Original Clinical Article

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Availability of global health opportunities in North American Paediatric Orthopaedic Fellowship Programmes

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Abstract

Purpose Orthopaedic residents are increasingly seeking international health electives (IHEs) during training, many of which involve providing paediatric orthopaedic care. However, little is known about the availability of IHEs during orthopaedic fellowship training. Our study sought to assess the global health opportunities available to North American paediatric orthopaedic fellows.

Methods We conducted an online, REDCap-based survey of paediatric orthopaedic fellowship programme directors (PDs) in the United States and Canada. The survey link was sent by the Pediatric Orthopaedic Society of North America (POSNA) Evidence-Based Medicine Committee to all POSNA-approved paediatric orthopaedic fellowship PDs. Follow-up reminder emails were delivered at set time intervals.

Results The overall response rate was 55% (26/47). Only three of 26 responding programmes (11.5%) offered a structured global health programme but 42.3% of programmes (11/26) reported fellow IHE participation within the last ten years. In all, 91% of PDs reported that fellows were extremely satisfied with their IHE, and 91% agreed that IHEs are valuable for trainees. Perceived barriers to fellow participation in IHEs included lack of funding, lack of established partner sites, lack of interest among fellows and concerns related to time away compromising clinical/call coverage. In all, 65.4% of PDs agree that IHE participation during training plays a major role in shaping fellows' future volunteer activities.

Conclusion There are limited global health opportunities among North American paediatric orthopaedic fellowship programmes, with only 11.5% offering a structured global health programme. Greater efforts to establish sustainable funding and international partnerships may increase opportunities for IHEs during paediatric orthopaedic fellowship training.

Level of Evidence Level II

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Introduction

It is estimated that five billion people lack access to safe, timely and affordable surgical care, and 143 million additional surgical procedures are needed in low- and middle-income countries each year to address this inequity.[1] A total of 13% of the globally unmet surgical need is attributable to procedures that address musculoskeletal conditions, including congenital and acquired limb deformities, osteomyelitis and traumatic injury.[2,3] Furthermore, these conditions are more likely to affect children in low- and middle-income countries, where road traffic injuries are more prevalent and appropriate treatment of common congenital deformities such as clubfoot and scoliosis may not be available.[3,4]

As awareness of the global need for orthopaedic surgical care has grown, interest and participation in international health electives (IHEs) among orthopaedic residents, fellows and attending surgeons has risen in kind. In a 2014 survey, 61.5% of attending orthopaedic surgeons reported being 'very likely' or 'extremely likely' to volunteer abroad.[5] Similarly, 61% of responding orthopaedic surgery residency programme directors supported clinical experiences for residents in developing countries.[6] Paediatric orthopaedics and orthopaedic trauma were the most common specialties in which residents practised.[6] Although outcomes following orthopaedic resident

experiences overseas are not well reported in the literature, upon returning from abroad, residents in other surgical specialties report marked personal growth, improved cultural understanding, perspective on functioning with limited resources, exposure to new operative pathology, improved physical exam skills and reinforced interest in participating in future volunteerism.[7,8] Additionally, trainee experiences in developing countries foster sustainable expansion of local providers' surgical skills and capacity, while also addressing healthcare inequities by providing surgical care that would be unavailable otherwise.[9]

Despite growing interest and involvement among orthopaedic surgeons and trainees in international projects, significant barriers remain. Recent studies have identified several critical barriers to resident participation in international electives, including lack of elective time, lack of funding, lack of established partners or programmes, limited faculty time and logistical challenges.[6,10] To our knowledge, the availability of international opportunities during orthopaedic fellowship training has not yet been investigated in the literature. In the present study, we explore the global health opportunities currently available to North American paediatric orthopaedic fellows, investigate fellowship director-reported outcomes and identify barriers to potential participation.

Methods and materials

Survey development

A 29-question survey was developed using the Research Electronic Data Capture system (RED-Cap Inc, Nashville, Tennessee), a secure, web-based application designed to support data capture for research studies. The survey was modelled after the survey questions described in the 2013 study by Clement et al.[6] Institutional Review Board approval for the current study was granted.

Survey distribution and follow-up

The survey link was sent to all 46 United States and Canadian paediatric orthopaedic fellowship programme directors (PDs) by the Pediatric Orthopaedic Society of North America (POSNA) Evidence-Based Medicine Committee. Two follow-up reminder emails were sent at two-week intervals for the first month. Finally, follow-up emails were sent to the cohort of non-responding fellowship PDs and those who had only partially completed the survey.

Survey content and analysis

The survey collected basic demographic information on each fellowship programme including name of institution and number of fellowship positions offered each year. To identify programmes with a history of fellow participation in international experiences, PDs were asked if their fellowship programme had a structured global health programme and if any fellows from the past ten years had participated in an IHE during their training. Programmes that offered structured global health programmes and/or indicated past fellow IHE participation were further prompted to complete the full survey. The remainder of the survey questions explored characteristics of fellows' experiences abroad, including partner sites, sources of funding and trip duration. All PDs were asked a series of questions that surveyed their opinions regarding the value of IHEs and perceived barriers to providing international experiences to fellows. The complete survey is included in the Supplemental Material.

Survey data collection, storage and analysis

Survey data was collected and stored in a RED-Cap database. All surveys that remained incomplete were excluded from the analysis. Descriptive statistical analysis was performed using Microsoft Excel (Microsoft Corp, Redmond, Washington).

Results

A total of 26 of the 47 PDs completed surveys for an overall response rate of 55%. Similarly, the responding programmes accounted for 44 (55%) of the 80 total fellowship trainee positions.

Structured global health programmes

As shown in Figure 1, three of the 26 responding fellowship programmes (11.5%) reported having a structured global health programme. Two such programmes have been in place for five to ten years, and the other has been in place for less than five years. Each cited receiving programme funding from orthopaedic department funds, donations and private grants. All three programmes specified that they had an ongoing relationship with at least one partner site in a developing country, and one

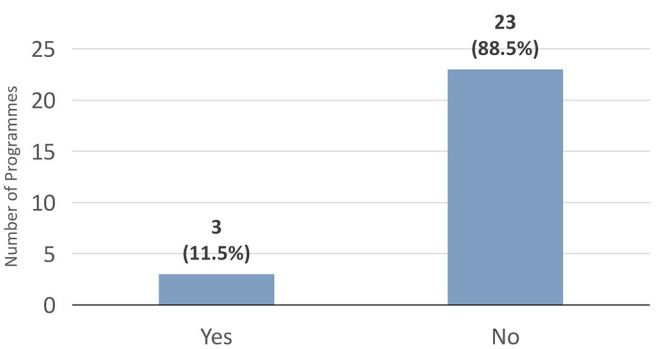

Fig. 1 Availability of structured global health programmes among US paediatric orthopaedic fellowship programmes.

Table 1 Additional information about structured global health programmes as provided by paediatric orthopaedic fellowship programme directors

	Programme		
	Washington University in St. Louis	University of Michigan	University of Utah
What global partnership(s) does your institution have?	World Paediatric Project	One institution overseas	Milwaukee Orthopaedics Overseas
What proportion of fellows participate in this programme?	100%	50%	26% to 50%
Do faculty members accompany fellows on these trips?	Yes; 1 faculty member	No	Yes; 2 to 3 faculty from Milwaukee and 1 faculty from University of Utah
Do fellows practice in paediatric orthopaedics only?	Yes	Yes	Yes

of the programmes indicated that one to three orthopaedic providers from this partner institution visit their own institution per year. Additional information about these three structured global health programmes is provided in Table 1.

Additional fellow IHE participation

Among fellowship programmes without a structured global health programme, 11 (42.3% of all responding programmes) reported having had fellows participate in international experiences over the past decade (Fig. 2). The mean length of time spent abroad was 1.5 weeks (range 1 to 2). A majority of PDs indicated that fellows could participate in IHEs at any point during their fellowship training, and fellows typically used clinical, elective and vacation time for their trips. Six fellowship programmes indicated that all fellows travelled to the same developing country, three programmes had fellows identify project locations independently and two programmes allowed fellows to choose travel locations from a list of pre-selected sites. Ten of the 11 PDs indicated that fellows received at least some form of funding, whether from the orthopaedic department, donations or private grants.

Project location and supervision

Responding PDs reported that their fellows had travelled to countries in Asia, Africa, Central and South America and the Caribbean for their IHEs. While abroad, fellows worked almost exclusively within their subspecialty, and time was spent primarily teaching local providers and providing clinical care. In all, 82% of PDs reported that an attending surgeon accompanied fellows during their IHEs.

PD perspectives on global health experiences

In all, 91% of PDs reported that fellows were extremely satisfied with their IHEs (Table 2). A total of 91% of responding PDs also believed such international electives are valuable for trainees and 65% agreed that global health opportunities play a major role in shaping the future professional and volunteer activities of their fellows (Table 3).

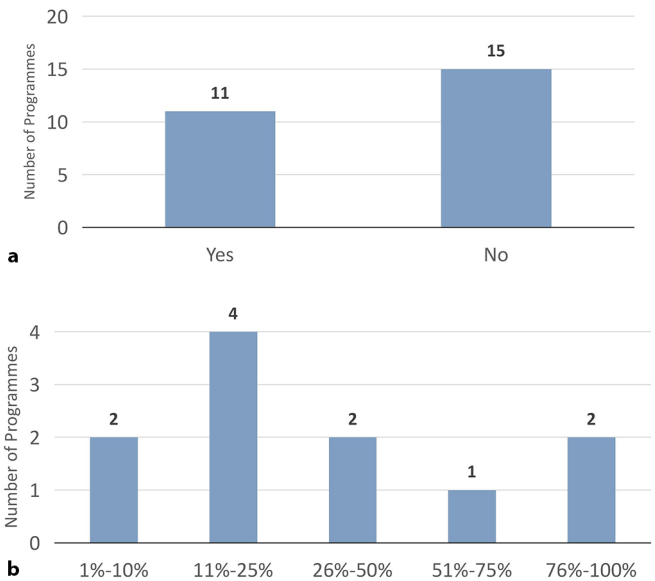

Fig. 2 (**a**) International health elective (IHE) participation by fellows from programmes without a structured global health programme; (**b**) proportion of fellows participating in IHEs over the past ten years (including programmes with and without structured global health programmes).

Table 2 Fellow satisfaction with international health elective (IHE) (among programmes with recent IHE participation)

Not at all satisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Extremely satisfied
0	0	0	9.1% (1/11)	90.9% (10/11)

Perceived barriers to international experiences for fellows

PDs at fellowship programmes without a structured global health programme or international rotation were asked if they had considered instituting such a programme. Of the PDs who issued a response (n = 21), 11 indicated it had not been considered, eight were still considering doing so and two expected to institute a global health programme (Table 4). All 26 responding PDs were surveyed about the perceived barriers to offering IHEs to their trainees. As shown in Figure 3, the most common barriers cited were lack of funding (58%), lack of established partner sites (46%), lack of interest among fellows (35%) and fellow time away compromising clinical/call coverage (31%).

JOURNAL OF CHILDREN'S ORTHOPAEDICS

Table 3 Programme director (PD) perspectives on value of international health electives (IHEs) during fellowship training

	Strongly disagree	Somewhat disagree	Neutral/undecided	Somewhat agree	Strongly agree
As a PD, I believe the educational experience provided by my fellow's recent IHE participation was valuable.	0	9.1% (1/11)	0	18.2% (2/11)	72.7% (8/11)
Does IHE participation have a major influence on fellows' future volunteer and professional activities?	7.7% (2/26)	0	26.9% (7/26)	30.8% (8/26)	34.6% (9/26)

Table 4 Programme director perspectives on plans to institute a structured global health programme

Has your fellowship programme considered instituting a structured global health programme?	
No	52.4% (11/21)
Yes, and we are still considering it	38.1% (8/21)
Yes, and we plan to institute it	9.5% (2/21)

Discussion

Our survey indicates that there are limited opportunities for international health electives during fellowship training among North American paediatric orthopaedic fellowship programmes. Compared with orthopaedic residency programmes, paediatric orthopaedic fellowships have fewer structured global health programmes (11.5% versus 12% to 32%)[6,10,11] and lower rates of IHE participation (42.3% versus 61%).[6] This is surprising given the fact that paediatric orthopaedics is often identified as the most prevalent subspecialty for international volunteerism within orthopaedics. In a recent survey of IHEs, Shultz et al[10] found that amongst the institutions offering IHEs to residents, 77% offered an elective involving paediatric orthopaedics. A separate survey of IHEs available to orthopaedic residents indicated that two-thirds of offered programmes included paediatric orthopaedics as a subspecialty option.[6]

High demand and value

There is a clear and demonstrated interest among orthopaedic resident trainees to participate in an IHE as a component of their training.[12-14] One survey of US orthopaedic residents indicated that 85% of residents are interested in participating in an IHE.[12] This same survey found that approximately 50% of residents were willing to use vacation time as a means of participating in IHEs if no other allotted time was available.[12]

A total of 91% of PDs in our survey reported their fellows were extremely satisfied with their IHE experience. In a previously published study, 97% of residents rated their IHE experience as very good (32%) or excellent (65%).[6] The vast majority of PDs in our study (73%) strongly agreed that an IHE is a valuable experience for a paediatric orthopaedic fellow. Moreover, only one respondent in our survey believed that the inclusion of a global health elective would compromise a fellow's education. PDs clearly see value in these experiences and few, if any, believe they are detrimental to training. These results support similar findings in a previous study, which showed that only 14% of PDs cited lack of value as a potential barrier to establishing an IHE.[10]

There may also be long-term benefits to participation in IHEs as a trainee.[15] At one institution, a retrospective analysis of residents who participated in their programme's structured IHE showed increased volunteerism both domestically and abroad after participation in the elective.[15] Additionally, IHE-experienced residents demonstrated a greater commitment to caring for the medically indigent in their daily practice.[15]

Addressing barriers

Funding

Our study demonstrates that lack of funding is a barrier to establishing an IHE, with 58% of responding PDs listing it as a concern. Hoehn et al. estimated the start-up cost for a structured global health programme in general surgery at approximately $24 000.[16] Nearly all other IHE studies have shown funding to be a major concern, with 90% of programmes believing finances are at least a moderate barrier.[6,10,11] Orthopaedic department funding is often the primary funding source, with donations and private grants commonly listed as additional sources of support.[6] Despite 59% of programmes offering at least some financial support, many residents often pay a portion or the entire cost of their experience abroad.[6] A majority of residents may be willing to at least partially fund their own trip,[12] however, in order to establish a more structured and sustainable IHE, the financial burden must be removed as much as possible from the trainee. This may require a cultural shift within orthopaedic departments or subspecialty divisions to consider IHEs as educational priorities.

A recent review by Fan et al.[11] explored other potential sources of funding for IHEs, including grants from the American Academy of Pediatrics (AAP) and Health Volunteers Overseas (HVO). Partnering with a hospital or university system with a focus on global health outreach may also help in this respect. Other supplemental finances could come from establishment of an alumni scholarship fund or other intra-departmental donations. Our survey did not explore in depth the manner in which each department supports its structured global health programme financially, but such information would be helpful for programmes considering establishment of such a programme in the future.

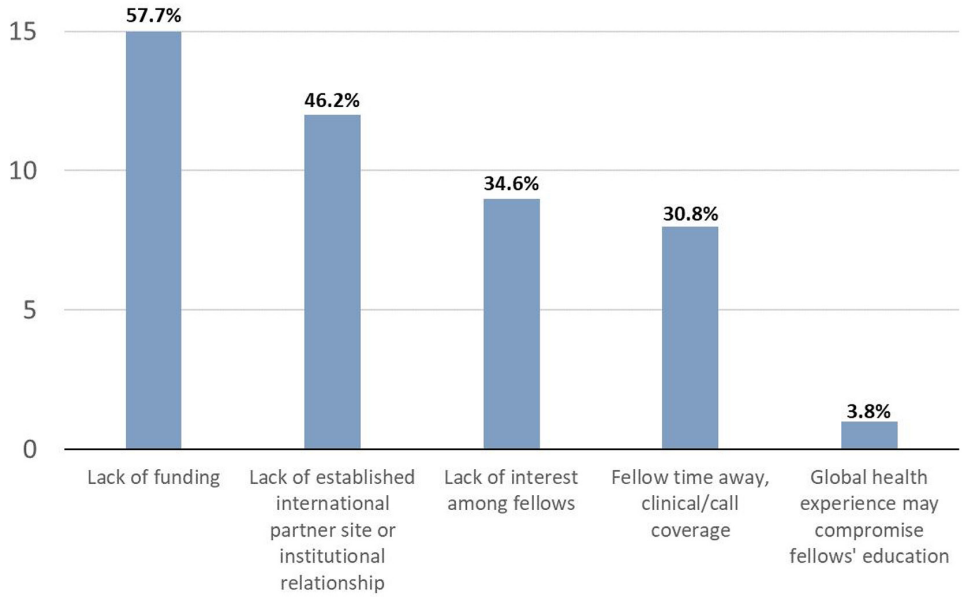

Fig. 3 Perceived barriers to providing fellows with international health elective (IHE) opportunities.

Establishing a programme

Based on our survey, 46% of responding PDs cite lack of established international partner sites as a barrier to fellow participation in an IHE. This is similar to a recent survey demonstrating that 49% of residency programmes offering an IHE had no ongoing relationship with an institution abroad.[6] Given the amount of time, money, and effort required to initiate and maintain a structured global health programme, the orthopaedic department and individual faculty members must be fully committed to the effort. Despite these obstacles, 40% of PDs in our study declared consideration of or intent to establish a structured global health programme.

Perhaps the best example of a mutually beneficial global partnership is the Institute for Global Orthopaedics and Traumatology (IGOT) at the University of California at San Francisco (UCSF).[2] With five established partnerships with international teaching hospitals, this orthopaedic department is at the forefront of orthopaedic global outreach among US training programmes.[2] In the general surgery literature, various institutions have detailed their journeys in establishing IHEs. Hoehn et al. described the initial efforts of the University of Cincinnati including identification of potential sites, site scouting visits, and ultimately a pilot month once a site was chosen.[16] They also designate key tenets of a successful international partnership, which include desire by the host institution for the programme, adequate surgical volume, breadth of cases, suitable hospital infrastructure, willingness to evaluate residents, and regular re-evaluation of the rotation.[16]

Many programmes find it challenging to initiate relationships with medical facilities abroad. Non-governmental organizations (NGOs) such as HVO are a good resource to foster these relationships. HVO has orthopaedic volunteering opportunities in diverse locations, and has been used by UCSF to facilitate its multiple global partnerships.[2,15,17] Specific to paediatric orthopaedics, the committee on Children's Orthopaedics in Underserved Regions (COUR) within POSNA has the specific goal of monitoring and cataloging outreach missions by POSNA member surgeons. This committee could be a valuable resource for paediatric orthopaedic fellowship programmes looking to establish international partnerships.

Other barriers

Our study shows that only 31% of respondents felt that on-call or clinical coverage was an obstacle to their fellows' IHE participation. Fellows often have fewer service and administrative duties when compared with residents, which may make finding elective or duty-free time easier during fellowship. Regardless, a pre-determined block of time designated for fellow participation in an IHE is crucial to its success.

Limitations

With a response rate of 55%, it is possible that there was a selection bias present as programmes with greater interest in international orthopaedics may have been more likely to respond to the survey. We did not allow respondents to write in on their own perceived barriers, therefore some

specific concerns were likely overlooked by the survey as well. These perceived barriers are possibly similar to those established in broader surveys.[10,11] Although we did assess perceived IHE satisfaction among fellows, we did not directly obtain this information from the fellows themselves. While we cannot definitively state that paediatric orthopaedic fellows have a strong desire to pursue IHEs, it is reasonable to assume that the high levels of interest in IHEs among orthopaedic residents can be extrapolated to trainees pursuing specialty training in paediatric orthopaedics.

Multiple studies have investigated the satisfaction of residents with their IHEs, but few have evaluated the impact on the host facilities. In order to ensure a mutually beneficial partnership, the impact of visiting North American trainees on the host institution must also be explored.

There is a large and growing interest in global health experiences among orthopaedic trainees. Despite the relative abundance of IHEs in paediatric orthopaedics compared with other orthopaedic sub-specialties, there continues to be a relative lack of established and structured global health programmes within paediatric orthopaedic fellowship training. Funding and lack of established partner sites are the greatest perceived barriers to establishing a programme. Overcoming these barriers may lead to an increase in international training opportunities for paediatric orthopaedic fellows. This will in turn have a significant global impact as more paediatric orthopaedic surgeons travel abroad, teach local surgeons throughout low- and middle-income countries, and strive to establish durable, sustainable solutions to the burden of paediatric musculoskeletal disease. Future research should explore the details of effective funding strategies for successful global health partnerships. Additionally, further examination of the logistical process required to establish and maintain a reciprocal relationship with a host facility could greatly benefit paediatric orthopaedic fellowship programmes in the early phases of establishing a structured global health programme.

SUPPLEMENTAL MATERIAL

Supplemental material is available for this paper at https://online.boneandjoint.org.uk/doi/suppl/10.1302/1863-2548.12.180153.

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COMPLIANCE WITH ETHICAL STANDARDS

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Ethical approval: All procedures performed in studies involving human participants were in accordance with ethical standards of the institutional review board, which granted approval for the study. This article does not contain any studies with animals performed by any of the authors.

Informed consent: Not required for this work.

ICMJE CONFLICT OF INTEREST STATEMENT

All authors declare that they have no relevant conflicts of interest.

REFERENCES

1. **Meara JG, Leather AJ, Hagander L, et al.** Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. *Surgery* 2015;158:3-6.

2. **Conway DJ, Coughlin R, Caldwell A, Shearer D.** The Institute for Global Orthopedics and Traumatology: a model for academic collaboration in orthopedic surgery. *Front Public Health* 2017;5:146.

3. **No authors listed.** Global Burden of Disease Collaborative Network. *Global Burden of Disease Study 2016.* Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2016.

4. **Rose J, Weiser TG, Hider P, et al.** Estimated need for surgery worldwide based on prevalence of diseases: a modelling strategy for the WHO Global Health Estimate. *Lancet Glob Health* 2015;3:S13-S20.

5. **Makhni MC, Miao D, Zurakowski D, Day CS.** Are academic orthopedic surgeons interested in global health? *Am J Orthop (Belle Mead NJ)* 2014;43:E37-E42.

6. **Clement RC, Ha YP, Clagett B, Holt GE, Dormans JP.** What is the current status of global health activities and opportunities in US orthopaedic residency programs? *Clin Orthop Relat Res* 2013;471:3689-3698.

7. **Campbell A, Sherman R, Magee WP.** The role of humanitarian missions in modern surgical training. *Plast Reconstr Surg* 2010;126:295-302.

8. **Jafari A, Tringale KR, Campbell BH, Husseman JW, Cordes SR.** Impact of humanitarian experiences on otolaryngology trainees: a follow-up study of travel grant recipients. *Otolaryngol Head Neck Surg* 2017;156:1084-1087.

9. **Dormans JP.** Orthopaedic surgery in the developing world—can orthopaedic residents help? *J Bone Joint Surg [Am]* 2002;84-A:1086-1094.

10. **Shultz PA, Kamal RN, Daniels AH, DiGiovanni CW, Akelman E.** International health electives in orthopaedic surgery residency training. *J Bone Joint Surg [Am]* 2015;97:e15, 1-8.

11. **Fan B, Zhao C, Sabharwal S.** International elective during orthopaedic residency in North America: perceived barriers and opportunities. *J Bone Joint Surg [Am]* 2015;97:e1, 1-8.

12. **Zhang S, Shultz P, Daniels A, Ackelman E, Kamal RN.** High disparity between orthopedic resident interest and participation in international health electives. *Orthopedics* 2016;39:e680-e686.

13. **Jense RJ, Howe CR, Bransford RJ, Wagner TA, Dunbar PJ.** University of Washington orthopedic resident experience and interest in developing an international humanitarian rotation. *Am J Orthop (Belle Mead NJ)* 2009;38:E18-E20.

14. **Matar WY, Trottier DC, Balaa F, Fairful-Smith R, Moroz P.** Surgical residency training and international volunteerism: a national survey of residents from 2 surgical specialties. *Can J Surg* 2012;55:S191-S199.

15. **Disston AR, Martinez-Diaz GJ, Raju S, et al.** The international orthopaedic health elective at the University of California at San Francisco: the eight-year experience. *J Bone Joint Surg [Am]* 2009;91-A:2999-3004.

16. **Hoehn RS, Davis BR, Huber NL, et al.** A systematic approach to developing a global surgery elective. *J Surg Educ* 2015;72:e15-e20.

17. **Coughlin RR, Kelly NA, Berry W.** Nongovernmental organizations in musculoskeletal care: orthopaedics overseas. *Clin Orthop Relat Res* 2008;466:2438-2442.