

# Pediatric Emergency Care

## A Novel Approach to Combining Pediatric Emergency Medicine and Global Health Fellowships

--Manuscript Draft--

<b>Manuscript Number:</b>	
<b>Full Title:</b>	A Novel Approach to Combining Pediatric Emergency Medicine and Global Health Fellowships
<b>Article Type:</b>	Original Research Article
<b>Keywords:</b>	Pediatric Emergency Medicine; global health; fellowship training
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<b>Abstract:</b>	<p><b>Objectives:</b> To describe the creation of the first known combined Pediatric Emergency Medicine - Global Health (PEM-GH) fellowship for graduates of pediatric or emergency medicine residency programs.</p> <p><b>Methods:</b> We detail the necessary infrastructure for a successful combined PEM-GH fellowship including goals, objectives, curriculum, timeline, and funding. The fellowship is jointly supported by the department of pediatrics, section of PEM, and the hospital. Fellows complete all requirements for the PEM fellowship and GH, the latter requiring an additional 12 months of training. Components of the GH fellowship include international fieldwork, scholarly activity abroad, advanced degree coursework, disaster training, and didactic curricula.</p> <p><b>Results:</b> Since 2005, 9 fellows (8 pediatric-trained and 1 EM-trained) have completed or are enrolled in the PEM-GH fellowship; 3 have graduated. All fellows have completed or are working toward advanced degrees and have or will participate in the disaster management course. Fellows have had 7 presentations at national or international meetings and have published 6 articles in peer-reviewed journals. Of the three graduates, all are working in academic PEM-GH programs and work internationally in Africa and/or Latin America.</p> <p><b>Conclusions:</b> Our response to a global trend toward improvement in PEM care was the development of the first combined PEM-GH fellowship program. Recognizing the value</p>

of this program within our own institution, we now offer it as a model for building such programs in the future. This fellowship program promises to be a paradigm that can be used nationally and internationally, and it establishes a foundation for a full-fledged accredited and certified subspecialty.

**A Novel Approach to Combining Pediatric Emergency Medicine and Global Health  
Fellowships**

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**Sources of support:** N/A

**Conflicts of Interest and Source of Funding:** None declared

## ABSTRACT

**Objectives:** To describe the creation of the first known combined Pediatric Emergency Medicine - Global Health (PEM-GH) fellowship for graduates of pediatric or emergency medicine residency programs.

**Methods:** We detail the necessary infrastructure for a successful combined PEM-GH fellowship including goals, objectives, curriculum, timeline, and funding. The fellowship is jointly supported by the department of pediatrics, section of PEM, and the hospital. Fellows complete all requirements for the PEM fellowship and GH, the latter requiring an additional 12 months of training. Components of the GH fellowship include international fieldwork, scholarly activity abroad, advanced degree coursework, disaster training, and didactic curricula.

**Results:** Since 2005, 9 fellows (8 pediatric-trained and 1 EM-trained) have completed or are enrolled in the PEM-GH fellowship; 3 have graduated. All fellows have completed or are working toward advanced degrees and have or will participate in the disaster management course. Fellows have had 7 presentations at national or international meetings and have published 6 articles in peer-reviewed journals. Of the three graduates, all are working in academic PEM-GH programs and work internationally in Africa and/or Latin America.

**Conclusions:** Our response to a global trend toward improvement in PEM care was the development of the first combined PEM-GH fellowship program. Recognizing the value of this program within our own institution, we now offer it as a model for building such programs in the future. This fellowship program promises to be a paradigm that can be used nationally and internationally, and it establishes a foundation for a full-fledged accredited and certified subspecialty.

**Key words:** pediatric emergency medicine; global health; fellowship training

## INTRODUCTION

Awareness of global health (GH) disparities among emergency care settings with various levels of medical resources has increased significantly in recent years. In response to these growing needs, a newer subspecialty, International Emergency Medicine (IEM) developed.<sup>1,2</sup> This specialty focuses upon general clinical emergency care (across the resource availability spectrum), disaster medicine, EM specialty field development, research, program management, and travel medicine.<sup>3</sup> Interest in developing IEM fellowships to train academic emergency physicians began in 1994.<sup>1</sup> With components of fellowship training outlined,<sup>4</sup> the number of fellowships has increased almost 5-fold from eight programs in 2005 to 39 in 2012.<sup>5</sup> However, most IEM training has been targeted for adult EM providers.

Pediatric emergency medicine (PEM) was first described as a subspecialty in the early 1980s,<sup>6</sup> and PEM activities have improved the morbidity and mortality rates in both developed<sup>7</sup> and developing<sup>8</sup> countries. In the latter, where expertise and resources in PEM can be severely constrained, the potential for pediatric IEM development to improve local patient outcomes is great.<sup>9,10</sup> Given that 90% of the world's children are born in developing countries,<sup>11</sup> and that under-5 mortality rates may be as high as 180 deaths per 1000 children in countries like Somalia (versus 5 per 1000 in the United Kingdom),<sup>12</sup> a pressing need exists for improved emergency health services for this vulnerable population. Unfortunately, the significant declines in childhood mortality rates have plateaued recently.<sup>13</sup> However, the causes of death in most of the approximately 10 million children who die each year<sup>14</sup> are curable with acute PEM interventions.

The number of PEM fellowship training opportunities, especially in the United States, has increased during the last few decades, as has the number of PEM training fellowship programs in countries outside the US, demonstrating a global trend towards improvement in PEM care.<sup>15</sup>

However, despite the growing interest in pediatric GH, few formal training programs currently provide the mentorship needed to develop requisite skills for effective leaders in the field,<sup>16</sup> and those that exist are designed for advanced training in General Pediatrics. Our response to the need for advanced training in GH for PEM physicians led to the development of the first combined Pediatric Emergency Medicine – Global Health (PEM-GH) fellowship program in 2005. We describe the creation and outcomes of this first combined subspecialty training program, including its goals, objectives, curriculum, timeline, and funding mechanisms, and offer it as a model for building future programs.

## **METHODS**

### **Inception**

The PEM fellowship at Baylor College of Medicine (BCM) and Texas Children's Hospital (TCH) was founded in 1992 and has graduated seventy-one fellows. In the last decade, there has been increasing interest in GH among our PEM applicants, reflecting a national trend.<sup>17</sup> To address this increasing interest, we used curriculum models developed by successful adult IEM fellowships as a starting point to create a combined PEM-GH fellowship pilot program.<sup>4,18</sup> The program was supported by the Department of Pediatrics the Section of PEM, and the hospital.

Several factors worked to our advantage: the timing of our initial efforts coincided with rapid growth in GH programs within the department; the Baylor International Pediatric AIDS Initiative (BIPAI) had already established successful partnerships and clinical operations in Romania and countries throughout Africa;<sup>19</sup> and the hospital had long-standing relationships in Latin America that were broadening to include collaborations with the World Health Organization (WHO). This critical expanse in interest and expertise in GH provided unique support for our curriculum and

advantages for our initial combined fellows to experience mentoring and robust opportunities abroad.

## **The PEM-GH Fellowship Program**

### ***Timeline***

The PEM-GH Fellowship at BCM, in collaboration with TCH, is a 3- to 4-year program for general EM and pediatric residency-trained fellows, respectively. In addition to completing the GH curriculum, the fellow fulfills all American Board of Pediatrics (ABP) requirements for PEM fellowship. The timeline for the combined PEM-GH fellowship parallels that of the standard PEM fellowship with regard to clinical and didactic curricula, with the addition of interspersed blocks of time for off-site, international GH training. The combined PEM-GH fellowship includes spending approximately 4 to 6 months abroad, divided into 2- to 8-week blocks distributed throughout the fellowship. The fellowship duration is one year longer than standard PEM fellowship, and this additional time is essential to allow for fieldwork, complete coursework for advance degrees, and to complete the GH-related scholarly project. However, because 4 years is not a standard length of time for an ABP fellowship (which currently does not have certification in GH), certain accommodations must be made to fund the additional training time.

### ***Funding***

From a financial perspective, academic institutions have difficulty justifying the development of a formal training program in GH because little to no revenue is generated for the host institution by clinical work conducted outside the country. In contrast, nonprofit organizations often allow the mission to supersede fiscal responsibility, or margin. Both the mission and the margin can be managed, but doing so requires collaboration between the clinician and the administrator.

Developing sustainable funding has been challenging, and our financial support to date has come from the department of pediatrics and the hospital. Funding for general IEM fellowship positions historically has included a combination of institutional support, project-specific grants, and revenue from clinical billing.<sup>4,20</sup> Once general IEM fellows have completed their training in EM, they can generate clinical revenue as faculty in the Emergency Department (ED). They typically work reduced clinical hours at lower salaries to fund their GH activities and further training. PEM fellows, however, are trainees in the ED environment and, as part of an Accreditation Council for Graduate Medical Education (ACGME)-approved fellowship, may not bill for clinical services they provide during training-required clinical hours.

In order to create a sustainable funding process for fellows in the combined PEM-GH program, we altered the general IEM fellowship funding model. After several iterations, the department ultimately agreed to cover required travel and curricular components, including advanced degrees for the GH fellowship, as long as expenses met departmental cost constraints. To fund the necessary fourth year of training, the GH fellows are appointed clinical instructors (with salary and benefits) within our section for 12 months. During this time, their clinical hours are reduced by 25% compared to those of faculty appointed as full-time assistant professors. This reduction in clinical hours, accompanied by an equivalent reduction in these instructors' salaries, allows the fellow time to complete requirements for the GH portion of their training (i.e., advanced degrees). The benefit is mutual. The section receives additions to the workforce and revenue from billing, while the fellow, having completed the PEM portion of his or her fellowship, completes GH training at a more competitive salary and with academic, clinical, and financial benefits as BCM faculty. Fellows are encouraged to identify funding sources for GH initiatives and projects, as any funding received decreases the institution's financial burden.

### ***Monitoring, Evaluation and Accreditation***



Each PEM-GH fellow chooses a faculty advisor from within the PEM section. In addition, the fellow invites faculty members (often from other sections in the department or from other departments) to participate on his or her scholarship oversight committee (SOC). Monitoring and evaluation of the fellow's clinical and academic progress follows the processes established by the PEM fellowship, an ACGME-accredited training program. Fellows in the combined PEM-GH program complete the same PEM fellowship-training requirements met by non-GH fellows and are, therefore, eligible to take the PEM subspecialty certification exams at the completion of their fellowship. Currently, no national level accreditation exists for IEM and pediatric GH fellowships. For our program, we defined criteria that constitute sufficient training to earn institutional certification of combined PEM-GH fellowship completion. These GH-specific requirements are described in the following section. As part of their individualized learning plans, fellows have opportunities to obtain advanced degrees (e.g. Diploma in Tropical Medicine and Hygiene, Master of Public Health, Master of Education, or Master of Health Administration).

Monitoring and evaluation of the PEM-GH fellowship are consistent with those of the traditional PEM fellowship, including an annual anonymous written program evaluation by combined fellows as well as semi-annual group reviews of the fellowship with the PEM and GH program directors.

## **Curriculum**

The goals and objectives for the GH component of the combined PEM-GH fellowship are summarized in Table 1. They were adapted from those described for general IEM fellowships<sup>4,15,18,21</sup> and incorporate the core competencies required by the ACGME for PEM fellowship training programs, as well as those curricular competencies recommended for training in IEM and pediatric GH fellowships.<sup>13,22</sup> Key GH activities include a combination of

formal and informal coursework, international fieldwork, and academic research. Required training components for the PEM-GH fellowship have been revised and restructured based on feedback from fellows since 2005. Currently, fellows may choose one of three curriculum pathways, depending on individual career goals (Figure 1).

### ***Coursework***

Advanced coursework is required in order to develop fundamental knowledge in global public health and/or tropical medicine. We generally recommend a Master of Public Health (MPH) diploma program or a Public Health Certificate, but another advanced degree may be approved if the fellow identifies advanced coursework that will enhance skills beneficial to his/her proposed career path. A Diploma in Tropical Medicine and Hygiene (DTMH) can be completed at the National School of Tropical Medicine at BCM or at the Gorgas Course in Peru. Formal training in disaster management is required. Currently, all fellows attend the Health Emergencies in Large Populations (HELP) Course, a 3-week public health module in humanitarian response co-sponsored by the World Health Organization (WHO) and International Committee of the Red Cross (ICRC) that can be completed in Baltimore, MD, or Geneva, Switzerland.

Formal coursework is supplemented with lectures and journal clubs that are available throughout the GH community at the hospital and medical school. Based on feedback from fellows requesting the need for a structured didactic GH curriculum, we developed a collaborative monthly seminar called Foundations in Global Health for professionals who are actively involved in GH work. The 18-month cycling curriculum is small-group, discussion-based and provides both a didactic curriculum to expand contextual knowledge on major GH challenges and constructive feedback for research-oriented projects. Additionally, all fellows in the PEM-GH combined program are required to attend a quarterly Global Health Journal Club,

which was created by the department of pediatrics for faculty, fellows, and residents conducting GH work. They also have the opportunity to attend and deliver topic lectures on GH throughout the hospital and medical school.

### ***Fieldwork***

The program recommends and supports a range of international experiences during fellowship. As described above, fellows in the combined PEM-GH program spend approximately 4 to 6 months abroad, divided into blocks distributed throughout the PEM fellowship. Through field experience conducting clinical work abroad and partnering with local stakeholders, fellows gain experience navigating the complexities associated with working in the GH setting. Key components of these rotations include participating in delivery of care to patients in resource-limited settings, teaching local health care providers, collaborating with local partners, and identifying health needs specific to the chosen international site. This fieldwork traditionally serves as a foundation for the fellows' needs-based projects and ultimately shapes the research components in which they are engaged, and for which they are encouraged. We offer training opportunities in travel medicine, disaster response, refugee medicine, public health, human rights, PEM program development (including both curriculum and systems development), quality improvement, and EM provider training in both developed and developing countries.

Our approach to identifying opportunities abroad for PEM-GH fellows is anchored by our commitment to develop meaningful, bi-directional relationships with local partners that produce measurable improvements in health care in their communities and ours.<sup>23</sup> Faculty within our section and the department have mature partnerships with collaborators in Africa and Latin America that have provided field opportunities for some of our fellows. Others had established similar relationships of their own prior to entering the fellowship program and have continued to work at those sites.<sup>24</sup> During their time abroad, fellows receive on-site supervision from local

experts and have regular contact with their US-based faculty advisor(s). In order to document cumulative field experience more precisely, we developed a template trip report that fellows complete at the end of each trip abroad. By the end of the fellowship, each one has a portfolio describing her/his fieldwork.

### ***Research***

Fellows in the combined PEM – GH fellowship develop skills and experience in designing and conducting research in the field of global PEM. Projects are needs-based and conducted through partnerships between BCM and local institutions. Fellows may join ongoing faculty research projects or develop and implement individual projects in their areas of interest, mentored by both US-based and international on-site healthcare providers. Fellows have access to faculty mentors and advisors, research support, and training resources throughout the medical school and affiliated institutions. Research support includes a structured quarterly meeting with research-track faculty advisors who offer methodological design, guidance, analysis and statistical support, and feedback on scholarly products such as abstracts, grants, and manuscripts. Fellows are expected to submit updated written protocols or manuscript documents prior to each quarterly session in preparation for formal discussion. Fellows' projects in the GH arena fulfill their PEM fellowship and ABP requirements for scholarly activity.

### **RESULTS**

Since 2005, nine fellows (8 pediatric-trained and 1 EM-trained) have completed or are enrolled in the PEM-GH fellowship and 3 have graduated (Table 2). From 2009-2011, we matriculated one PEM-GH fellow per fellowship class, and in the class that entered the fellowship 2012-2013, three were combined PEM-GH fellows. Since the inception of the combined fellowship,

the number of applicants applying for PEM fellowship or faculty positions who are also interested in GH has increased steadily. All combined fellows had prior international medical experience. One fellow had already completed his MPH prior to starting fellowship, but of the remaining fellows, the majority (6/8) has chosen to complete a master's degree (in public health, education, or health administration) during their fellowships, and all have completed advanced coursework of some kind, including tropical medicine and/or disaster medicine training. Over the last 5 years, fellows have co-authored six papers in peer-reviewed journals and presented their global research seven times at national or international meetings. In addition, three fellows have received competitively-awarded grant funding. All graduates (3/3, 100%) are ABP PEM sub board certified or eligible and are working in academic PEM-GH programs and work internationally in Africa and Latin America.

## **DISCUSSION**

The Pediatric Emergency Medicine - Global Health (PEM-GH) Fellowship at BCM/TCH has grown rapidly since its inception in 2005. What began as an experimental collaboration among a PEM fellow, a fellowship director, and a section head is now a structured program that has supported nine fellows. Largely through trial and error, we have been able to adapt the excellent work of our adult EM colleagues to create a program compatible with our resources and constraints. The success of our pilot program has generated increased interest in our PEM fellowship program among highly qualified fellowship applicants, and additionally, the program has had a positive effect on PEM faculty recruitment, mentorship, and retention. Key elements for our success include the consistent, thoughtful support of our section head and department chair; a strong and coordinated relationship with the leadership of our PEM fellowship program; and the growing expertise in GH throughout BCM and TCH.

Our greatest challenge to date has been to create a successful mission-driven yet financially sustainable GH fellowship in an era in which most academic institutions are experiencing reductions in grant funding, third-party reimbursement, and operating margins. In our case, fellows were not always able to secure the initial funding that they needed for travel and advanced degrees through grants alone. The new funding scheme described above resulted from collaboration among administrators and academicians in an effort to deliver on the departmental mission within the institution's margin. The program continues to grow because of philosophical and sustainable financial commitments and in-kind support from the department and hospital

Moving forward, we must maintain our relationships abroad and develop new opportunities for faculty and fellows. Our fellowship has grown rapidly, and we run the risk of outstripping our US-based resources including available mentors. The strength and sustainability of the PEM-GH fellowship depends on the success of our local partnerships. Significant faculty investment is required to develop and maintain these essential relationships. While these efforts benefit faculty as well as fellows, they require substantial resources in time and money, presenting a challenge to our relatively junior faculty. Additional priorities for our partnerships abroad include expanding bi-directional educational opportunities and developing collaborations with other PEM-GH programs. The strong relationships that we have developed within the department of pediatrics, the section of pediatric emergency medicine, hospital administration, and our partners abroad are the foundation for our past and future successes.

With the increased awareness of the GH disparities that exist between developed and developing countries, the need to train specialists to work in collaborative efforts abroad to meet the health needs in those countries and to train local healthcare providers has opened a new frontier in pediatric medicine. Our successful development of a combined PEM-GH fellowship program has great potential for providing both a framework for other institutions both nationally

and abroad and a platform for expanding the ever-increasing need to develop pediatric medical professionals who have the desire to train and work in developing countries. Additionally, the program establishes a foundation for a full-fledged accredited and certified subspecialty. We are grateful for the opportunity to contribute to this emerging and essential facet of pediatric care.

## **ACKNOWLEDGEMENTS**

We would like to thank the following people for their interminable support of the program and assistance with this manuscript: Mark W. Kline, MD, William Jones Jr., BBA, and Michael T. Walsh Jr., MHA. Additionally we would like to thank B. Lee Ligon, PhD, and Andrea Cruz, MD, MPH for their editorial assistance.

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<b>Table 1. Combined Pediatric Emergency Medicine – Global Health (PEM – GH) Fellowship Goals/Objectives</b>		
<b>GOALS</b>		
<b>Assess</b> global health systems to identify pertinent pediatric and/or emergency health issues and gaps in delivering high quality care		
<b>Design</b> sustainable, effective, culturally acceptable pediatric and/or emergency health programs that address collaboratively identified needs		
<b>Implement</b> pediatric and/or emergency medicine global health programs abroad and integrate them into existing health systems		
<b>Evaluate</b> the quality and defining structural, process and outcomes metrics for the global health programs implemented		
<b>OBJECTIVES</b>	<b>ACGME Competencies</b>	<b>Curriculum Components</b>
Participate actively in international field projects that incorporate the Accreditation Council of Graduate Medical Education (ACGME) core competencies	Patient care Medical knowledge Practice-based learning and improvement Systems-based practice Interpersonal and communication skills Professionalism	International Fieldwork Rotation Academic research conducted abroad
Develop fundamental knowledge in global public health, tropical medicine, and/or disaster medicine	Medical knowledge Practice-based learning and improvement Systems-based practice	Master of Public Health (MPH) Public Health Certificate Diploma in Tropical Medicine and Hygiene (DTMH) Health Emergencies in Large Populations (HELP) Course Foundations in Global Health (FIGH) didactic curricular series
Conduct research and/or scholarly activity in pediatric emergency medicine	Practice-based learning and improvement Systems-based practice Professionalism	Academic research conducted abroad Mentorship at Baylor College of Medicine (BCM) and Texas Children’s Hospital (TCH)
Obtain a working knowledge of university, governmental and non-governmental global health organizations	Systems-based practice	International Fieldwork Rotation MPH Public Health Certificate HELP Course
Gain knowledge regarding development, funding, and sustainability of international programs	Systems-based practice	International Fieldwork Rotation Academic research conducted abroad MPH Public Health Certificate Mentorship at BCM and TCH
Begin networking necessary for a successful career in global health through mentoring and partnership development	Interpersonal and communication skills, professionalism	International Fieldwork Rotation Academic research conducted abroad FIGH didactic curricular series Global Health Journal Club Other formal lectures at BCM and TCH Mentorship at BCM and TCH

Figure.

Proposed curriculum pathways for the  
Combined Pediatric Emergency Medicine – Global Health (PEM – GH) Fellowship

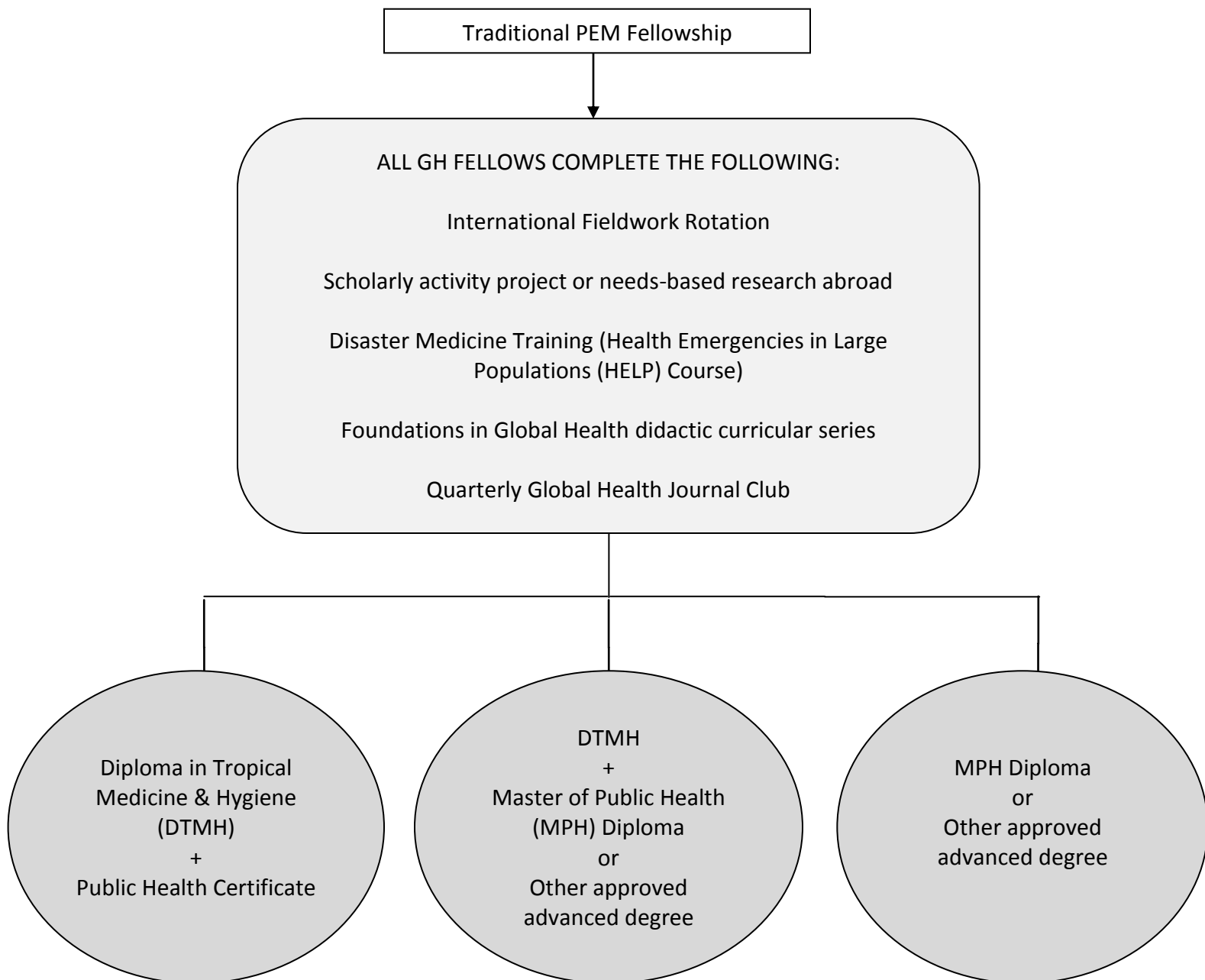


Table 2. Combined Pediatric Emergency Medicine – Global Health (PEM – GH) Fellow Accomplishments				
FELLOW	DATES	ADVANCED DEGREES/COURSEWORK (Completed or in progress)	IN-COUNTRY WORK DURING FELLOWSHIP	PROJECT AREA
#1	2005 - 2009	DTMH, Gorgas Course Peru HELP Course	<ul style="list-style-type: none"> <li>• Dominican Republic</li> <li>• Kenya</li> <li>• Lesotho</li> <li>• Malawi</li> <li>• Swaziland</li> <li>• Botswana</li> </ul>	<ul style="list-style-type: none"> <li>• Curriculum development and trainings</li> <li>• Program development and community outreach</li> <li>• Emergency Department (ED) process and improvement</li> <li>• Local systems development and quality improvement</li> </ul>
#2	2009 - 2012	MPH, University of Texas HELP Course	<ul style="list-style-type: none"> <li>• Botswana</li> </ul>	<ul style="list-style-type: none"> <li>• Task-shifting in resource-limited settings</li> <li>• ED process and improvement</li> <li>• Disease-specific interventions</li> </ul>
#3	2010 - 2013	Public Health Certificate, University of Texas HELP Course	<ul style="list-style-type: none"> <li>• Guatemala</li> </ul>	<ul style="list-style-type: none"> <li>• Local systems development and quality improvement</li> </ul>
#4	2011 - 2015	MEd, University of Houston DTMH, Baylor College of Medicine HELP Course	<ul style="list-style-type: none"> <li>• Ghana</li> <li>• Rwanda</li> </ul>	<ul style="list-style-type: none"> <li>• Curriculum development and trainings</li> <li>• Educational interventions</li> </ul>
#5	2012 - 2015	(Completed MPH prior to fellowship) DTMH, Gorgas Course Peru HELP Course	<ul style="list-style-type: none"> <li>• India</li> </ul>	<ul style="list-style-type: none"> <li>• Educational interventions</li> <li>• ED process and improvement</li> </ul>
#6	2012 - 2016	MPH, Johns Hopkins University DTMH, Baylor College of Medicine HELP Course	<ul style="list-style-type: none"> <li>• Uganda</li> </ul>	<ul style="list-style-type: none"> <li>• Program development and community outreach</li> </ul>
#7	2012 - 2016	MEd, University of Texas DTMH, Baylor College of Medicine HELP Course	<ul style="list-style-type: none"> <li>• Tanzania</li> <li>• Haiti</li> </ul>	<ul style="list-style-type: none"> <li>• Curriculum development and trainings</li> <li>• Educational interventions</li> </ul>
#8	2013 - 2017	MPH, University of Texas DTMH, Baylor College of Medicine HELP Course	<ul style="list-style-type: none"> <li>• El Salvador</li> </ul>	<ul style="list-style-type: none"> <li>• Curriculum development and trainings</li> <li>• ED process and improvement</li> </ul>
#9	2013 – 2016*	MHA, site to be determined DTMH, Baylor College of Medicine HELP Course	<ul style="list-style-type: none"> <li>• Trinidad &amp; Tobago</li> <li>• Barbados</li> </ul>	<ul style="list-style-type: none"> <li>• Curriculum development and trainings</li> <li>• ED process and improvement</li> </ul>

\*: Emergency Medicine residency graduate

DTMH: Diploma in Tropical Medicine and Hygiene; HELP Course: Health Emergencies in Large Populations; MEd: Master of Education; MPH: Master of Public Health; MHA: Master of Health Administration

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