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Resident Rotations in Low- and Middle-Income Countries
Motivations, Impact, and Host Perspectives


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

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. 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 requirements. Although lack of funding has long been considered prohibitive to implementing such orthopaedic rotations, new models of orthopaedic partnerships within LMICs and evidence for the cost-effectiveness of global orthopaedic care have increased LMIC orthopaedic access. Today, over 25% of North American orthopaedic residency programs offer some form of international training.

The published orthopaedic literature regarding LMIC surgical rotations overwhelmingly focuses on benefits to HIC residents. Perspectives of LMIC hosts are rarely considered despite concerns that resident rotations may have negative outcomes for LMIC partners. 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 diagram 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. Analogous to meta-analysis in quantitative research, meta-ethnography is a tool for synthesizing the results of qualitative studies. It involves a process of determining the interrelatedness of qualitative or semiqualitative 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. The role of second-order concepts is to categorize and thus extend first-order interpretations beyond what can directly be extracted from the original studies.

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):
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

<table>
<thead>
<tr>
<th>Author</th>
<th>Study Population</th>
<th>Country/WHO Health Organization (WHO) Income Level</th>
<th>Data Collection Instrument</th>
<th>Primary Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barton et al. 2007</td>
<td>103 general surgery residents</td>
<td>Canada/HIC</td>
<td>Electronic survey</td>
<td>Operating, travel, learning, and teaching</td>
</tr>
<tr>
<td>Cheung et al. 2017</td>
<td>61 general surgery residents</td>
<td>US/HIC</td>
<td>Electronic survey</td>
<td>Clinical experience, research, and training the local population</td>
</tr>
<tr>
<td>Disston et al. 2009</td>
<td>31 orthopaedic surgery residents†</td>
<td>US/HIC</td>
<td>Electronic survey</td>
<td>Opportunity to serve a less privileged population, desire for cross-cultural experience, and limited-resource setting</td>
</tr>
<tr>
<td>Javidnia et al. 2011</td>
<td>53 ear nose throat residents</td>
<td>Canada/HIC</td>
<td>Electronic survey</td>
<td>Contribute to an important cause, personal growth, learn about medicine in developing countries, travel, and improve understanding of other cultures</td>
</tr>
<tr>
<td>Johnston et al. 2018</td>
<td>74 surgical residents</td>
<td>US/HIC</td>
<td>Paper survey</td>
<td>Giving back by participating on surgical, medical, or disaster relief missions, long-term career goals, and religious motivation</td>
</tr>
<tr>
<td>Matar et al. 2012</td>
<td>361 general and orthopaedic surgery residents</td>
<td>Canada/HIC</td>
<td>Electronic survey</td>
<td>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</td>
</tr>
<tr>
<td>Pope et al. 2016</td>
<td>278 obstetrics, gynecology residents</td>
<td>US/HIC</td>
<td>Electronic survey</td>
<td>Promote maternal survival, research social determinants of health, and health policy</td>
</tr>
<tr>
<td>Powell et al. 2007</td>
<td>52 general surgery residents</td>
<td>US/HIC</td>
<td>Electronic survey</td>
<td>Technical/clinical skills, cultural experience, personal goals, language skills, altruism, and international contacts</td>
</tr>
<tr>
<td>Powell et al. 2009†</td>
<td>724 surgical residents</td>
<td>US/HIC</td>
<td>Electronic survey</td>
<td>Cultural experience, technical/clinical skills, fulfilling personal goals, altruism, language skills, and international contacts</td>
</tr>
<tr>
<td>Sawatsky et al. 2016</td>
<td>377 reflective reports from residents</td>
<td>US/HIC</td>
<td>Qualitative analysis</td>
<td>Making a difference, altruism impact; experience of gratitude and trust from patients, meaningful patient-doctor relationship, and noting patient resilience</td>
</tr>
<tr>
<td>Stagg et al. 2017</td>
<td>4,926 obstetrics and gynecology (OBGYN) residents</td>
<td>US/HIC</td>
<td>Electronic survey</td>
<td>Education, practicing medicine in other countries, full OBGYN experience, humanitarian opportunity, cultural competency, and “chance to see the world”</td>
</tr>
<tr>
<td>Zhang et al. 2016</td>
<td>122 orthopaedic surgery residents</td>
<td>US/HIC</td>
<td>Electronic survey</td>
<td>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</td>
</tr>
</tbody>
</table>

#### Section 1.2. Self-Described Impact of LMIC Rotation on HIC Residents

<table>
<thead>
<tr>
<th>Author</th>
<th>Study Population</th>
<th>Country/WHO Income Level</th>
<th>Data Collection Instrument</th>
<th>Primary Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graf et al. 2017</td>
<td>Surgical residents 9 blog reviews 6 survey responses</td>
<td>US and Israel/HIC</td>
<td>Qualitative analysis of resident reports and electronic survey</td>
<td>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</td>
</tr>
</tbody>
</table>

*continued*
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>
<thead>
<tr>
<th>First-Order Concept Grouping</th>
<th>Scope of Concept</th>
<th>Second-Order Concept Grouping</th>
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</thead>
</table>
| Altruism                    | ● 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                 | ● Experience a meaningful doctor-patient relationship  
                           ● Feel satisfaction with ability to provide care  
                           ● Confirm passion for medicine and reasons for pursuing medicine | |
| Religion                    | ● Address religious obligation through providing surgery to the underserved | |
| Operative experience        | ● 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          | ● Rotation will enable new opportunities in home country  
                           ● Benefit to career or self | |
| Novel pathology             | ● Exposure to surgical pathology that is uncommon in HICs | |
| Research                    | ● New setting lends to new research opportunities  
                           ● Local disease burden  
                           ● Cost-effectiveness  
                           ● Healthcare delivery | |
| Cultural awareness          | ● 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                      | ● Tourism  
                           ● Chance to see the world | |
| Contextualize health care systems | ● Unique window into foreign healthcare system  
                           ● Interest in LMIC healthcare | |
| Language                    | ● Interest in learning a new language | |
| Professional collaboration   | ● 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                    | ● Ability to share lessons learned and variations in clinical practice by institution  
                           ● Providing surgical technique training | |
| Friendship                  | ● Interest in meeting new residents  
                           ● Social connection and interaction | |
| Capacity building           | ● Wish for impact of rotation to last beyond initial visit  
                           ● Desire to develop sustainable programs that will build local capacity | |

*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.*
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<th>Scope of Concept</th>
<th>Second-Order Concept Grouping</th>
</tr>
</thead>
</table>
| **Learning in a unique environment** | • 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** | • 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** | • Exposure to local pathology and disease  
• Exposure to complications and disease progression uncommon in high-income countries | |
| **Greater responsibility** | • 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** | • Exposure to new surgical practice  
• Rich "open surgery experience" | |
| **Fulfillment** | • 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** | • 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** | • 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** | • 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** | • 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 | |
TABLE III (continued)

<table>
<thead>
<tr>
<th>First-Order Concept Grouping</th>
<th>Scope of Concept</th>
<th>Second-Order Concept Grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethical concerns</td>
<td>• Emotional challenges of dealing with preventable death</td>
<td>Feeling ineffective: developing an awareness of self-limitations and need of navigating culture and protocol differences that can be frustrating and emotionally draining</td>
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<tr>
<td></td>
<td>• Absence of “urgency” in life-threatening situations</td>
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<tr>
<td>Recognition of internal expectations for standards of care</td>
<td>• Different care and protocol expectations within the clinical environment</td>
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<td></td>
<td>• Interpretation of anesthesia care being of poor quality</td>
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<tr>
<td></td>
<td>• Interpretation of pre- and post-operative care as being of low quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Absence of organized rounds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• New appreciation for home healthcare system and availability of resources</td>
<td></td>
</tr>
<tr>
<td>Underpreparedness</td>
<td>• Difficulty functioning with limited language proficiency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Unfamiliar environment and clinical issues</td>
<td></td>
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<tr>
<td></td>
<td>• Adjusting to different medical practices</td>
<td></td>
</tr>
<tr>
<td>Awareness of professional role</td>
<td>• Concern with taking cases away from host country colleagues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Challenges in navigating resident role and working relationships</td>
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</tbody>
</table>

*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 County; 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, 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.

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 year.” Strong models of longitudinal partnerships in the orthopaedic literature 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. 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.

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 stakeholders.

Despite extensive literature devoted to the development of resident “guides” or recipes for success, HIC residents believed and LMIC hosts agreed that HIC residents were underprepared 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>
<thead>
<tr>
<th>First-Order Concept Grouping</th>
<th>Scope of Concept</th>
<th>Second-Order Concept Grouping</th>
</tr>
</thead>
</table>
| Sustained collaboration     | • 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        | • 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 | 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 |
| Limited impact on patient care | • 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 | Unmet local needs: 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 |
| Unmet local needs           | • 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: 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        | • Planning institution-wide changes without involving host healthcare providers undermines local authority | Undermined authority: Planning institution-wide changes without involving host healthcare providers undermines local authority |
| Limited reciprocity         | • High LMIC resident participation in international research projects with few credited as co-authors  
                              • No opportunity for LMIC residents to rotate at HIC institutions | Limited reciprocity: High LMIC resident participation in international research projects with few credited as co-authors  
                              No opportunity for LMIC residents to rotate at HIC institutions |
| Resident effectiveness limited by underpreparedness | • 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 | Resident effectiveness limited by underpreparedness: 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            | • 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 | Ethical concerns: 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 |

*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.
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 experts\(^1\). 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\(^2\). Although flexibility is an essential skill in all orthopaedic residents\(^3\), 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 month\(^4\), LMIC partners note that this is too short for residents to substantially contribute\(^5\), unless their rotation is a component of a larger, sustained partnership between institutions\(^6,7\). 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 requirement\(^8\).

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 on LMIC rotations. 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\(^9\).” 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 understanding\(^10\) 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 improving resident training because it encompasses awareness of power dynamics and emphasizes a lifelong commitment to self-evaluation, improvement, and partner advocacy.

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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.
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 oversight. 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 perspective. 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 generalizable45. 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 guidelines45, 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 grow2,3,8, 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). ■

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References

60. Accreditation Council for Graduate Medical Education. ACGME program requirements for graduate medical education in orthopaedic surgery. 2019:1-23.