Review Article: Training Programs Within Global Networks: Lessons Learned in the Fogarty International Clinical Research Scholars and Fellows Program

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Abstract. The Fogarty International Clinical Research Scholars and Fellows Support Center at Vanderbilt describes administrative lessons learned from the management of 436 scholars (American students or host country junior trainees) and 122 post-doctoral fellows (Americans or host country nationals). Trainees spent 10–11 months working on mentored research projects at 61 well-vetted sites in 27 low- or middle-income host countries (LMICs) with strong US partners. Economies of scale, strong centralized information exchange, and effective standardized operations linking US institutions with LMIC field sites were achieved in a program that minimized administrative overhead. Advantages and drawbacks of this approach are presented and discussed. Training of a new generation of global research leaders is greatly facilitated by an overseas mentored research experience that is administratively streamlined to optimize the use of resources for training, research, and capacity building.

INTRODUCTION: GLOBAL HEALTH AND THE RISE OF NETWORKS

Interest in global health among US medical trainees has expanded considerably in recent years.^{1,2} Academic medical centers have responded to this demand by increasing opportunities for exposure to and participation in international settings. Models of this response include exploratory visits, short-term and extended rotations, clinical versus didactic versus research projects, distance learning opportunities, and 1-year overseas programs.³ Programs vary across institutions to balance student demand with the available overseas partnerships, required infrastructure, and support of US institutional leadership. The nature and scope of international efforts, including complex challenges related to stationing and providing for trainees overseas, have created a need for institutional leadership to evaluate their administrative practices for optimal management of global health endeavors.^{4,5}

Global health training opportunities are given considerable support when they are nested within strong bilateral or multilateral partnerships among international institutions.^{6,7} Well-established partnerships add value to all parties by creating an environment of reciprocity, shared knowledge and understanding of infrastructure and local living and safety conditions, and training program cohesiveness with shared objectives and outcome metrics.⁸ Structured partnerships mitigate ethical, cultural, and sustainability compromises.^{9,10} Egalitarianism is an important principle, avoiding academic imperialism; Westerners are being trained, and local talent must also be nurtured and developed with sincere and substantial effort.

By building on existing partnerships and structuring new partnerships appropriately, global health networks can provide training models with the features described above. Networks across established working groups of scientific excellence afford opportunities for trainees to experience international collaboration, and organization of such networks can catalyze resources, exchange ideas, and present shared standards,

guidelines, and metrics. For instance, at the US National Institutes of Health (NIH), the National Heart, Blood, and Lung Institute/United Health Collaborating Centers of Excellence,¹¹ the six Division of Acquired Immunodeficiency Syndrome National Institute of Allergy and Infectious Diseases networks (AIDS Clinical Trials Group, International Maternal Pediatric Adolescent AIDS Clinical Trials, International Network for Strategic Initiatives in Global HIV Trials, HIV Prevention Trials Network, HIV Vaccine Trials Network, and Microbicide Trials Network; all partnering with multiple NIH institutes),¹² and the Medical Education Partnership Initiative (MEPI)¹³ are global networks of academic institutions and public funding agencies that provide opportunities for trainees.

The administrative and logistical requirements of networks and academic partnerships are sometimes given inadequate institutional support. Administrative burdens can be acute at international sites that already face unmet staff and resource needs.¹⁴ We describe a model of global health training in a network that was managed between 2007 and 2013 by a central entity: the Fogarty International Clinical Research Scholars and Fellows (FICRS-F) Support Center at Vanderbilt University.^{15,16} We review challenges and considerations faced by such efforts, discuss program infrastructure and lessons learned by FICRS-F Program leaders, and describe an administrative framework for centralized training programs across universities and networks. The scope of this paper is limited to administrative aspects of the program, but it is part of a series of reports that will collectively describe FICRS-F in depth. Overviews of the program, recruitment and selection process, and program outcomes have been published^{15,17} or are in preparation.

PROGRAM DESCRIPTION

In 2003, the NIH Fogarty International Center (FIC) founded a training program for US doctoral students in the health sciences (the Fogarty–Ellison Scholars Program) in partnership with the Ellison Medical Foundation. This program provided year-long research training experiences for US medical, health professional, and health sciences students along with low- or middle-income host country (LMIC)

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trainees at international sites, typically research centers and/or universities participating in FIC training programs. In 2007, the program was restructured through a competitively awarded capacity-building R24 grant to the Vanderbilt Institute for Global Health (VIGH), which created the FICRS-F Support Center at Vanderbilt (previously described in detail¹⁵). A post-doctoral fellowship component was developed in 2008 and added to the administrative responsibilities of the Support Center. Between 2007 and 2013, the NIH funded year-long research training experiences through the Support Center for 298 pre-doctoral and 122 post-doctoral trainees in 61 international sites in 27 LMICs in addition to providing alumni support for 138 trainees in the prior Fogarty–Ellison Program.

DISCUSSION

Central administration-distributed responsibilities. Network-based training requires the engagement of multiple parties with delineated responsibilities. The FICRS-F Support Center at Vanderbilt centralized trainee recruitment, application, and selection procedures to facilitate efficiency and consistency (Figure 1). A hallmark of the FICRS-F Program was universal eligibility of US applicants, regardless of their current institution. Disbursements of funds and management of insurance for the US trainees, coordination of major events, alumni tracking, and program evaluation were also centralized to achieve econ-

FIGURE 2. Administrative personnel costs compared with the number of trainees by training year. Percent personnel costs were higher in year 1, because most direct trainee costs (stipends and insurance) were paid directly from the FIC in year 1 only.

omies of scale with a small Support Center staff team focused on FICRS-F. This organization enabled the FICRS-F Support Center administrative personnel costs to stay between 8% and 10% of total program costs across a range of trainees after initial Support Center startup (Figure 2) and optimized the flow of funds to trainees and international training sites.

The central administrative unit enabled insights shared by the training sites to be expeditiously shared with many others,

FIGURE 1. Structure of the FICRS-F Support Center at Vanderbilt.

and standard operating procedures reflecting the collective wisdom were made available to all partner institutions and sites through the FICRS-F website (www.fogartyscholars.org). Because the Support Center staff managed logistical details of multiple trainees, they were able to recommend and implement solutions for individual issues that had worked for other trainees.

Successful and efficient centralization of program activities required significant support from the Vanderbilt University Medical Center (VUMC). Departments across VUMC worked with VIGH to address the unique human resource issues of the FICRS-F Program. The integration of FICRS-F trainees into VUMC's health and emergency coverage and access for all FICRS-F trainees to online VUMC resources facilitated the trainees' overseas experiences.

Key training activities were addressed by international sites and their US partner institutions, which understood the unique

situations in each country and local infrastructure and resources available to trainees. With rare Support Center input, the US partners and their collaborating international sites managed research projects and centers in which trainees were nested. Issues such as international trainee pay equity and payroll logistics, specific health and safety threats, host country laws and practices, and local logistical coordination required detailed familiarity with the international sites and were guided by LMIC training leaders.⁴ The Support Center sought the most logical central versus distributed administrative responsibilities to maximize efficiency, allowing training partners to focus on mentoring trainees and successful research projects (see below). As a flagship NIH/FIC program, Fogarty personnel were closely involved in guiding program direction, aiding in the development and coordination of the program's orientation each July on the NIH campus, and rallying financial support for the program from other NIH Institutes and Centers.

Administrative responsibilities in the Fogarty International Clinical Research Scholars and Fellows Program (FICRS-F)
Support Center Responsibilities

Pre-departure

- Market the Program, including outreach to minority candidates and institutions, paying attention to scientific interests of contributing NIH institutes and centers
- Manage applications and selection procedures for U.S. trainees
- Provide stipend and research payments, as well as health and evacuation insurance
- Enable online access to electronic library resources at Vanderbilt
- Develop site-specific budgets and contracts for U.S. and international training partners
- Generate and submit reports to all program funders through the NIH Fogarty International Center
- Design and administer FICRS-F Orientation & Training (1 to 2 weeks on the NIH campus in July, the first month of the year-long training)

While trainees were in the field

- Advise training sites as to administrative, logistical, and research funding issues to optimize administrative efficiency and troubleshoot obstacles inherent in multi-partner collaborations
- Administer subcontracts, stipends, and other expenditures
- Provide centralized procedures for mentoring; guidelines and expectations for IRB approvals; safety and emergency response, including communications and evacuations and urgent responses to health issues
- Troubleshoot problems related to trainees and training sites
- Organize and host online lecture/discussions among trainees

After returning home (U.S.) or to local jobs (international counterparts)

- Evaluate trainees, mentors, and host sites
- Generate and submit reports to program funders
- Coordinate alumni activities; support travel to present findings at meetings, as funds permitted
- Track alumni activities and both career and scientific outcomes

International Site and U.S. Academic Partner Responsibilities

Pre-departure

- Market the program at the host-country site; manage application and selection procedures for international trainees (U.S. and partner international sites work together)
- Interview and rank finalist applicants at an annual selection meeting at the NIH, hosted by the Fogarty International Center, and coordinated by the Support Center
- Orient trainees selected for their sites on site-specific issues (logistics, safety, science)
- Facilitate travel visas and vaccinations for U.S. trainees to go abroad and for international trainees to come to the NIH for July Orientation & Training
- Make international airline reservations and travel arrangements to site and/or to NIH for July training
- Guide trainees in housing and transportation choices
- Design and communicate on-site safety and emergency procedures
- Manage interactions with the host research field sites
- Develop research training projects with each selected U.S. and local international trainee

While trainees were in the field

- Understand and fulfill host institution IRB requirements
- Troubleshoot problems on-site
- Deploy emergency procedures at the sites, when needed
- Mentor trainees and manage research projects

After returning home (U.S.) or to local jobs (international counterparts)

- Finalize processing of financial obligations and closing of contracts
- Work with partners and Support Center to track alumni
- Facilitate presentation and publication of research results
- Participate in alumni events (web-based and meetings)
- Continue mentoring and career counseling

Key Handbooks, Standards of Procedures, and other in-depth resources on the administration of the FICRS-F program can be found at www.fogartyscholars.org

Flexible financial structures and sharing of responsibilities.

Although it is paramount for accounting mechanisms to adhere to the regulations of the funding agency (NIH), specific institutional policies vary. Training embedded in a network of institutions and offices of grants management requires a flexible administrative framework. The centralized nature of the Support Center allowed for management of financial relationships with individual institutions according to their unique needs and arrangements while maintaining efficient flows of funding (Figure 3).

Financial mechanisms also provided a framework for appropriate responsibilities to fall to the institutions and organizations in the network. The distribution of funds to support activities, such as travel to the site, visa acquisition, and immunizations, reinforced the premise that issues related to specific international sites devolve to their US partner institutions or the international sites themselves, allowing the research mentors to use their background and expertise with the sites. Infrastructure funds provided to the international sites enabled them to focus on supporting research with sufficient supplies, staff, and other resources appropriate to the local environment. It was important for trainees, network partners, and the Support Center to use a clear and shared understanding of their respective financial roles and responsibilities.

The FICRS-F Support Center addressed the need for clarity in expectations through administrative handbooks, guidelines, and tools developed for training site administrators in the FICRS-F Network (available at www.fogartyscholars.org). Financial support for training was provided through cost-reimbursable subcontracts to institutions within the training network, and sometimes they involved several contracts with relevant parties for a given trainee. Because funding flowed to various entities through contracts and subconsortia, entities were responsible for certain duties and/or ensuring that monies reached the appropriate institutions. These responsibilities were outlined in the scope of work for each subcontract as well as the administrative handbook, and subcontracts were revised each year in full discussion with the training sites. US partners and international sites also produced site-specific orientation and policy manuals, invaluable for the trainees at time of deployment.

Health, safety, and communication. Because trainees deploy around the world, the risk of injury, disease, and death is a legitimate concern. In addition to infectious diseases not usually encountered in the United States, 85% of road-traffic fatalities occur in LMICs. From 2007 to 2009, most US citizen injury-related deaths abroad were because of road traffic crashes; drowning accounts for 14% of total US citizen deaths overseas,¹⁸ and up to 25,000 cases of malaria are contracted

FIGURE 3. Algorithm guiding the division of responsibilities and subcontracts among partner institutions and trainees.

abroad by persons arriving from high-income countries.¹⁹ Health risks to trainees studying in LMICs have been reviewed elsewhere.^{20–22} Institutions and collaborative networks have moral and legal responsibilities to be prepared for such events. Risk and liability waivers, while important, should not be relied on as a substitute for thoughtful and well-designed policies regarding health, safety, security, and emergency situations. Standard operating procedures that outline responsibilities of the administrative hub and the network members are crucial for navigating situations and ensuring that responses are timely and appropriate.

The FICRS-F Program network included diverse locales and conditions, making a wide range of emergent events possible. The collaborative and reciprocal nature of the FICRS-F Network was a strength of its emergency response effort, with a key single point of contact and communication structure known to all stakeholders.⁴ The Support Center established a system that called on the international site staff to attend to the immediate needs of trainees in emergencies, with the expectation that communication would be swift, accurate, and as detailed as possible. Simultaneously, the Support Center worked with United States-based entities, including the trainees' pre-authorized emergency contacts and home institutions, to make them aware of the situation and assist with appropriate arrangements. Efforts both domestic and abroad relied on communication and preparation by the Support Center, including collecting extensive emergency information and ensuring that strong safety and security plans were in place at all international sites.²³ We recommend that even small training partnerships have such emergency and contingency plans in place.

Twinning of US and LMIC trainees. A unique component of the FICRS-F Program was selection and twinning of LMIC trainees with US pre-doctoral trainees.¹⁵ This component provided significant value to both US and LMIC trainees as well as reciprocity among research sites and host countries.^{10,24,25} Simultaneously with the selection process for US trainees each year, international sites and their US partners nominated and selected local doctoral students, post-doctoral trainees, and junior faculty members to pair with incoming US trainees at the international site. The sites and their US partners had substantial flexibility in selecting the local twin. When research interests were complementary, the pair worked together, supporting one another scientifically and personally, but it was not uncommon for them to be involved in different projects. The two trainees often served as virtual mentors to one another in their respective areas of scientific and cultural strength; the US scholars often looked to their twin for assistance and guidance in navigating the host country workplace and culture.

The twinning relationship benefitted the international trainee, who gained the opportunity to develop research skills through training events, such as program orientation on the NIH campus, collegial interactions with the US scholar, and a unique year dedicated to learning research while conducting it. Funding provided to the international site for the twin enabled the trainee to conduct research and helped with general capacity building at the site. Investments made by the FICRS-F Program built global health research capacity by training internationally based scientists and facilitating site development.²⁶ Allowing sites broad latitude to select their trainees enabled them to select individuals deserving of the

mentored research opportunity, in turn contributing to site capacity building in research. By avoiding highly specific constraints, such as a given post-graduate educational attainment (which may not be available locally), sites autonomously selected trainees whose interests and goals represented good fits based on research career trajectory, qualifications of the local trainee, and research priorities of the site.

The principle threat to the effectiveness of the twinning design occurred when the international trainee was not given substantial protected time by his/her primary institution to pursue research. When the duties of LMIC FICRS-F scholars who were in clinical training programs or had teaching or patient care responsibilities were not substantially altered, the unique benefits of the FICRS-F year were compromised. This risk can be minimized by careful communication with site principal investigators, periodic monitoring of sites, and interviews with international scholars and alumni.

Continuity of mentorship. The multi-institutional FICRS-F training and Support Center model provided challenges in continuity of mentorship. A typical US trainee would leave his/her home institution to spend a year at a site that might have no research ties to the trainee's home institution. Within the 10–11 months abroad, scholars and fellows had to acclimate to new environments, develop new mentoring and professional relationships, establish feasible research plans, navigate restrictions and local impediments, and execute their plans with measurable outcomes. When the mentorship and research projects did not have continuity with the US trainees' home institutions, the trainees' continued productivity and research development were at risk of compromise.

With the strong mentorship offered by so many of the FICRS-F sites, trainee success and productivity are common, but it is enhanced when trainees are able to develop mentoring relationships before the year abroad and continue them after it. Continuity of mentorship improves both the trainee's development of skills and the quality of the research, because a longer-term commitment secures and enhances the mentor's responsibility to both.²⁷ Mentoring is most successful when it supports the duration of a trainee's research from project plan inception to publication and follow-up rather than providing guidance only while at the performance site.²⁸

The FIC recognized the importance of mentorship continuity in the redesign of FICRS-F into the Global Health Program for Fellows and Scholars inaugurated in 2012.²⁹ Continuity and strengthening of global health research networks and mentors should be achieved in the new program, which comprises five consortia with a total of 24 US institutions that offer established institutionally linked LMIC research sites and recruit and select candidates who have existing research and mentoring relationships that they can carry to the sites. This model has the advantage of providing a longer global health research pathway with longer relationships and partnerships than were available in the FICRS-F model. A principle disadvantage, however, is that it limits opportunities for US trainees who are not affiliated with any of the 24 funded institutions and LMIC trainees and students, because the twinning model is not a feature of the new Global Health Fellows Program.

Documenting long-term outcomes. Medical students comprised the majority of pre-doctoral FICRS-F scholars, and therefore, 4–7 years must elapse before concrete career directions of scholar alumni are confirmed. Similarly, some

post-doctoral trainees have a few years of training to complete in their home countries, creating a delay in charting career trajectories, which represents a challenge in measuring and documenting long-term FICRS-F Program outcomes. Another challenge is the lack of a suitable comparison group for purposes of evaluation. Although programs such as the Doris Duke International Clinical Research Fellows, the Centers for Disease Control and Prevention Hubert Fellowship, and institutional programs have similarities to FICRS-F, none are directly comparable. Furthermore, it is difficult to distinguish causal connections between programs, such as FICRS-F, and the passions, plans, and choices of trainees. With little doubt, choosing to take a year off from one's primary training to pursue a program such as FICRS-F indicates a prior commitment to global health and a likelihood of pursuing it to some degree long term.

Both immediate and long-term outcomes of the FICRS-F Program are evidenced by the number and quality of publications and presentations produced by scholar and fellow alumni.¹⁵ Other major outcomes to be documented over time will include research grants obtained, career positions taken, networks and collaborations built and fostered, and impacts made on scientific disciplines and specialties.

CONCLUSIONS AND RECOMMENDATIONS

Because institutions consider optimal ways to develop and maintain global health research training programs, global health networks provide substantial benefits. Networks benefit all members in terms of nurturing trainees in scientific excellence, shared understandings and goals, and reciprocity. Based on experiences of the FICRS-F Support Center, we suggest the following strategies for developing frameworks of support for network training activities:

Certain functions are best centralized in an administratively robust entity, nurturing economies of scale and allowing network members to focus on science and mentoring.

The central administrative entity should support its partners in a client-driven culture, developing useful guidelines based on the aggregate experience of network members.

Responsibilities of network members must be clearly communicated and enforced.

The financial accounting framework should be focused on maximizing funds available to training and scientific endeavors, providing sufficient flexibility to accommodate unique needs of network members.

Training networks should structure programs to provide a continuum of mentorship that extends beyond the training period by providing support and incentives for follow-up collaborations and activities for program alumni.

Training support centers should maintain buy-in and solicit feedback from network members regularly to ensure that they are achieving common goals and serving effectively as liaisons between the network and funding agencies.

The nurturing of a future generation of global health research leaders is the ambitious goal of the FIC and its many partners at the NIH and in academia. We hope that these lessons learned help institutions and mentors expand global health research opportunities within a coherent administrative context.

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REFERENCES

1. Evert J, Bazemore A, Hixon A, Withy K, 2007. Going global: considerations for introducing global health into family medicine training programs. *Fam Med* 39: 659–665.
2. Macfarlane SB, Jacobs M, Kaaya E, 2008. In the name of global health: trends in academic institutions. *J Public Health Policy* 29: 383–401.
3. Freedman DO, Gotuzzo E, Seas C, Legua P, Plier DA, Vermund SH, Casebeer LL, 2002. Educational programs to enhance medical expertise in tropical diseases: the Gorgas Course experience 1996–2001. *Am J Trop Med Hyg* 66: 526–532.
4. Rubin ER, 2013. *Global Operations Require Strategic Assessment. Association of Academic Health Centers*. Available at: <http://www.aahcdc.org/Resources/ReportsAndPublications/IssueBriefs/View/ArticleId/12/Global-Operations-Require-Strategic-Assessment.aspx>. Accessed May 8, 2013.
5. Nelson BD, Kasper J, Hillberg PL, Thea DM, Herlihy JM, 2012. Developing a career in global health: considerations for physicians-in-training and academic mentors. *J Grad Med Educ* 4: 301–306.
6. Costello A, Zumla A, 2000. Moving to research partnerships in developing countries. *BMJ* 321: 827–829.
7. AMPATH Consortium, 2013. Available at: www.ampathkenya.org/our-partners/consortium-members. Accessed May 8, 2013.
8. Vermund SH, Audet CM, Martin MH, Heimbürger DC, 2010. Training programmes in global health. *BMJ* 341: c6860.
9. Crump JA, Sugarman J, 2010. Working Group on Ethics Guidelines for Global Health Training (WEIGHT). Global health training: ethics and best practice guidelines for training experiences in global health. *Am J Trop Med Hyg* 83: 1178–1182.
10. Umoren RA, James JE, Litzelman DK, 2012. Evidence of reciprocity in reports on international partnerships. *Education Research International*, ID, 10.1155/2012/603270.
11. UnitedHealth and NHLBI Collaborating Centers of Excellence, 2013. Available at: www.nhlbi.nih.gov/about/globalhealth/centers/index.htm. Accessed May 8, 2013.

12. Division of Acquired Immunodeficiency Syndrome (DAIDS) HIV/AIDS Clinical Trials Networks, 2013. Available at: www.niaid.nih.gov/about/organization/daids/networks/pages/daids-networks.aspx. Accessed May 8, 2013.
13. Medical Education Partnership Initiative (MEPI), 2013. Available at: www.fic.nih.gov/Programs/Pages/medical-education-africa.aspx. Accessed May 8, 2013.
14. Provenzano AM, Graber LK, Elansary M, Khoshnood K, Rastegar A, Barry M, 2010. Short-term global health research projects by US medical students: ethical challenges for partnerships. *Am J Trop Med Hyg* 83: 211–214.
15. Heimbürger DC, Carothers CL, Gardner P, Primack A, Warner TL, Vermund SH, 2011. Nurturing the global workforce in clinical research: the NIH Fogarty International Clinical Scholars and Fellows Program. *Am J Trop Med Hyg* 85: 971–978.
16. Vermund SH, Sahasrabudhe VV, Khedkar S, Jia Y, Etherington C, Vergara A, 2008. Building global health through a center-without-walls: the Vanderbilt Institute for Global Health. *Acad Med* 83: 154–164.
17. Heimbürger DC, Warner TL, Carothers CL, Blevins M, Thomas Y, Gardner P, Primack A, Vermund SH, 2013. Recruiting trainees for a global health research workforce: the NIH Fogarty International Clinical Research Scholars Program selection process. *Am J Trop Med Hyg* 89: 281–287.
18. Centers for Disease Control and Prevention, 2012. *CDC Health Information for International Travel 2012*. New York, NY: Oxford University Press.
19. Franco-Paredes C, Santos-Preciado JI, 2006. Problem pathogens: prevention of malaria in travellers. *Lancet Infect Dis* 6: 139–149.
20. Tyagi S, Corbett S, Welfare M, 2006. Safety on elective: a survey on safety advice and adverse events during electives. *Clin Med* 6: 154–156.
21. Philipp R, Webber S, Butler AV, Macara AW, 1985. Student health during overseas electives. *J R Coll Gen Pract* 35: 80–83.
22. Goldsmid JM, Bettiol SS, Sharples N, 2003. A preliminary study on travel health issues of medical students undertaking electives. *J Travel Med* 10: 160–163.
23. Steiner BD, Carlough M, Dent G, Pena R, Morgan D, 2010. International crises and global health electives: lessons for faculty and institutions. *Acad Med* 85: 1560–1563.
24. Scarlett HP, Nisbett RA, Stoler J, Bain BC, Bhatta MP, Castle T, Harbertson J, Brodine SK, Vermund SH, 2011. South-to-north, cross-disciplinary training in global health practice: ten years of lessons learned from an infectious disease field course in Jamaica. *Am J Trop Med Hyg* 85: 397–404.
25. Drain PK, Holmes KK, Skeff KM, Hall TL, Gardner P, 2009. Global health training and international clinical rotations during residency: current status, needs, and opportunities. *Acad Med* 84: 320–325.
26. Bryant JH, Vejli A, 2011. Global health and the role of universities in the twenty-first century. *Infect Dis Clin North Am* 25: 311–321.
27. Hirsch DA, Ogur B, Thibault GE, Cox M, 2007. “Continuity” as an organizing principle for clinical education reform. *N Engl J Med* 356: 858–866.
28. Budderberg-Fischer B, Herta K, 2006. Formal mentoring programmes for medical students—a review of the Medline literature. *Med Teach* 28: 248–257.
29. Global Health Program for Fellows and Scholars, 2013. Available at: <http://www.fic.nih.gov/Programs/Pages/scholars-fellows-global-health.aspx>. Accessed May 8, 2013.