that the orthopaedic community seeks to meet this need. This study explored the opportunities available for orthopaedic surgeons to volunteer overseas as offered by nonprofit organizations in the United States and Canada.

Methods: A systematic Internet search was conducted using 2 distinct search strategies. A website was considered a "hit" if it was that of a U.S. or Canada-based nonprofit, volunteer, or non-governmental organization that had opportunities for international orthopaedic volunteerism. Duplicate hits were eliminated to identify distinct organizations. Data regarding the work and geographical reach of the organization, as well as changes to its volunteer programs as a result of COVID-19, were extracted from each hit.

Results: Of the 38 distinct organizations identified in the U.S. and Canada, the most common orthopaedic subspecialties represented were pediatrics (37%), hand (24%), and arthroplasty (18%). Foot and ankle (4 organizations; 11%), sports medicine (2 organizations; 5%), and oncology (1 organization; 3%) were the least represented subspecialties. The most common regions for volunteer trips included Latin America and the Caribbean, followed by West and East Africa. Twelve organizations (32%) were identified as having a religious affiliation. For most organizations, the trip duration was a minimum of 1 week. All volunteer organizations included operative or clinical experiences as part of their trips, and the majority of organizations (58%) reported that their trips included opportunities for training local surgeons. Many organizations (71%) reported having resumed trips after halting them during the COVID-19 pandemic.

Conclusions: Many opportunities exist for orthopaedic surgeons to volunteer their time and skills abroad. Future directions for the improvement of international volunteer efforts among the orthopaedic community could include expanding the number of existing volunteer opportunities and assessing the ethics, safety, efficacy, and longevity of these programs.

The surgical burden of musculoskeletal conditions worldwide is substantial, particularly in low and middle-income countries (LMICs)¹. Although the estimated mortality from

musculoskeletal conditions has decreased since 1990, these conditions represent 33% of all disability-adjusted life years lost in LMICs². In many LMICs, there are not enough orthopaedic

*Kelsey E. Brown, BA, and Rafat H. Solaiman, BA, contributed equally to this work.

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Clinical Care: Challenges

Factors	Implications
<ul style="list-style-type: none">• Rapid urbanization• Poor implementation of safety measures• High rates of motor vehicle use	<ul style="list-style-type: none">• Increased prevalence of musculoskeletal injury
<ul style="list-style-type: none">• Infrastructural and resource limitations• Political and socioeconomic challenges	<ul style="list-style-type: none">• Reduced access to health services• Complex musculoskeletal pathology & disability
<ul style="list-style-type: none">• Corruption• Theft• Personal safety concerns• Unfavorable conditions	<ul style="list-style-type: none">• Deterrents to financial aid, institutional support and organization of clinical volunteers
<ul style="list-style-type: none">• Social, religious and political discrepancies	<ul style="list-style-type: none">• Local distrust in the quality of care provided

Clinical Care: Solutions - Volunteerism

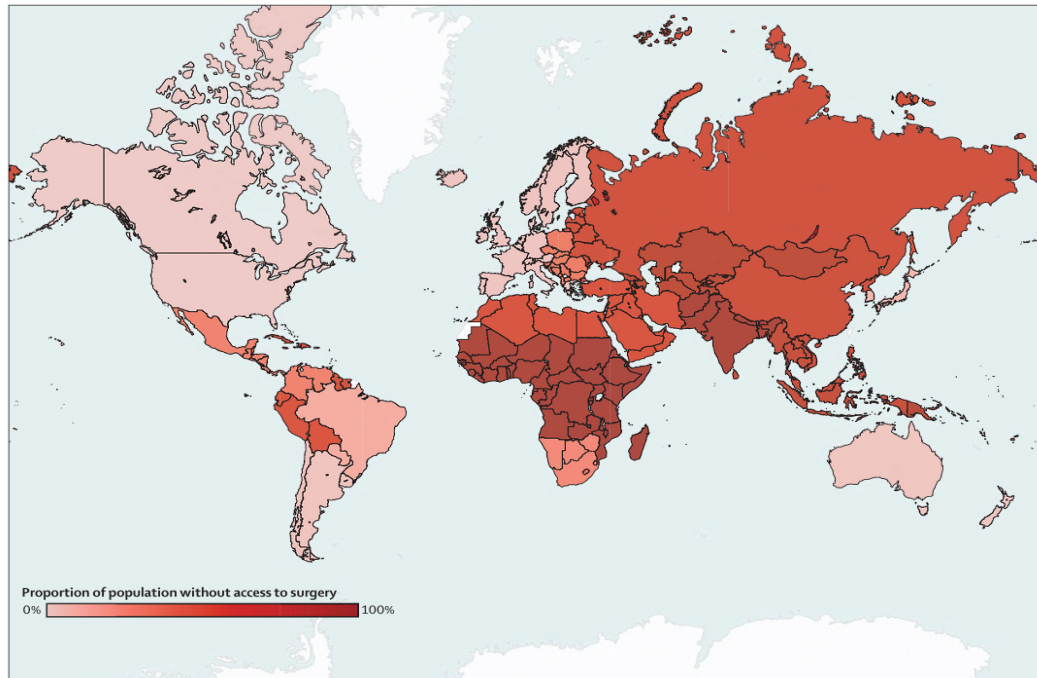


Figure 2: Proportion of the population without access to safe, affordable surgery and anaesthesia by Institute for Health Metrics and Evaluation region (selective tree)^{25,29}

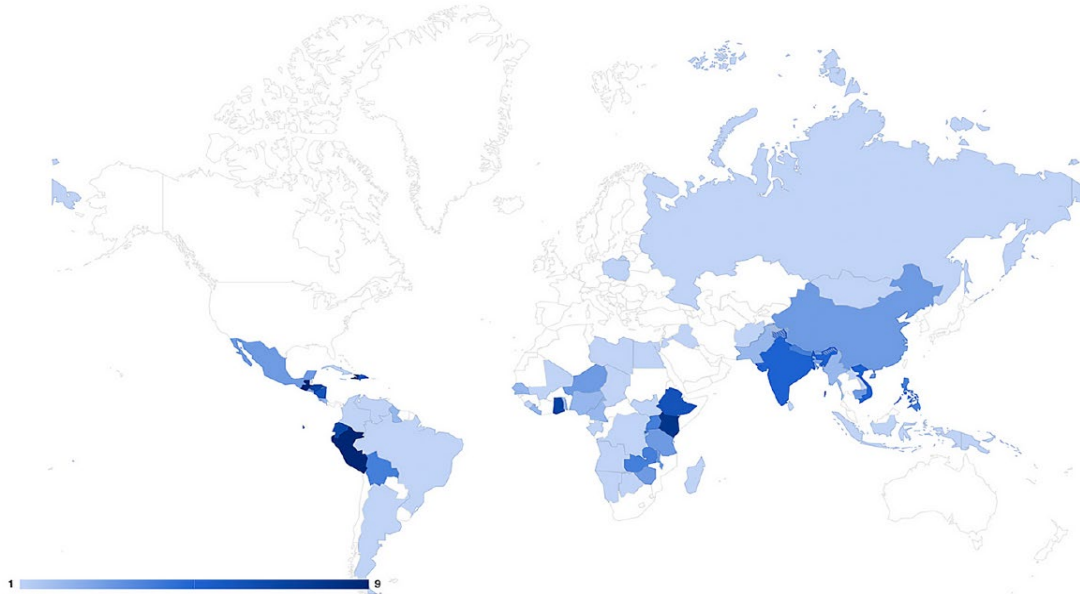


Fig. 2
Geographical distribution of orthopaedic volunteer trips.

Clinical Care: Solutions - Volunteerism

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TABLE | Volunteer Organization and Trip Details*

Trip Duration	Organization Name	Religious Affiliation	Housing Provided	Food Provided	Suitable for Partners	Suitable for Children	Participant Program Fee	Fundraising Support	Resident Opportunity
1 week	Bayside Medical Missions	Y							✓
1 week	Centura Health	Y	✓	✓	✓	✓			
1 week	Children's Surgery International	N	✓	✓				X	
1 week	Esperança	N	✓	X	✓	✓			
1 week	Faith In Practice	Y	✓	✓				✓	
1 week	Guatemala Healing Hands Foundation	N							✓
1 week	Health and Educational Relief Organization	N	✓	✓					
1 week	Medical Mission Ecuador	N	✓	X					
1 week	MNO Foundation	Y				✓			✓
1 week	Operation Rainbow	N							✓
1 week	Operation Walk	N							
1 week	Pediatric Orthopedic Project	N							
1 week	Saving Lives Initiatives	N							
1 week	Scalpel At The Cross	Y	✓				✓	X	
1 week	The Shalom Foundation	Y						X	✓
1 week	Steps2Walk	N							
1 week	Surgicorps International	N	X	X			✓	✓	✓
1-2 weeks	One World Surgery	N	✓	✓	✓	✓		X	
1-2 weeks	SIGN Fracture Care	N							✓
1-2 weeks	Touching Hands	N	✓	✓				✓	✓
1 week-1 month	Health Volunteers Overseas	N	✓	✓	✓	✓		✓	✓
1 week-1 month	Project Medishare for Haiti	N	✓	✓			✓		
1 week-1 month+	Making a Difference Foundation	N	✓	✓	✓		✓	✓	✓
2 weeks-1 month+	Foundation of Orthopedics and Complex Spine	N							✓
2 weeks-1 month+	Mercy Ships	Y	✓	✓	✓	✓	✓	✓	✓
6 months+	Catholic Medical Mission Board	Y	✓					✓	
Not specified	Bridges Global Medical Missions								
Not specified	Canadian Association of Medical Teams Abroad	N							✓
Not specified	Canvasback Missions	Y							✓
Not specified	CURE International	Y							✓
Not specified	Global Surgical and Medical Support Group	N							
Not specified	IMAHelps	N				✓			
Not specified	Libyan Healthcare Education and Research Organization	N							
Not specified	Meant 2 Live Foundation	Y							
Not specified	Palestine Children's Relief Fund	N							
Not specified	Samaritan's Purse	Y	✓	✓					✓
Not specified	World Pediatric Project	N							
Not specified	World Spine Care	N							

*Not all volunteer trip details were reported by each organization.

Clinical Care: Solutions – Organizational

Advancement of local healthcare capacities:

- Clinical
- Financial
- Technical
- Material
- Technological



Clinical Care: Considerations

Considerations for Volunteers:

- Lack of financial aid
- Poor facility support
- Corruption
- Theft
- Personal safety
- Unfavorable local conditions



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Clin Orthop Relat Res (2012) 470:2895–2904
DOI 10.1007/s11999-012-2333-4

CLINICAL RESEARCH

Critically Assessing the Haiti Earthquake Response and the Barriers to Quality Orthopaedic Care

Daniel B. Sonshine BA, Amber Caldwell BA,
Richard A. Gosselin MD, MSc, MPH, FRCS(C),
Christopher T. Born MD, R. Richard Coughlin MD, MSc

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Abstract

Background Although numerous authors have described surgical experiences following major disasters, little is

known regarding the needs of and barriers to care faced by surgeons during such disasters.

Questions/purposes We therefore (1) identified and compared recurrent interview themes essential to the disaster response following the 2010 Haiti earthquake; (2) determined the difference in reported disaster equipment management task difficulty between disaster-trained and untrained volunteers; and (3) approximated the quantity of various procedures performed.

Methods We conducted 14 interviews with selected orthopaedic surgeon volunteers. We also invited the 504 members of the American Academy of Orthopaedic Surgeons (AAOS), who registered as Haiti earthquake volunteers, to complete an online survey; 174 (35%) completed the survey and 131 (26%) were present in Haiti during the 30 days after the earthquake. Recurrent interview themes were identified, quantified, and compared using Poisson regression analysis. The difference in disaster equipment management difficulty scores was determined with a Wilcoxon rank-sum test.

Results Of 10 recurrent interview themes, group organization (31 occurrences) was mentioned much more often than all but two of the remaining nine themes. Compared with disaster-untrained respondents, equipment management

One of the authors (CTR) is a consultant for Stryker Orthopaedics (Mahwah, NJ, USA) and IlluminOs Medical, Inc. (East Providence, RI, USA); owns stock from Biolattice (Irvine, CA, USA) and IlluminOs; has received research funding from the Airlift Research Foundation (Pittsburgh, PA, USA) and the Stein-Bellet Foundation (Philadelphia, PA, USA); and has received research materials from Stryker Orthopaedics. The remaining authors certify that they, or a member of their immediate family, have no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

All KEMIS Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research* editors and board members are on file with the publication and can be viewed on request.

Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participants in the study was obtained.

All work was performed at the Orthopaedic Trauma Institute, San Francisco, CA, USA.

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D. B. Sonshine
Weill Cornell Medical College, New York, NY, USA

D. B. Sonshine (✉), R. A. Gosselin
Institute for Global Orthopaedics and Traumatology, University of California, San Francisco, San Francisco, CA, USA
e-mail: sonshimed@orthosurg.ucsf.edu

D. B. Sonshine, A. Caldwell, R. A. Gosselin, R. R. Coughlin
Orthopaedic Trauma Institute, San Francisco General Hospital,
2550 23rd Street, Building 9, 2nd Floor, San Francisco,
CA 94110, USA

A. Caldwell, R. R. Coughlin
Department of Orthopaedic Surgery and Institute for Global
Orthopaedics and Traumatology, University of California,
San Francisco, San Francisco, CA, USA

R. A. Gosselin
School of Public Health at University of California,
Berkeley, Berkeley, CA, USA

C. T. Born
Department of Orthopaedic Surgery, Brown University
and Rhode Island Hospital, Providence, RI, USA

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Disaster Response: Challenges

Mass casualty incidents and natural disasters in lesser-resourced regions:

- Overwhelm regional health care capacities
- Require population-based care and the conservation of resources
- Attract unaffiliated volunteers without credentials or logistical provisions



Disaster Response: Solutions

- International outreach work is translatable to disaster response
- Predictability, accountability and strengthening of partnerships between response agencies is critical



**United
Nations**

Disaster Response: Considerations

Disaster response volunteers should evaluate:

- Necessity and appropriateness of their services
- Personal motives for participation
- Individual qualifications
- Risks of procedures in austere surgical environments
- Ability to provide adequate postoperative care



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From Mission Trips to Partnerships: The Evolution of International Outreach

Both injury and surgery are now recognized as major global health problems. Injury is the number one cause of death and disability from the ages of 15–49 years, with road traffic injuries being the major contributor, accounting for 1.2 million global deaths and 20–50 million nonfatal injuries annually.^{1,2} At the same time, surgical diseases taken together are estimated to account for 11% of global disability-adjusted life years.³ This burden disproportionately affects low- and middle-income countries (LMICs).⁴

At the intersection of injury and surgery is musculoskeletal injury, which is a burden that has not been well quantified nor has it received the attention given many other health conditions.⁵ The global incidence of femur fractures, just one of many common musculoskeletal injuries, has been estimated to be 2.8 million per year, which exceeds the global incidence of HIV infection.⁶ Even less is known about the unmet burden in LMICs, that is, the proportion of patients with musculoskeletal injury who receive inadequate or no treatment.

There is a long history of volunteerism in LMICs aimed at addressing these disparities in surgical care for victims of musculoskeletal injuries.⁷ This has evolved from short-term surgical missions by individuals to long-standing institutional and organizational partnerships.^{8,9} Examples of this evolution from the nonprofit sector include SIGEN Fracture Care International, which manufactures and donates surgical implants and provides educational material in many forms, and Health Volunteers Overseas, which facilitates educational missions at partner hospitals.¹⁰

At the same time, academic institutions are finding a role in supporting the improvement in global orthopaedic care through collaborative partnership.^{11,12} This comes in many forms: bidirectional exchange of faculty and trainees, various forms of educational events and materials, support for clinical research, technological innovation, and infrastructure development. At the root of all these activities is an effort to build capacity through the academic triad of clinical care, education, and research.

In this supplement issue of the *Journal of Orthopaedic Trauma*, supported by a grant from the Orthopaedic Trauma Association, we aim to highlight a number of examples of successful academic partnerships in orthopaedic surgery, each with a unique focus. Perhaps the largest obstacle to such projects is the lack of financial support. Advocacy for greater government funding and philanthropic support (such as the Wyss Medical Foundation that also provided support for this supplement and the work presented in it) is essential. We wish to acknowledge that this supplement captures only a fraction of the many collaborative efforts that exist in our field, and there is an unintended North American bias among participating institutions. Nonetheless, we hope that this can serve as a valuable resource for readers seeking to learn more about existing models of academic partnership as a means of improving musculoskeletal care globally.

David W. Shearer, MD, MPH
Saam Morshed, MD, PhD
R. Richard Coughlin, MD
Theodore Miclau, MD

From the Orthopaedic Trauma Institute, Institute for Global Orthopaedics and Traumatology, Department of Orthopaedic Surgery, University of California, San Francisco, Zuckerberg San Francisco General Hospital, San Francisco, CA.
The authors report no conflict of interest.
Reprints: David W. Shearer, MD, MPH, Orthopaedic Trauma Institute, Institute for Global Orthopaedics and Traumatology, Department of Orthopaedic Surgery, University of California, San Francisco, Zuckerberg San Francisco General Hospital, 2550 23rd St., Bldg. 9, 2nd Floor, San Francisco, CA, 94110 (e-mail: David.Shearer@ucsf.edu).
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Surgical Education: Challenges

- Volunteer surgical missions provide a safe and cost-effective health intervention
- Surgical missions can:
 - perpetuate dependency
 - disrupt local dynamics
 - be difficult to **sustain**



Surgical Education: Solutions - Organizations

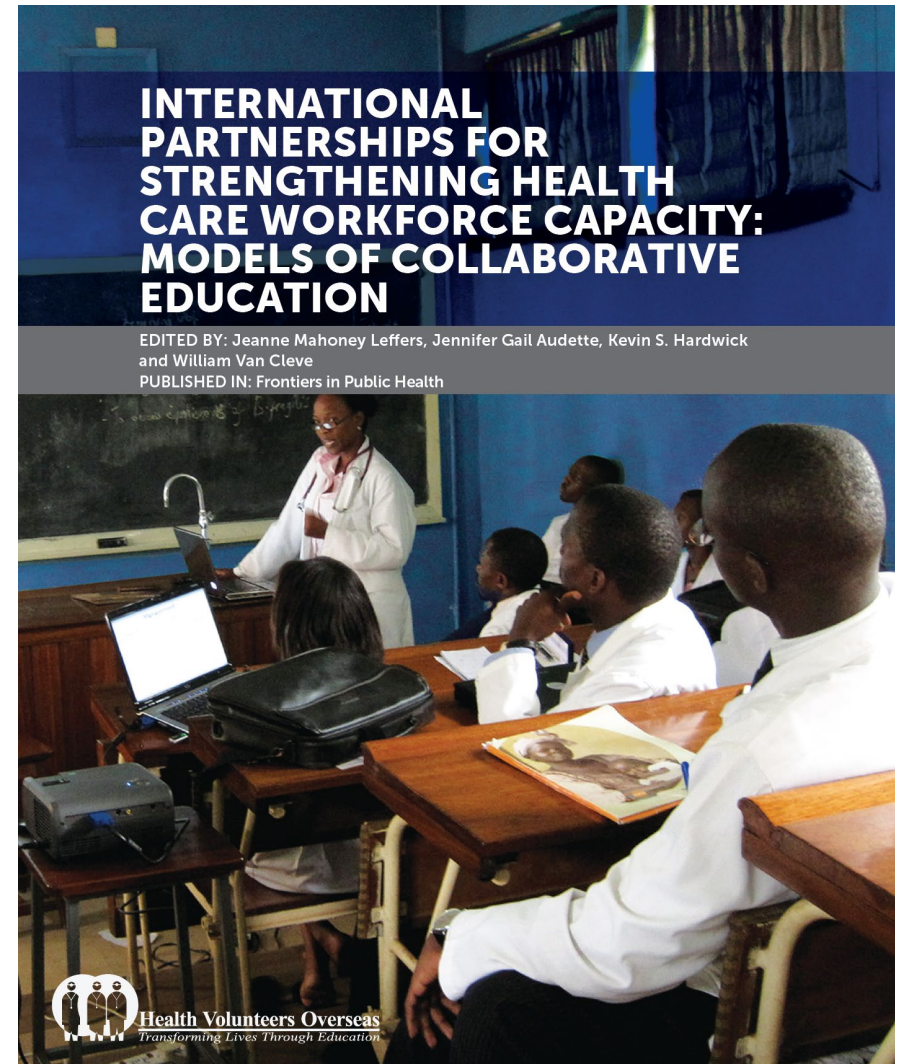


Sustainable development of local surgical capacity can ultimately eliminate the need for external services in time



Surgical Education: Considerations

- Education is the most valuable and durable contribution of a surgical mission
- Sustainable and constructive partnerships should be centered around directed education
- Programs should equip trainees with locally common knowledge and well-rounded didactics



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Models of Academic Partnership in Orthopaedic Surgery in Low- and Middle-Income Countries

Guest Editors: Theodore Miclau, MD and David Shearer MD, MPH

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The views and opinions expressed in this supplement are those of the authors and do not necessarily reflect the views of the editors of *Journal of Orthopaedic Trauma*.

Clinical Research: Challenges

- Global orthopaedic research remains undersupported and underrepresented in LMICs
- Studies from HICs do not necessarily represent problems or solutions faced by LMICs
- Partnerships between institutions in HICs and LMICs are needed develop global research capacity

Orthopaedic Trauma in the Developing World: Where Are the Gaps in Research and What Can Be Done?

Stravya Challa, BS, BA,* Hao-Hua Wu, MD,*† Brian P. Cunningham, MD,‡ Max Liu, BS,* Kushal Patel, MD,* David W. Shearer, MD, MPH,* Saam Morshed, MD, PhD, MPH,* and Theodore Miclau, MD*

Purpose: There are an estimated 1.2 million deaths from road traffic injuries annually, disproportionately affecting patients in low-resource settings. The purpose of this scoping review is to identify knowledge gaps in global orthopaedic trauma in an effort to help prioritize future research.

Methods: Using the 6-stage Arksey and O'Malley framework for conducting a scoping review, orthopaedic trauma literature was reviewed over a ten-year period from 2004 to 2014. Studies from low-resource settings were included and categorized by geographic location, anatomic region, study type, and level of evidence.

Results: Of 548 included studies, 51.4% were from low- and middle-income countries in South Asia and 33.7% were from sub-Saharan Africa. Therapeutic (53.3%), epidemiologic (26.4%), and qualitative (8.9%) studies were most common. Only 10.2% of the studies were considered high level of evidence, whereas the vast majority (89.8%) was level 3 or below. Overall, lower extremity injuries were much more frequently represented in the literature compared with upper extremity injuries (233 vs. 78). Pelvic and acetabular fractures were the least studied anatomic region of the lower extremity (3.4%).

Conclusions: Our study identified a lack of cost-effectiveness analyses pertaining to injury and intervention, paucity of high-quality research, and under-representation of pelvic, acetabular, and upper extremity injuries. Improved and prioritized research in low- and middle-income countries may help optimize care and inform policy makers of how to reduce the global burden of musculoskeletal trauma.

Key Words: musculoskeletal trauma, low resource, quality research, LMICs

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INTRODUCTION

With injury accounting for 11.2% of the total disability-adjusted life-years worldwide, orthopaedic disorders represent a significant proportion of the global burden of disease.¹ Low- and middle-income countries (LMICs) in particular shoulder a disproportionate burden of musculoskeletal disease due to a rise in motor vehicle transportation without concomitant safety laws.^{2,3} Notably, an estimated 1.2 million deaths and 50 million nonfatal injuries occur each year because of road traffic accidents alone, a phenomenon that has prompted the World Health Organization to declare 2011–2020 a decade for road traffic safety.^{2,3} Despite the growing burden of traumatic musculoskeletal disease in LMICs, less than 10% of global research resources are dedicated to the population experiencing 90% of the health problems, known as the 10/90 gap.^{4–6} This deficiency is notable considering how organizations such as the World Health Organization have recognized the importance of locally produced research in the development of effective health care infrastructure.^{4,6,7} To better characterize the disparity affecting orthopaedic trauma literature and identify research gaps, we conducted a scoping review.

Scoping reviews identify the available evidence on a particular topic and delineate the breadth and depth of existing literature, which can assist in knowledge synthesis and inform directions for future research.^{8–11} Although scoping reviews have been conducted for noncommunicable disease in Nepal, reproductive health in sub-Saharan Africa, and global informatics, they are rare in orthopaedics.^{12–15} The few available focus on specific disease processes, such as scoliosis and proximal humerus fractures, without much focus on research conducted in LMICs.^{11,16,17}

Thus, we aim to identify the available literature reporting on the surgical management of traumatic musculoskeletal injury in LMICs through a scoping review. The purpose of this study is to identify research gaps in global orthopaedic trauma and prioritize future research.

METHODS

This study adhered to the Arksey and O'Malley 6-stage framework for a scoping review. Orthopaedic trauma studies conducted in LMICs over the past decade were extracted from

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From the *Orthopaedic Trauma Institute, Institute for Global Orthopaedics and Traumatology, Department of Orthopaedic Surgery, University of California, San Francisco, Zuckerberg San Francisco General Hospital, San Francisco, CA; †University of Pennsylvania, Philadelphia, PA; and ‡Department of Orthopaedic Surgery, University of Illinois at Chicago, Chicago, IL.

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Reprints: Theodore Miclau, MD, Orthopaedic Trauma Institute, Institute for Global Orthopaedics and Traumatology, Department of Orthopaedic Surgery, University of California, San Francisco, Zuckerberg San Francisco General Hospital, 2550 23rd St, Bldg. 9, 2nd Floor, San Francisco, CA 94114 (e-mail: Miclau@orthosurg.ucsf.edu).

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Clinical Research: Challenges

Barriers to research (lack of):

- Time
- Money
- Internal support
- Recognition
- Difficulty publishing
- Networks/organization
- Knowledge of clinical research



Barriers to Clinical Research in Latin America

Kathryn Chomsky-Higgins¹, Theodore A. Miclau², Madeline C. Mackechnie^{3,4}, Dino Aguilar⁵, Jorge Rubio Avila⁶, Fernando Baldy dos Reis⁷, Roberto Balmaseda⁸, Antonio Barquet⁹, Alfredo Ceballos¹⁰, Fernando Contreras¹¹, Igor Escalante¹², Nelson Elias¹³, Sergio Iriarte Vincenti¹⁴, Christian Lozano¹⁵, Fryda Medina¹⁶, Gavino Merchan¹⁷, Julio Segovia¹⁸, Enrique Guerado¹⁹, Jose Eduardo Quintero²⁰, Saam Morshed²¹, Mohit Bhandari²¹ and Theodore Miclau III²¹*

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Quality, USA

***Correspondence:**
Theodore Miclau III
miclau@orthosurg.ucsf.edu

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¹San Francisco – East Bay Surgery Program, University of California, Oakland, CA, USA, ²Stanford University, Palo Alto, CA, USA, ³Department of Orthopaedic Surgery, Institute for Global Orthopaedics and Traumatology (IGOT), University of California, San Francisco, CA, USA, ⁴Department of Orthopaedic Surgery, Orthopaedic Trauma Institute, Zuckerberg San Francisco General Hospital and Trauma Center, San Francisco, CA, USA, ⁵Hospital Vivian Palles, Managua, Nicaragua, ⁶Clinica Medica Sur, Guadalajara, Mexico, ⁷Federal University of Sao Paulo, Sao Paulo, Brazil, ⁸Department of Orthopaedic Surgery, Centro de Investigaciones Médico-Quirúrgicas (CIMEQ), La Habana, Cuba, ⁹Department of Traumatology and Orthopaedics, AEPISM, Montevideo, Uruguay, ¹⁰Department of Orthopaedic Surgery, Centro de Investigaciones Médico-Quirúrgicas (CIMEQ), La Habana, Cuba, ¹¹Hospital San Juan de Dios, San José, Costa Rica, ¹²Hospital Universitario de Caracas, Caracas, Venezuela, ¹³Vila Velha Hospital, Espírito-Santo, Brazil, ¹⁴Hospital San Gabriel and Clínica del Sur, La Paz, Bolivia, ¹⁵Clinica Anglo Americana, Lima, Peru, ¹⁶Hospital de Traumatología Instituto Mexicano del Seguro Social, Mexico City, Mexico, ¹⁷Hospital de la Policía Nacional, Guayaquil, Ecuador, ¹⁸Instituto de Previsión Social, Servicio de Ortopedia y Traumatología, Asunción, Paraguay, ¹⁹Department of Orthopaedic Surgery, Traumatology, and Rehabilitation, University of Malaga, Hospital Costa del Sol, Marbella, Málaga, Spain, ²⁰Hospital Universitario San Jorge, Clínica de Ortopedia y Traumatología, Pereira-Risaraldó, Colombia, ²¹Division of Orthopaedic Surgery, McMaster University, Hamilton, ON, Canada

Enhancing health research capacity in developing countries is a global health priority. Understanding the orthopedic burden of disease in Latin America will require close partnership between more-developed and less-developed countries. To this end, the Osteosynthesis and Trauma Care Foundation assembled a research consortium of Latin-American orthopedic leaders. Prior to the meeting, we surveyed attendees on perceived barriers to conducting research at their institutions. During the event, working groups discussed these barriers, developed strategies for addressing them, and planned future steps for collaboration. The participants established the need for global relationships that allow colleagues from Latin America to access to training and established investigational infrastructure of North American centers to address research questions relevant to their communities. As a result of the discussion, the International Orthopaedic Multicenter Study (INORMUS) in Fracture Care was initiated. Since then, an expanded international working group, Asociación de Cirujanos Traumatológicos en las Américas (ACTUAR), has been created with the purpose of promoting increased global partnership for research capacity development.

Keywords: barriers, clinical research, capacity, sustainability, Latin America

Clinical Research: Solutions – Research Studies

Clinical research can help understand:

- Burden of musculoskeletal disease
- Barriers to receiving care
- Quality, cost effectiveness, and equity of care delivery
- Where and why disparities exist
- Whether efforts to address disparities are efficacious



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Orthopaedic Trauma Research Priorities in Latin America

Developing Consensus Through a Modified Delphi Approach

Heather J. Roberts, MD, Madeline C. MacKechnie, MA, David W. Shearer, MD, MPH, Julio Segovia Altieri, MD, Fernando de la Huerta, MD, Marcelo W. Rio, MD, Carlos Sánchez Valenciano, MD, Theodore Miclau, MD, and the ACTUAR Study Group*

Investigation performed at the University of California San Francisco, San Francisco, California

Background: Despite a substantial burden of musculoskeletal injury, orthopaedic trauma studies in Latin America are lacking. The purpose of the present study was to identify research priorities among orthopaedic trauma surgeons in Latin America.

Methods: Research questions were solicited from members of the Asociación de Cirujanos Traumatólogos de las Américas. Participants rated questions by importance from 1 to 9. All questions were redistributed with an aggregate rating, and participants related questions with knowledge of group responses.

Results: Seventy-eight participants completed the first survey and were included in subsequent surveys. The mean age was 51.8 years, and most participants were male (92%), had completed an orthopaedic trauma fellowship (60.3%), and participated in research (80.8%). Seventeen countries were represented; 5 respondents were from a high-income country, 67 were from an upper middle-income country, and 6 were from a lower middle-income country. Sixty-five questions were identified. Six questions were rated from 1 to 3 (“more important”) by >70% of participants: (1) What is the optimal treatment protocol for elderly patients with hip fracture? (2) What is the most effective initial and definitive management of musculoskeletal injury, including timing and surgical strategy, for the polytraumatized patient? (3) What is the ideal state of open fracture treatment, including timeliness and method of antibiotics, debridement, surgical fixation, and closure or coverage, at each hospital level in the health-care system? (4) What patient and fracture characteristics predict infection after musculoskeletal injury? (5) What is the current state of treatment for fracture-related infection, including timeliness and method of antibiotics and surgical intervention, at each hospital level in the health-care system? (6) What is the optimal protocol for temporary management for the hemodynamically unstable patient with a pelvic or acetabular fracture?

Conclusions: This modified Delphi study of orthopaedic trauma surgeons in Latin America identified geriatric hip fractures, polytrauma, open fractures, musculoskeletal infection, and pelvic and acetabular fractures as top research priorities. This information is important for resource allocation and goal setting for orthopaedic trauma in the region.

Building health research capacity is necessary to help guide future treatment on critical clinical questions¹. Over the last 2 decades, developing and advancing health research has become an increasingly recognized global health priority, particularly for musculoskeletal injury care. Traumatic injury is a leading cause of mortality and disability worldwide, with an estimated 1.2 million deaths and 50 million non-fatal injuries every year, many of which are due to musculoskeletal trauma^{2,3}. Low and middle-income countries (LMICs), including those in Latin America, are disproportionately

affected by this burden, with the highest number of deaths per capita compared with higher-income countries⁴.

Despite this burden, studies of orthopaedic trauma in Latin America are lacking. Research from Latin America lags behind that from the rest of the world after adjusting for gross domestic product (GDP) and population⁵, and, between 1988 and 2013, only 1% of orthopaedic articles came from a Latin American country⁶. Even among LMICs, Latin America is underrepresented, with only 3.1% of orthopaedic trauma studies originating from Latin America⁶. While the burden of

*The members of the ACTUAR (Asociación de Cirujanos Traumatólogos de las Américas) Study Group are listed in a Note at the end of the paper.

Disclosure: The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (<http://links.lww.com/JBJS/G720>).

Clinical Research: Solutions – Organizations (ACTUAR)

- Founded 2017
- Established monthly meeting schedule
- 200+ members / 20 countries
- Developed identity: logo/website (www.actuarla.org)
- Published 26 articles in 6 years
- Closed 4-year multi-center clinical trial open tibia study (22 sites enrolling across Latin America)
- Clinical surgery, research and leadership courses - FEMECOT 2017-24; Havana, 2019, 2022
- Created on-line clinical research coordinator course
- Translated clinical research coordinator book
- Started an annual resident research scholarship



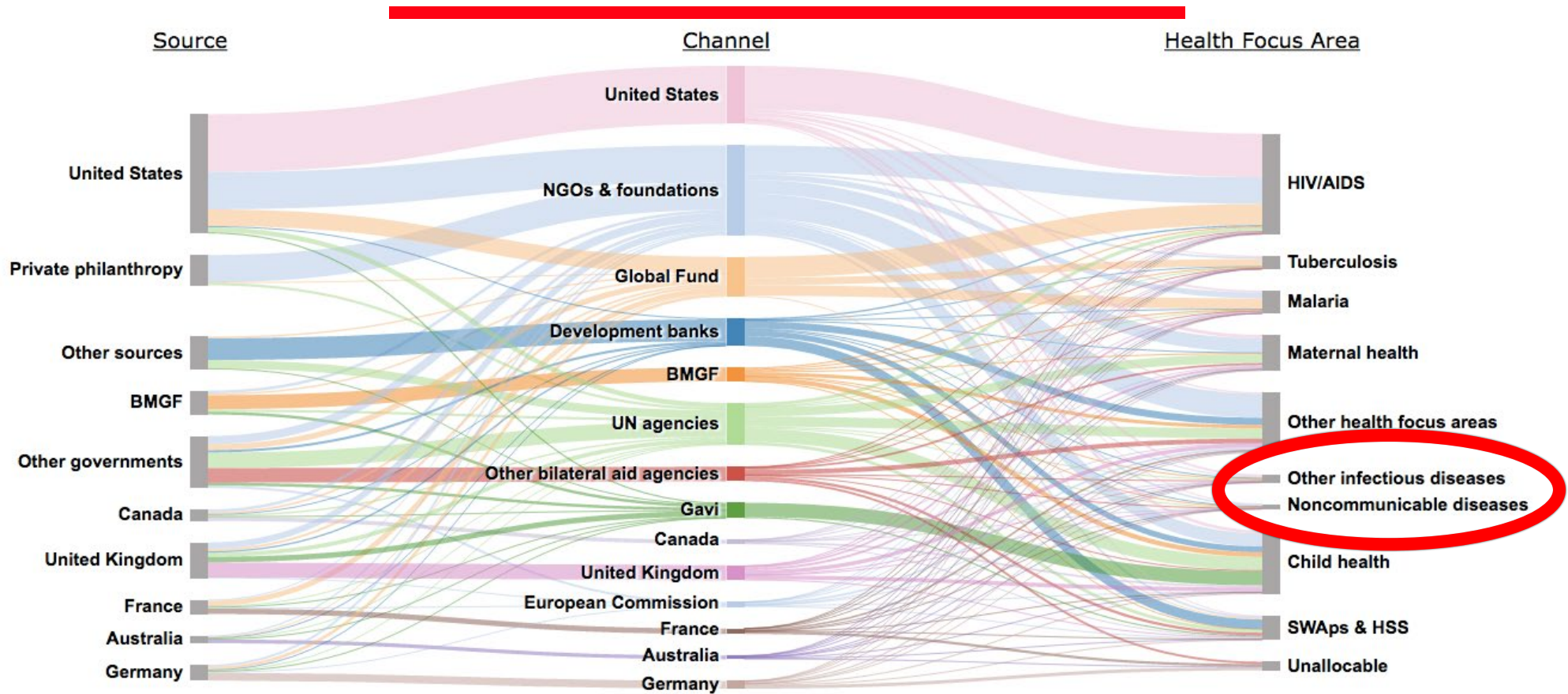
Clinical Research: Considerations

Building global research capacity requires that:

- Partnering institutions are involved in all stages of research
- Contributing members are represented in authorship
- Access to raw data is available for further analysis or new projects



Clinical Research: Considerations



Lack of funding:

Trauma accounts for a fraction of 1% of global health dollars

Objectives

Getting Involved

(Challenges, Solutions, Considerations):

- Clinical Care
- Disaster Response
- Surgical Education
- Clinical Research
- Advocacy



Systematic Review Article

OPEN

The global burden of musculoskeletal injury in low and lower-middle income countries

A systematic literature review

Daniella M. Cordero, BS^a, Theodore A. Miclau, BS, MS^b, Alexandra V. Paul, BS^c, Saam Morshed, MD^c, Theodore Miclaull, MD^c, Claude Martin, MD, MBA^d, David W. Shearer, MD, MPH^{e,*}

Abstract

Background: While the global burden of musculoskeletal injury is increasingly recognized, few epidemiologic studies have specifically recorded its incidence or prevalence, particularly in low- and middle-income countries. Understanding the burden of musculoskeletal injury relative to other health conditions is critical to effective allocation of resources to mitigate the disability that results from trauma. The current study aims to systematically review the existing primary literature on the incidence and prevalence of pelvic and appendicular fractures, a major component of musculoskeletal injury, in low- and lower-middle income countries (LMICs).

Methods: This study conforms to the systematic review and traditional meta-analysis guidelines outlined in the PRISMA-P statement. Incidence rates were calculated as the occurrence of new fracture cases per 100,000 person-years, and prevalence as total fracture cases per population sample, reported as percentages.

Results: The literature search yielded 3497 total citations. There were 21 full-text articles, representing 14 different countries, selected for data extraction. Included studies reported a wide range of incidence and prevalence rates, with an overall mean fracture incidence ranging from 779 (95% CI: 483.0–1188.7) to 1574 (95% CI: 1285.1–1915.1) per 100,000 person-years.

Conclusion: Better understanding the unmet burden of musculoskeletal injury in LMICs is critical to effectively allocating resources and advocating for underserved populations. To address existing gaps and heterogeneity within the literature, future research should incorporate population-based sampling with broader geographic representation in LMICs to more accurately capture the burden of disease.

Keywords: global surgery, orthopedics, trauma

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^aSchool of Medicine, University of California San Francisco, San Francisco, CA

^bStanford University, Palo Alto, ^cInstitute for Global Orthopaedics and

Traumatology, Orthopaedic Trauma Institute, University of California San

Francisco, San Francisco, CA, ^dAO Alliance Foundation, Davos, Switzerland,

^eCorresponding author. Address: Institute for Global Orthopaedics and

Traumatology, Orthopaedic Trauma Institute, University of California San

Francisco, 2550 23rd Street Building 9, 2nd Floor, San Francisco, CA 94110.

E-mail address: David.shearer@ucsf.edu (D. W. Shearer).

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1. Introduction

The Global Burden of Disease and Risk Factors study (GBD), first published in 1990, sought to quantify the health effects of more than 100 diseases and injuries across 8 regions of the world. This was a landmark study that impacted global health research by providing estimates of mortality and morbidity by age, sex and region. This report found that injuries accounted for more than 15% of all ill-health in the world in 1990 and forecast this to increase to 20% by 2020.^[1] The GBD update in 2010 corroborated this trend, with notable increases in both road injuries (6.2% increase from 1990 to 2010) and musculoskeletal disorders (84% increase from 1990 to 2010).^[2] These findings suggest a significant, but nonspecific, global burden of both musculoskeletal disease and injury, resulting in repeated calls for action within the field of global orthopaedics.^[3–6]

While the global burden of musculoskeletal disease and injury are documented by these studies, they are broadly defined. Musculoskeletal disease encompasses a range of conditions—including traumatic injuries, congenital anomalies, chronic back pain, arthritis, rheumatologic conditions, and others—each of which has varying incidence and cost of intervention.^[7] Injury descriptions, on the other hand, often focus on mechanisms of injury (e.g., road traffic accidents, falls, interpersonal violence) rather than anatomical characteristics or outcomes. While this focus may assist in identifying areas for primary prevention, it does not adequately describe regional or country-income level differences in incidence or outcome, which would allow for more

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Advocacy: Challenges

- HIC healthcare quality and access efforts have been unsuccessful in LMICs
- Political climate is difficult to navigate
- Local advocacy for policy changes are imperative
- Other key obstacles include a lack of:
 - Funding and resources
 - Research and data
 - Coordination and communication



Advocacy: Solutions - Organizations

- Widespread efforts to improve health equity and sustainability
- Global participation facilitated by web-based digital platforms
- Conduct of research to inform allocation of funds in LMICs



Advocacy: Solutions - Organizations (COACT)

- 30+ member North American academic institutions
- Promotes global musculoskeletal trauma care in low- and middle-income countries: sharing of best practices, research opportunities, mentorship, and advocacy
- Promotes communication, collaboration, and advocacy through a central network

Consortium of Orthopaedic Academic Traumatologists: A Model for Collaboration in Orthopaedic Surgery

Theodore Miclau, MD, Maddine C. MacKechnie, MA, and David Shearer, MD, MPH on behalf of the COACT group

Summary: In March 2016, North American academic leaders with an interest in and commitment to the field of global orthopaedics met in Orlando, Florida to gauge each other's clinical, research, and educational programs in developing countries, establish the main functions to participating in global health efforts, and assess areas of need for both the participating institutions and their international partners. After the inaugural meeting a needs assessment survey was distributed to the group to better understand how to organize and unify the individual institutional global efforts. The results revealed that surgeons believed there was a real need for improved communication, mentorship, and institutional support between North American universities. To this end, the Consortium of Orthopaedic Academic Traumatologists (COACT) was founded. The COACT seeks to promote a novel framework for mutual improving trauma care capacity by building collaborative partnerships among leading academic centers across the United States and Canada. The consortium represents a comprehensive partnership that promotes communication, collaboration, and advocacy through a central network to facilitate investigative, educational, and clinical services. Academic partners share best practices, resources, and opportunities in their international outreach projects in low- and middle-income countries in the field of orthopaedic trauma. Over the course of the past 2 years, the COACT has grown to more than 30 faculty, fellows, students and resident members, representing over 20 orthopaedic institutions across North America.

Key Words: orthopaedics, global, trauma, academic, consortium
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INTRODUCTION

Globally, musculoskeletal trauma continues to be a leading cause of mortality and disability among low- and lower middle-income countries (LMICs).¹ Although numerous efforts have been made to prevent and limit road traffic accidents, there continues to be a high burden of trauma that can often overwhelm local health care providers and

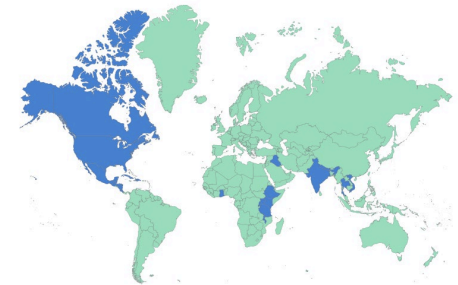
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institutions.² Musculoskeletal injuries account for most long-term disability after trauma, and the need for and the potential benefit of orthopaedic trauma-related efforts in using resource-poor settings are evident.³ In orthopaedic trauma, as in other areas of medicine, close partnerships between organizations in resource-rich and resource-challenged countries can be beneficial to address the gaps in care.⁴ Orthopaedic surgeons from centers across North America have shown an increasingly strong presence and interest in volunteer activities internationally to attempt to address the treatment of musculoskeletal injuries in LMICs.^{5,6} These efforts include sustainable, capacity-building projects such as clinician exchange programs, collaborative research studies, and surgical courses with international partner institutions.⁷ The main challenge, however, is that there is a limitation of resources available for these efforts. Most are single institutional partnerships known only to the participating partners, thereby limiting the participation in the programs and sometimes resulting in duplicative work. Facilitating communication, coordination, and collaboration between academic institutions engaged in this international work has the potential to amplify the project's potential by pooling resources and experience and enhancing individual efforts through collective support. Such collaborative partnerships are believed to be fundamental to the development of sustainable services in LMICs.^{8,9} Although numerous efforts have been developed successfully at the academic society (International Combined Orthopaedic Research Society, <http://icors.org/>),¹⁰ International Orthopaedic Trauma Association (<http://iota.org>),¹¹ and International Association for Global Health (<http://www.igah.org/>)¹² levels, the network has not extended to North American academic orthopaedic surgery departments and, in particular, projects addressing musculoskeletal injury care. To address this need, the Consortium of Orthopaedic Academic Traumatologists (COACT, coactpartners.org) was developed after a meeting of North American academic orthopaedic surgical leaders interested in and committed to sustainable clinical, research, and educational work in LMICs. The early primary goal of the consortium is to develop comprehensive partnerships that promote communication, collaboration, and advocacy through the sharing of best practices, resources, and opportunities in musculoskeletal injury care in LMICs. A needs assessment survey, distributed by the Institute for Global Orthopaedics and Traumatology (IGOT) and Orthopaedic Trauma Institute (OTI) to the Department of Orthopaedic Surgery at the University of California, San Francisco (UCSF), was the



COACT

www.coactpartners.org

Advocacy: Considerations - Financing

Sustainability relies on funding:

- Promote activities that support long-term support from potential stakeholders
- Recruit industry, national granting, and philanthropic support
- Generate sustainable funding



Conclusions

You Can Get Involved!

Opportunities:

- Clinical Care
- Disaster Response
- Surgical Education
- Clinical Research
- Advocacy



Thank You!



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