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AOA Critical Issues in Education

Resident Rotations in Low- and Middle-Income Countries

Motivations, Impact, and Host Perspectives

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Introduction: Interest in clinical rotations in low- and middle-income countries (LMICs) has grown among high-income country (HIC) orthopaedic residents. This study addresses the following questions: (1) What motivates HIC surgical residents to rotate in LMICs? (2) What is the impact of rotations on HIC residents? (3) What are the LMIC partner perceptions of HIC collaboration?

Materials and Methods: A search strategy of multiple databases returned 3,740 unique articles pertaining to HIC surgical resident motivations for participating in rotations in LMICs or the LMIC host perspective. Data extraction was dually performed using meta-ethnography, the qualitative equivalent of meta-analysis.

Results: Twenty-one studies were included in the final analysis. HIC residents were primarily motivated to rotate in LMICs by altruistic intent, with greatest impact on professional development. LMIC partners mostly valued HIC sustained investment and educational opportunities for LMIC partners. From LMIC's perspective, potential harm from collaboration arose from system-level and individual-level discordance between HIC and LMIC expectations and priorities. HIC priorities included the following: (1) adequate operative time, (2) exposure to varied pathology, and (3) mentorship. LMIC priorities included the following: (1) avoiding competition with HIC residents for surgical cases, (2) that HIC groups not undermine LMIC internal authority, (3) that HIC initiatives address local LMIC needs, and (4) that LMIC partners be included as authors on HIC research initiatives. Both HIC and LMIC partners raised ethical concerns regarding collaboration and perceived HIC residents to be underprepared for their LMIC rotation.

Discussion: This study synthesizes the available literature on HIC surgical resident motivations for and impact of rotating in LMICs and the LMIC host perception of collaboration. Three improvement categories emerged: that residents (1) receive *site-specific preparation* before departure, (2) *remain in country* long enough to develop site-specific skills, and (3) *cultivate flexibility* and *cultural humility*. Specific suggestions based on synthesized data are offered for each concept and can serve as a foundation for mutually beneficial international electives in LMICs for HIC orthopaedic trainees.

Disclosure: The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (<http://links.lww.com/JBJSOA/A183>).

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Orthopaedic surgery resident interest in low- and middle-income country (LMIC) rotations is growing, a trend broadly reflected by high-income country (HIC) surgical residents over the past decade^{1,2}. In a 2008 survey of resident members of the American College of Surgeons, over 80% of respondents endorsed preference for international electives over other clinical opportunities, with over 70% wishing to participate even without credit toward graduation requirements³. Although lack of funding has long been considered prohibitive to implementing such orthopaedic rotations⁴, new models of orthopaedic partnerships within LMICs^{5,6} and evidence for the cost-effectiveness of global orthopaedic care⁷ have increased LMIC orthopaedic access. Today, over 25% of North American orthopaedic residency programs offer some form of international training^{2,8-11}.

The published orthopaedic literature regarding LMIC surgical rotations overwhelmingly focuses on benefits to HIC residents¹¹⁻¹⁶. Perspectives of LMIC hosts are rarely considered despite concerns that resident rotations may have negative outcomes for LMIC partners^{13,17}. Although the LMIC perspective is lacking in the orthopaedic literature, an examination of other surgical specialties may provide insight for orthopaedics.

The goal of this study was to provide a comprehensive understanding of the following questions because they pertain to international orthopaedic resident rotations. (1) What motivates HIC surgical residents to electively rotate in LMICs? (2) What is the perceived impact of such rotations on HIC residents? (3) What are LMIC partner perceptions of HIC collaboration?

Methods

Search Strategy

We searched the following databases: PubMed, EMBASE, Web of Science, Scielo, IRIS, AIM African Index Medicus, LILACS, Asia Journals Online, and Africa Journals Online (Appendix A) for articles related to international resident rotations. This search strategy, last run in September of 2019, identified 4,403 articles, of which 3,740 were unique and screened for eligibility. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram¹⁸ details the number of articles retrieved and excluded at each stage of the review (Fig. 1).

Study Identification

Two authors (C.A.D. and N.W.) screened titles and abstracts using DistillerSR (Evidence Partners, Ottawa, Canada). These 2 authors then assessed the full-text articles of eligible studies for final inclusion. Consensus was achieved through discussion.

Eligibility Criteria

Title and abstract screening inclusion criteria were as follows: (1) articles that pertain to HIC surgical resident rotations in an LMIC, (2) include resident motivations for participating in an overseas rotation, or (3) incorporate the LMIC host

perspective on HIC collaborations. Exclusions were made by full-text screening to eliminate articles that were as follows: (1) published before 1990, (2) ethical considerations of global surgery without empirical data, (3) conference notes or residency program director surveys, (4) narrative accounts of an LMIC experience, (5) HIC group visits lasting less than 1 month, (6) descriptions of a model between 2 institutions, or (7) case log reviews and status of LMIC surgical need. A full list of exclusion criteria is included in Fig. 1.

Data Extraction for Meta-Ethnography

Two authors (C.A.D. and N.W.) identified key findings from the included articles via a meta-ethnographic methodology^{19,20}. Analogous to meta-analysis in quantitative research^{19,21}, meta-ethnography is a tool for synthesizing the results of qualitative studies^{22,23}. It involves a process of determining the interrelatedness of qualitative or semiquantitative studies, intuitively categorizing similar key findings termed “first-order concepts,” making interpretive groups of these categories termed “second-order concepts,” and defining these groupings in a manner that best captures their collective meaning^{20,24}. The role of second-order concepts is to categorize and thus extend first-order interpretations beyond what can directly be extracted from the original studies²³.

Table I shows each study's population, country of origin, and data collection instruments. Owing to heterogeneity within studies, LMIC rotation site was not included in our analysis. The “Primary Findings” column of Table I preserves the terminology used in the original articles.

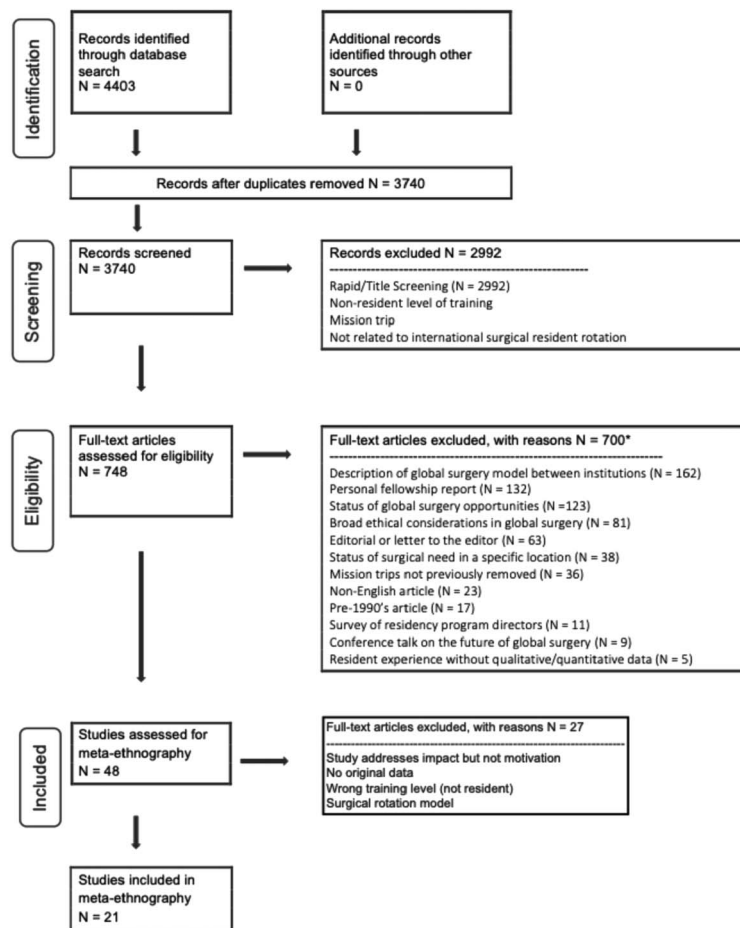
Studies were categorized as follows (Table I): (1) HIC resident motivation for seeking LMIC rotation (*section 1.1*), (2) self-described impact of LMIC rotation on HIC residents (*section 1.2*), and (3) LMIC host perspective of HIC collaboration (*section 1.3*).

Results

Of 3,740 articles, 21 were included in the final analysis: 12 that addressed HIC resident motivations for participation in LMIC rotations, 6 that addressed the impact on HIC residents of rotations in LMICs (one study was co-listed), and 4 that addressed the LMIC host perspective. None of these 4 were specific to orthopaedics, and all discussed both surgical resident rotations and general HIC collaboration. To our knowledge, there are no publications that exclusively address LMIC host perspectives of HIC surgical resident rotations. Included studies used both qualitative and quantitative methods. First- and second-order concept groupings reported in Tables II–IV are first organized by benefit or harm and then ordered by the descending frequency.

HIC Resident Motivations for LMIC Rotations

Fifteen first-order concepts were synthesized from HIC resident-reported surveys and descriptive responses. These first-order concepts were thematically grouped into 4 second-order concepts (Table II):



*some articles were excluded for multiple reasons

Fig. 1

A PRISMA flow diagram for systematic review. This workflow shows the steps of article screening, article inclusion and exclusion, and data extraction. Each step completed in duplicate.

- Potential benefits: finding meaning, professional development, personal experience, and engage in collaboration
- Potential harm: not identified

The motivation for HIC resident participation in LMIC rotations cited by the most studies was altruism.

Self-Identified Impact of LMIC Rotations on HIC Residents

Fourteen first-order concepts were grouped into 4 second-order concepts (Table III):

- Potential benefits: professional development, finding meaning, and developing awareness of global inequity
- Potential harm: feeling ineffective

The impact of LMIC rotations on HIC residents most frequently cited was finding mentorship in a unique environment.

LMIC Host Perspective on the Impact of HIC Resident Rotations and Collaboration

All studies that addressed the LMIC perspective did so through interviews with LMIC surgeons (faculty and residents). From these, 9 first-order concepts were identified and synthesized into 3 second-order concepts (Table IV):

- Potential benefit: sustained investment in education
- Potential harm: systems-level and individual-level discordance between HIC and LMIC expectations

Sustained HIC collaboration was the most frequently cited theme.

TABLE I Study Information*

Section 1.1. HIC Resident Motivations for Seeking LMIC Rotation				
Author	Study Population	Country/World Health Organization (WHO) Income Level	Data Collection Instrument	Primary Findings
Barton et al. 2007 ²⁵	103 general surgery residents	Canada/HIC	Electronic survey	Operating, travel, learning, and teaching
Cheung et al. 2017 ²⁶	61 general surgery residents	US/HIC	Electronic survey	Clinical experience, research, and training the local population
Disston et al. 2009 ²⁷	31 orthopaedic surgery residents†	US/HIC	Electronic survey	Opportunity to serve a less privileged population, desire for cross-cultural experience, and limited-resource setting
Javidnia et al. 2011 ²⁸	53 ear nose throat residents	Canada/HIC	Electronic survey	Contribute to an important cause, personal growth, learn about medicine in developing countries, travel, and improve understanding of other cultures
Johnston et al. 2018 ²⁹	74 surgical residents	US/HIC	Paper survey	Giving back by participating on surgical, medical, or disaster relief missions, long-term career goals, and religious motivation
Matar et al. 2012 ³⁰	361 general and orthopaedic surgery residents	Canada/HIC	Electronic survey	Contribute to an important cause, enhance technical/clinical skills, tourism/cultural enhancement, determine interest in international volunteerism, exposure to uncommon pathologies, teaching, and establishing contacts abroad
Pope et al. 2016 ³¹	278 obstetrics, gynecology residents	US/HIC	Electronic survey	Promote maternal survival, research social determinants of health, and health policy
Powell et al. 2007 ³²	52 general surgery residents	US/HIC	Electronic survey	Technical/clinical skills, cultural experience, personal goals, language skills, altruism, and international contacts
Powell et al. 2009 ^{3‡}	724 surgical residents	US/HIC	Electronic survey	Cultural experience, technical/clinical skills, fulfilling personal goals, altruism, language skills, and international contacts
Sawatsky et al. 2016 ³³	377 reflective reports from residents	US/HIC	Qualitative analysis	Making a difference, altruism Impact§: experience of gratitude and trust from patients, meaningful patient-doctor relationship, and noting patient resilience
Stagg et al. 2017 ³⁴	4,926 obstetrics and gynecology (OBGYN) residents	US/HIC	Electronic survey	Education, practicing medicine in other countries, full OBGYN experience, humanitarian opportunity, cultural competency, and “chance to see the world”
Zhang et al. 2016 ³⁵	122 orthopaedic surgery residents	US/HIC	Electronic survey	Contribute to care for the underserved, improve communication skills, physical exam and surgical techniques and resource allocation, and improve knowledge base with pathology not commonly seen in the United States
Section 1.2. Self-Described Impact of LMIC Rotation on HIC Residents				
Author	Study Population	Country/WHO Income Level	Data Collection Instrument	Primary Findings
Graf et al. 2017 ³⁶	Surgical residents 9 blog reviews 6 survey responses	US and Israel/HIC	Qualitative analysis of resident reports and electronic survey	Positive learning experience, exposure to new pathology and disease, and development of close relationships. Difficulty functioning with limited language proficiency and emotional challenges of dealing with different standards of care

continued

TABLE 1 (continued)

Section 1.2. Self-Described Impact of LMIC Rotation on HIC Residents				
Author	Study Population	Country/WHO Income Level	Data Collection Instrument	Primary Findings
Henry et al. 2012 ³⁷	14 surgical residents#	US/HIC	Electronic survey/qualitative analysis of free text	Unique learning opportunity with more authority and leadership. Opportunity to form sustainable relationships and feel rejuvenated. Helps awareness of growing burden of operative disease worldwide
Jafari et al. 2017 ³⁸	44 residents, 8 fellows**	Multiple/HIC	Electronic survey	Residents believed that the experience was life-changing and confirmed their passion for surgery
Kelley et al. 2015 ³⁹	21 current/former surgical residents	Canada/HIC	Electronic survey	Helped residents grow as physicians and develop new appreciation for their home health care system and public health. Improved managerial skills, creativity, and resourcefulness.
Tarpley et al. 2013 ⁴⁰	9 4th year residents returning from 4-week surgical rotation in Kenya	US/HIC	Survey and discussion	Opportunity to work with LMIC residents and care for patients in a resource-challenged environment. Challenged by language differences, unfamiliar clinical issues, and adjusting to different medical environment.
Section 1.3. LMIC Host Perspective of HIC Collaboration				
Author	Study Population	Country/WHO Income Level	Data Collection Instrument	Primary Findings
Cadotte et al. 2014 ⁴¹	14 LMIC neurosurgeons (10 residents, 4 faculty) 7 HIC neurosurgeons	Ethiopia/LMIC and Canada, US, Norway††/HIC	In-person open-ended interviews	HIC mentorship of LMIC trainees is valuable if sustained. Do not undermine authority of local healthcare providers.
Elobu et al. 2014 ⁴²	33 “postgraduate trainees” in anesthesia and surgery at single institution	Uganda/LMIC	Paper survey	Value in internationally organized surgical skill workshops and specialist camps. International groups had a neutral or negative impact on patient care and questioned the ethics of clinical decisions made by visiting faculty. Research projects are often conducted without crediting LMIC authors and are not in locally identified priority areas.
Ibrahim et al. 2015 ²⁷	13 HIC surgeons, 18 LMIC surgeons	Multiple HICs and LMICs	In-person and online semi-structured interviews	Need to monitor and evaluate longitudinal success of international collaboration and impact on local community with broad regional and national indicators.
O'Donnell et al. 2014 ⁵⁸	3 department chairs, 6 residents, 15 attending physicians of EM medicine	Peru/LMIC	Semi-structured interviews	There is value in knowledge transfer with long-term relationships. Challenges include visitor's lack of language proficiency and reciprocity and short rotation length and low level of training.
*HIC = High Income Country; LMIC = Low-, Middle-Income Country. †Completed survey in June, immediately after graduation. ‡Follow-up study to Powell et al. 2007 with expanded study population. §Included here with “motivations,” see also section 1.2. #Study included attending surgeons and medical students, but stratified the responses, enabling inclusion. **Responses from residents and fellows were not separated. ††Could not exclude HIC neurosurgeons (even though faculty) as thematic analysis did not separate out responses.				

The concordance and discordance between major themes identified from the HIC perspective and LMIC perspective is represented in a Venn diagram (Fig. 2).

Discussion

This study synthesizes available literature on HIC surgical resident motivations for rotating in LMICs, the impact on

TABLE II HIC Resident Motivation for LMIC Rotations*,†

First-Order Concept Grouping	Scope of Concept	Second-Order Concept Grouping
Altruism	<ul style="list-style-type: none"> • Contribute to global society • Support an important cause • Experience altruistic satisfaction • Open the heart • Serve the vulnerable and disadvantaged • Fulfill humanitarian obligation 	Find meaning: Residents anticipated that practicing medicine in resource-austere environment would provide them with a sense of humanitarianism, meaning, purpose, or fulfillment beyond what was typical in their home institutions
Fulfillment	<ul style="list-style-type: none"> • Experience a meaningful doctor-patient relationship • Feel satisfaction with ability to provide care • Confirm passion for medicine and reasons for pursuing medicine 	
Religion	<ul style="list-style-type: none"> • Address religious obligation through providing surgery to the underserved 	
Operative experience	<ul style="list-style-type: none"> • Opportunity to operate with autonomy • High volume of trauma • Experience problem-solving in a resource-constrained environment 	Professional development: Residents anticipated that practicing surgery within a new, LMIC hospital setting might present developmental opportunities beyond those available at their home institutions
Career advancement	<ul style="list-style-type: none"> • Rotation will enable new opportunities in home country • Benefit to career or self 	
Novel pathology	<ul style="list-style-type: none"> • Exposure to surgical pathology that is uncommon in HICs 	
Research	<ul style="list-style-type: none"> • New setting lends to new research opportunities • Local disease burden • Cost-effectiveness • Healthcare delivery 	
Cultural awareness	<ul style="list-style-type: none"> • Cultural curiosity • Improve cultural understanding • Interest in foreign culture and people 	Personal experience: Residents anticipated that conducting surgical interventions in an LMIC setting might allow them to experience a new culture and learn about the people and practice of healthcare in other countries
Travel	<ul style="list-style-type: none"> • Tourism • Chance to see the world 	
Contextualize health care systems	<ul style="list-style-type: none"> • Unique window into foreign healthcare system • Interest in LMIC healthcare 	
Language	<ul style="list-style-type: none"> • Interest in learning a new language 	
Professional collaboration	<ul style="list-style-type: none"> • Enhancement of professional groups through multinational communication • Development of apprenticeships • Establishment of contacts • Development of long-term, sustainable partnerships 	Engage in collaboration: Residents anticipated that rotating in an LMIC might provide a purpose and joy for both the host and visiting surgeons and that with thoughtful management such relationships might grow and deepen over time
Teaching	<ul style="list-style-type: none"> • Ability to share lessons learned and variations in clinical practice by institution • Providing surgical technique training 	
Friendship	<ul style="list-style-type: none"> • Interest in meeting new residents • Social connection and interaction 	
Capacity building	<ul style="list-style-type: none"> • Wish for impact of rotation to last beyond initial visit • Desire to develop sustainable programs that will build local capacity 	
<p>*This table was first grouped into potential benefits (4) and potential harm (0) and then ordered by frequency, with concepts that received the most mentions across included papers listed first. Lines delineate unique second-order concepts encapsulating first-order groupings. †HIC = High-Income Country; LMIC = Low-, Middle-Income Country.</p>		

TABLE III Self-Described Impact of LMIC rotation on HIC residents*[‡]

First-Order Concept Grouping	Scope of Concept	Second-Order Concept Grouping
Learning in a unique environment	<ul style="list-style-type: none"> • Opportunity for surgical training with less pressure and scrutiny, away from the hierarchy of the home academic institution • Unique mentoring relationships with local surgeons • Diversity of instruction from surgeons trained in different ways 	Professional development: practicing surgery in an LMIC hospital setting may present developmental opportunities for residents beyond what they have access to at their home institutions
Positively challenged	<ul style="list-style-type: none"> • Creativity to cope with paucity of resources • Developing alternative methods to diagnose and treat surgical disease improves resident clinical and technical skill 	
Exposed to novel pathology	<ul style="list-style-type: none"> • Exposure to local pathology and disease • Exposure to complications and disease progression uncommon in high-income countries 	
Greater responsibility	<ul style="list-style-type: none"> • Participate in cases of greater complexity and broader spectrum • Residents given more authority, autonomy, and leadership opportunities • Opportunity to develop managerial skills 	
Trained with different methodologies	<ul style="list-style-type: none"> • Exposure to new surgical practice • Rich “open surgery experience” 	
Fulfillment	<ul style="list-style-type: none"> • Experience gratitude and trust from patients • Have meaningful patient-doctor relationships • “Truly amazing professional and personal experience” • Reminds residents why they went into surgery • Chance to help others in need 	Finding meaning: residents describe the relationships they have with their patients and friendships they develop with LMIC colleagues as providing meaning and fulfillment beyond what they experience at their home institutions
Rejuvenation of purpose	<ul style="list-style-type: none"> • Confirms passion for humanitarian work • Trip described as the, “most important event of residency training” • Answer the search for meaning that residents experience during surgical training • “Opens the heart to give what we have already been given” 	
Friendship	<ul style="list-style-type: none"> • Formation of friendships and close relationships • Feeling of kinship • Lifelong meaningful friendships around the globe aimed towards collaboration, mutual respect, understanding, and support 	
Global sensitization	<ul style="list-style-type: none"> • New appreciation for home healthcare system and availability of resources • Greater interest in public health • Greater commitment to promoting care for underserved/vulnerable populations • Increased understanding of social determinants of health and barriers to health • Awareness of growing burden of operative disease worldwide • Sensitization to global need for surgery 	Awareness of global inequity: residents emerge from global surgery rotations with a greater appreciation for the social determinants of health, scarcity of care for the high burden of surgical disease and improved cultural awareness, understanding of, and commitment to global surgery equity
Cultural awareness	<ul style="list-style-type: none"> • Differential diagnoses are inherently affected by the cultural framework surrounding pathology • Acquire awareness and improved sensitivity to cultural differences • Ability to transcend potential barriers and develop cross-cultural communication skills • Broader understanding of cultural attitudes toward medical systems • Development of cultural humility 	

continued

TABLE III (continued)

First-Order Concept Grouping	Scope of Concept	Second-Order Concept Grouping
Ethical concerns	<ul style="list-style-type: none"> • Emotional challenges of dealing with preventable death • Absence of “urgency” in life-threatening situations 	Feeling ineffective: developing an awareness of self-limitations and need of navigating culture and protocol differences that can be frustrating and emotionally draining
Recognition of internal expectations for standards of care	<ul style="list-style-type: none"> • Different care and protocol expectations within the clinical environment • Interpretation of anesthesia care being of poor quality • Interpretation of pre- and post-operative care as being low quality • Absence of organized rounds • New appreciation for home healthcare system and availability of resources 	
Underpreparedness	<ul style="list-style-type: none"> • Difficulty functioning with limited language proficiency • Unfamiliar environment and clinical issues • Adjusting to different medical practices 	
Awareness of professional role	<ul style="list-style-type: none"> • Concern with taking cases away from host country colleagues • Challenges in navigating resident role and working relationships 	

*This table was first grouped into potential benefits (3) and potential harm (1) and then ordered by frequency, with concepts that received the most mentions across included articles listed first. Lines delineate unique second-order concepts encapsulating first-order groupings. †HIC = High-Income Country; LMIC = Low-, Middle-Income Country.

residents of these rotations, and the LMIC host perception of collaboration. To our knowledge, this is the first systematic review to interpret data on surgical resident rotations in LMICs. Despite strong interest in these rotations from orthopaedic programs^{2,3,8}, literature reporting their motivations and impact is sparse. Thus, for this analysis, we included surgical resident rotations beyond orthopaedics to identify practices that minimize harm and share benefits with LMIC partners^{43,44}.

The available data from the LMIC perspective shows that the most important component of HIC collaboration is *sustained investment*. Because any HIC collaboration requires significant LMIC host investment, a commensurate, long-term HIC investment is warranted. As one LMIC partner states, “It’s not worth it to come back for one second and say a few things and leave. The person has to come on a slightly regular basis, maybe once a year⁴⁵”. Strong models of longitudinal partnerships in the orthopaedic literature⁴⁶⁻⁴⁹ are considerate of LMIC capacity, including adequate surgical volume and faculty supervision to support visiting residents, and to ensure that residents operate within their training level^{46,47,50,51}. These models rely on ongoing interest and investment of both LMIC and HIC orthopaedic faculty, and designated LMIC and HIC program director responsible for ongoing management^{46,47,50,51}. Once established, monitoring and evaluating the longitudinal success of these collaborations is beneficial.

In addition to sustained investment, LMIC partners benefit most when programs are designed as *bidirectional educational exchanges* rather than merely HIC resident training opportunities.

Although LMIC residents would likely benefit most from a true bidirectional relationship in which residents from each institution “swap,” a more limited bidirectional model that instead emphasizes local capacity maintains advantages for both stakeholders⁵². In the words of one LMIC surgeon, “Try not to replace the local doctor, because you’re going to leave⁴⁴”. For orthopaedic residency programs, this means the following: (1) preferentially *sending residents of higher training level*, (2) ensuring residents receive the best possible *pretrip preparation*, and (3) investing in *local capacity*. Capacity building may include HIC faculty mentorship for LMIC residents, incorporating LMIC training and surgical education opportunities, and encouraging HIC residents to ask how they can be helpful to LMIC hosts^{49,53}. Under appropriate LMIC directorship, HIC residents have opportunities to meaningfully channel their desire to help and can contribute substantively. Furthermore, global networks developed through these educational exchanges may further global interest in locally identified but poorly recognized disease burden.

Despite extensive literature devoted to the development of resident “guides” or recipes for success^{14,54-56}, HIC residents believed and LMIC hosts agreed that *HIC residents were under-prepared* for their LMIC rotations and required *increased supervision*, often because of poor patient-surgeon communication or surgeon-surgeon communication. In addition, HIC residents of all training levels often assumed authority and the ability to teach or provide training where perhaps they should not. From this, 3 categories for improvement emerged: that residents (1) receive *site-specific preparation* from experienced individuals prior to

TABLE IV LMIC host perspective of HIC collaboration* , †

First-Order Concept Grouping	Scope of Concept	Second-Order Concept Grouping
Sustained collaboration	<ul style="list-style-type: none"> Value in friendship and long-term relationships but successful collaborations take time and continued investment Collaborations need HIC faculty investment HIC mentorship of LMIC trainees is valuable if sustained 	Sustained investment in Education: LMIC residents benefit from international collaboration when such collaborations are sustained and include new educational development
Educational exchange	<ul style="list-style-type: none"> Visiting groups can improve host institution surgical training with skill workshops and specialist camps Value in knowledge sharing, including medical knowledge transfer, access to resources, and research LMIC residents can benefit from HIC collaboration and learning opportunities 	
Limited impact on patient care	<ul style="list-style-type: none"> International groups may have a neutral or negative impact on patient care Language barriers may negatively impact patient care There is no monitoring of impact on local community 	Systems-level discordance: organizations must thoughtfully implement LMIC collaborations, including coordinating with other international groups that may be working out of the same host site, involving local healthcare providers, assessing and adjusting to meet local needs, and developing protocols for assessing potential impact
Unmet local needs	<ul style="list-style-type: none"> International partners may have a poor understanding of local burden of disease Research projects and interventions conducted by international partners may not be in locally identified priority areas and without adequate understanding of local needs 	
Harmful effects of multiple visiting groups	<ul style="list-style-type: none"> Multiple international groups operating out of the same location without communication may cause harm Volume of visitors may overwhelm hospital capacity or repeat initiatives 	
Undermined authority	<ul style="list-style-type: none"> Planning institution-wide changes without involving host healthcare providers undermines local authority 	
Limited reciprocity	<ul style="list-style-type: none"> High LMIC resident participation in international research projects with few credited as co-authors No opportunity for LMIC residents to rotate at HIC institutions 	Individual-level discordance: individual actions, including not providing credit to local healthcare providers for their work and lack of cultural awareness or sensitivity from HIC visitors may damage relationships within a host institution
Resident effectiveness limited by underpreparedness	<ul style="list-style-type: none"> HIC residents may lack language proficiency HIC residents may lack cultural awareness Short rotation length limits HIC resident usefulness to host institution Level of training may be low, but HIC residents anticipate a high degree of involvement HIC residents may have varying degrees of sensitivity and openness to learning 	
Ethical concerns	<ul style="list-style-type: none"> Discomfort with the ethics of clinical decisions made by visiting HIC faculty Minimal oversight of visiting HIC residents HIC residents acting beyond their level of training No capacity for reporting or modifying poor behavior HIC residents may arrive with inappropriate expectations of hospital resources and surgical equipment 	
<p>*This table was first grouped into potential benefits (1) and potential harm (2) and then ordered by frequency, with concepts that received the most mentions across included articles listed first. Lines delineate unique second-order concepts encapsulating first-order groupings. †HIC = High-Income Country; LMIC = Low-, Middle-Income Country.</p>		

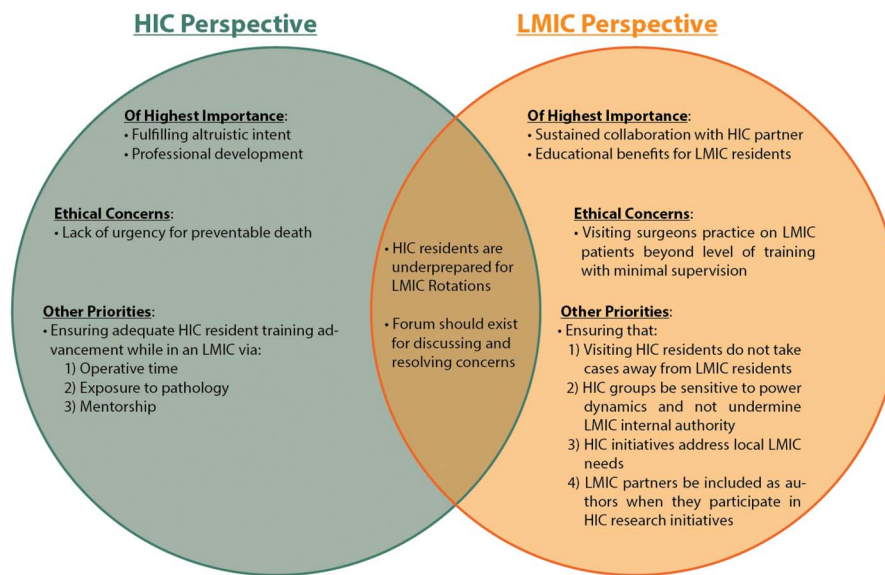


Fig. 2
Concordance and discordance of HIC and LMIC perspectives. Categorization of concordance and discordance between themes identified by HIC and LMIC partners. HIC = High-Income Country and LMIC = Low-, Middle-Income Country.

departure; (2) *remain in country* long enough to integrate into the environment, and develop a working knowledge of the local system, pathology, and surgical procedures; and (3) *cultivate flexibility*, particularly in recognizing that despite their training, they will not be local experts⁵⁷. As one LMIC surgeon notes, "...you should not seek to learn how to practice medicine, but instead learn how medicine is practiced in another country"⁵⁸. Although flexibility is an essential skill in all orthopaedic residents^{59,60}, on LMIC rotations "flexibility" means being receptive and responsive to feedback from LMIC partners, recognizing your limitations, being open to learning, and being willing to change. Because of the lack of data, this review reveals no definite answer as to what in-country rotation length would be optimal for both HIC residents and LMIC partners. Although the Residency Review Committee (RRC) defines the minimum resident elective as one month⁶⁰, LMIC partners note that this is too short for residents to substantively contribute⁴⁵, unless their rotation is a component of a larger, sustained partnership between institutions⁶¹. If HIC residents wish to stay longer at an LMIC site, the RCC denotes no maximum time for elective rotations, but residents may be limited by financial constraints and difficulty fulfilling their minimum 60-month Accreditation Council for Graduate Medical Education (ACGME) training requirement⁶⁰.

The idea of resident flexibility may be incorporated into pretrip planning by establishing *reasonable resident expectations*. Our study identifies that surgical residents are highly motivated by increasing their exposure to surgical pathology and are eager to operate on interesting cases. However, there is an associated cost: LMIC residents then struggle to compete with HIC residents for cases and mentorship opportunities. This cost can be mitigated on 2 fronts: (1) at the *systems-level*, by ensuring that before initiating a partnership, an LMIC institution has the surgical volume to accommodate visiting

residents, and (2) at the *individual-level*, by ensuring that HIC residents are prepared to respectfully share cases and training opportunities with LMIC residents.

An additional component of pretrip expectation is developing an awareness of how personal motivations for going on an LMIC rotation may affect behavior. Altruistic intent was the most commonly reported HIC resident motivation for an LMIC surgical rotation. As one HIC surgeon notes, "When we go [to an LMIC institution], we don't just go to help the patients, we go to help society"⁴⁵. This desire to help, or affect change, is laudable⁶². However, this "altruistic intent" is often a generalized, intangible idea of what may be helpful without a realistic understanding of LMIC institution needs. Unchecked altruistic intent may lead to a belief that visitors can "fix things" where less competent others have failed, lacking recognition that doing so may undermine local authority⁵⁷ and permanently damage relationships with LMIC hosts. As one Ghanaian nurse noted, "[HIC visitors] don't take our advice, or if you tell them something, they think they know better than us and that is not good"⁴⁴. For orthopaedic residents, this means having the humility to recognize personal and system-level limitations, even at the oft-reported cost of feeling ineffective. Working as an HIC visitor in an LMIC surgery program demands that residents have the emotional maturity to orient to the "big picture" without abandoning the desire for continued improvement essential for all parties in a longitudinal surgical training partnership. In our review, we chose the terminology "cultural humility" over "cultural competence" to incorporate ongoing discussions of cultural understanding⁶³⁻⁶⁵ within resident training because it encompasses awareness of power dynamics and emphasizes a lifelong commitment to self-evaluation, improvement, and partner advocacy.

Finally, one pitfall in setting up resident rotations resulted from the absence of a framework for *addressing and*

resolving concerns. Both HIC and LMIC surgeons expressed concern regarding the ethics of the other party. HIC residents reported that LMIC hosts lacked urgency for preventable death. This perception may arise when visiting residents are unaware of the systemic issues that lead to this perceived “lack of urgency,” including insufficient resources or oversight⁴⁵. Conversely, LMIC hosts believed as though visiting surgeons used LMIC patients to gain experience or practice new techniques beyond their training level, an ethical concern that has been acknowledged from the HIC perspective¹⁷. As both parties concede that these ethical concerns are valid, orthopaedic residency programs may incorporate discussion forums for surgeon accountability and patient outcome measures. As noted by one LMIC surgeon, “...we just have to once in a while sit down and discuss things...and what needs to be changed”⁴⁵. HIC resident concerns may be mitigated by setting appropriate expectations, including awareness of the resource limitations that are beyond the control of LMICs. Directors from resident rotation sites, both HIC and LMIC, may provide opportunities for feedback regarding resident rotations and other aspects of partnership, sharing this information to address concerns as they arise. To best determine the impact of visiting surgeons on patient care, it may be helpful to establish outcome measures toward monitoring the effect of overseas clinical rotations on the local LMIC community.


There are several limitations to our study. All meta-ethnographies assume that the results of each study are generalizable¹⁹. Although the studies included in this work overlap in setting and methodology (Table I), they differ in LMIC location, support of HIC residents, and human factors; thus, these data may not be commensurable. In addition, in keeping with 2019 ACGME guidelines⁶⁰, only articles describing resident rotations of at least 1-month duration were included; all other accounts of orthopaedic studies, mission trips, and general volunteerism were omitted. Although mission trips and other short-term trips make up a substantive proportion of global health initiatives and literature (our review excluded nearly 1,000 studies based on this criteria), the extreme heterogeneity of such trips makes it challenging to draw meaningful conclusions. Although we recognize that the distinction between a mission trip and a resident rotation may not be easily defined, broadly we noted that mission trips have much greater variability in personnel, training level, involvement of local stakeholders, length of stay, and trip purpose. With no meaningful ways of stratifying these trips and relating to resident rotations, we chose to exclude them.

In addition, the LMIC stakeholder perspective is limited by the lack of published literature, with only 4 LMIC-perspective studies involving surgical residents identified through this review. Even research that directly queries LMIC providers often uses survey instruments developed by HIC researchers without input from their LMIC counterparts, likely introducing HIC-perspective bias into the study design. A much greater effort is needed to address the striking absence of the LMIC perspective throughout the global health literature.

Conclusion

Orthopaedic resident interest in LMIC rotations continues to grow^{2,3,8}, an unsurprising trend considering the opportunities it affords HIC residents to honor their humanitarian ideals through immersive exposure to a new pathology and surgical technique. This article highlights several points on HIC surgical resident rotations in LMICs and the need for future orthopaedic research on this topic, particularly from the LMIC perspective. As HIC orthopaedic residency programs create LMIC rotations for their residents, careful consideration of sustainable investment, bidirectional educational exchange, and prerotation orientation may improve the overall value of collaboration for both stakeholders. A foundation of analysis, planning, and preparation may render LMIC/HIC orthopaedic residency training partnerships beneficial to all parties and their patients and build within HIC residents a lifelong commitment to global and equitable partnerships.

Appendix

 Supporting material provided by the authors is posted with the online version of this article as a data supplement at [jbjs.org \(http://links.lww.com/JBJSOA/A184\)](http://links.lww.com/JBJSOA/A184). ■

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